### 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.

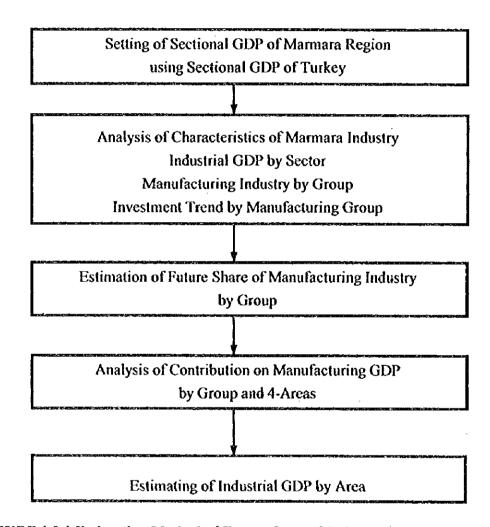


FIGURE 1.3.1 Estimation Method of Future State of Industry in Marmara Region

#### (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	(	ЭR	(	JR	
Yurkey	:								-
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
Marmara									
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
Turkey	······································	***********	***********		
GDP	100%	100%	100%	100%	100%
Agriculture	15%	13%	12%	10%	8%
Industry	27%	28%	29%	30%	32%
Service	58%	Б9%	59%	60%	60%
Jarmara -					
GDP	100%	100%	100%	100%	100%
Agriculture	6%	5%	1%	3%	3%
Industry	37%	38%	39%	41%	42%
Service	57%	67%	67%	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

Value         Zalie         Zalie <th< th=""><th></th><th>1987</th><th>1988</th><th>1989</th><th>1990</th><th>1661</th><th>1992</th><th>1993</th><th>1994</th><th></th></th<>		1987	1988	1989	1990	1661	1992	1993	1994	
RA REGION         coo ood TL         000 000		Value								
RA REGION         2 078 254         2 344 182         2 530 464         2 316 002         2 219 970 <t< th=""><th></th><th>000 000 TL</th><th>:</th><th></th><th>300 000 TL</th><th>000 000 TL</th><th></th><th>000 000 TL</th><th>000 000 TL</th><th></th></t<>		000 000 TL	:		300 000 TL	000 000 TL		000 000 TL	000 000 TL	
e         2 078 254         2 344 182         2 530 464         2 316 002         2 219 970         2 219 970           and quarrying         181 065         195 945         2 10 111         189 111         168 864         1114 378         115 34           cturing         8 747 869         8 798 442         9 040 904         10 049 536         10 356 028         111 114 378         115 114 378         115 114 378         115 86 028         111 114 378         115 86 028         111 114 378         115 86 028         111 114 378         115 86 028         111 114 378         115 86 028         111 114 378         115 86 028         111 114 378         118 81 114 378         118 81 114 378         118 81 114 378         118 81 114 378         118 81 114 378         118 81 114 378         118 81 114 378         118 81 114 378         118 81 114 378         118 81 114 378         118 81 114 378         118 81 114 378         118 81 114 378         118 81 35 58         118 81 35 58         118 81 35 58         118 81 35 58         118 81 35 58         118 81 35 58         118 81 35 58         118 81 35 58         118 81 35 58         118 81 35 58         118 81 35 58         118 81 35 58         118 81 35 58         118 81 35 58         118 81 35 58         118 81 35 58         118 81 35 58         118 81 35 58         118 38 35 58         118 38 35 58	MARMARA REGION									
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and quarrying 181 065 195 945 210 111 189 111 168 864 112	2.Industry	9 228 344	9 305 373	9 745 594	10 774 188	_	11 997 946	13 213 895	12 068 141	
teturing 8 747 869 8 798 442 9 040 904 10 049 536 10 356 028 111	Mining and quarrying	181 065	195 945	210 111	189 111	168 864	174 212	196 221	173 623	
ity, gas, water 299 410 310 987 494 578 535 541 589 486 18 20 403 59 15 044 380 15 246 056 16 878 650 17 143 688 183 26 346 957 26 704 380 27 522 113 29 968 840 30 478 035 32 32 32 32 32 32 32 32 32 32 32 32 32	Manufacturing	8 747 869	\$ 798 442	9 040 904	10 049 536	_	11 226 627	12 404 699	11 232 946	
15 040 359 15 045 825 15 246 056 16 878 650 17 143 688 183 26 346 957 26 704 380 27 522 113 29 968 840 30 478 035 32 183  The standard sta	Electricity, gas, water	299 410	310 987	494 578	535 541		597 107	612 974	661 573	
Share Share Share Share Share Share 7.7% 7.3% and quarrying 2.0% 2.1% 5.1% 5.2% 5.2% 5.3% 5.3% 5.1% 5.1% 5.1% 5.1% 5.3% 5.3% 5.1% 5.1% 5.1% 5.1% 5.3% 56.2% 56.2%	3.Service	15 040 359	15 054 825	15 246 056	16 878 650		18 205 722	20.310 159	18 302 128	
Share Share Share Share 7.7% 7.3% 7.3% 7.3% 35.0% 34.8% 35.4% 36.0% 36.5% 36.5% and quarrying 2.0% 2.1% 2.2% 1.8% 1.5% ceturing 94.6% 92.8% 93.3% 53.8% 55.2% 55.2% 56.2%	4.GDP	26 346 957	26 704 380	27 522 113	29 968 840		32 500 112	35 682 707	32 534 142	:
Share Share Share Share Share Share Share 7.3% 7.3% 7.3% 35.0% 34.8% 35.4% 36.0% 36.5% 1.5% 21.0% 2.1% 2.2% 1.8% 15.5% 15.5% 34.8% 94.6% 92.8% 93.3% 93.2% 55.1% 55.1% 56.3% 56.2%	-							-		. •
re 7.9% 8.8% 9.2% 7.7% 7.3% 35.0% 34.8% 35.4% 36.0% 36.5% 36.5% and quarrying 2.0% 2.1% 2.2% 1.8% 1.5% 1.5% 94.6% 92.8% 93.3% 93.2% iity, gas, water 3.2% 3.3% 5.1% 5.0% 5.3% 56.2%		Share	Share	Share	Share .	Share	Share	Share	Share	Avarege
35.0% 34.8% 35.4% 36.0% 36.5% and quarrying 2.0% 2.1% 2.2% 1.8% 1.5% 1.5% ccturing 94.8% 94.6% 92.8% 93.3% 93.2% 3.2% 3.3% 5.1% 5.0% 5.3% 56.2%	1. Agnoulture	7.9%		9.2%	7.7%		7.1%	%0.9	6.7%	7.6%
ag and quarrying 2.0% 2.1% 2.2% 1.8% 1.5% 1.5% 1.5% 1.5% 1.5% 1.5% 1.5% 1.5	2.1ndustry	35.0%	34.8%	35.4%	36.0%		36.9%	37.0%	37.1%	36.1%
ifacturing 94.8% 94.6% 92.8% 93.2% 93.2% ricity, gas, water 3.2% 5.1% 5.0% 5.3% 57.1% 56.4% 55.4% 56.3% 56.2%	Mining and quarrying	2.0%			1 8%		1.5%	1.5%	1.4%	1.7%
ricity, gas, water 3.2% 3.3% 5.1% 5.0% 5.3% 5.1% 56.4% 55.4% 56.3% 56.2%	Manufacturing	94.8%		92.8%	93.3%		93.6%	93.9%	93.1%	93.6%
57.1% 56.4% 55.4% 56.3% 56.2%	Electricity, gas, water	3.2%		5.1%	5.0%		5.0%	4.6%	5.5%	4.6%
	3.Service	57.1%	-	\$5.4%	\$6.3%		\$6.0%	\$6.9%	\$6.3%	56.3%
100.0% 100.0%	4.GDP	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Mining, Manufucturing 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
	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	19.34	22.61	18.19	22.61	18.82
Wood .	0.33	0.35	0.51	0.34	0.45	0.29	0.40	0.54	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	4.15	3.72	3.43
Metal	7.02	5.95	6.21	6.63	8.27	6.95	5.12	5.60	1.88
Machine	23.80	22.93	27.57	26.62	25.15	31.97	27.37	33.81	30.62
Other	0.49	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	Share by	
	Domestic Investment.	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.

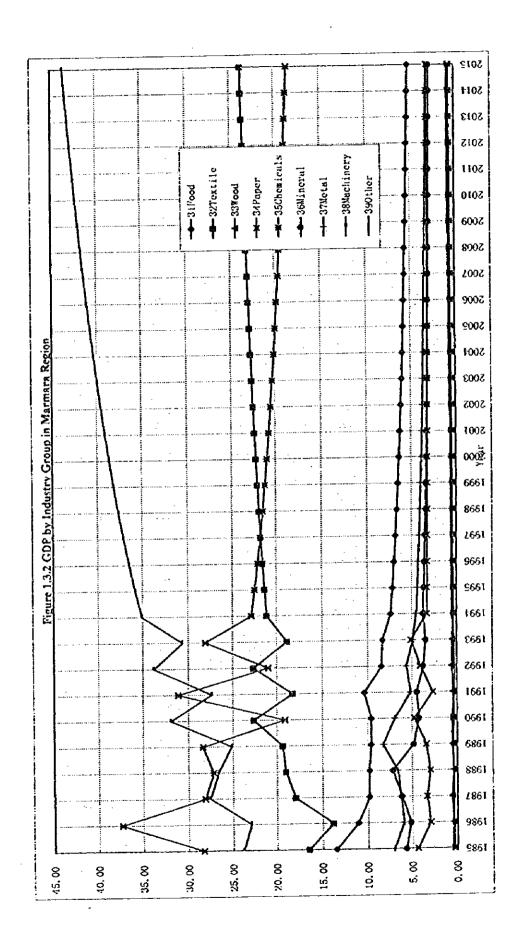


TABLE 1.3.6 Share of Manufacturing Group by Area

			0005	2015
Thrace	1991	1995	2005	2015
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%
31 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%
	9.38%	12.48%	14.08%	14.93%
38 Machinery		0.43%	0.60%	0.69%
39 Other	0.23%			43.93%
Total	41.51%	43.18%	43.66%	43.7370
<b>Ezwit</b>	1991	1995	2005	2015
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%
	16.89%	22.48%	25.36%	26.91%
38 Machinery		0.06%	0.08%	0.09%
39 Other	0.03%			52.98%
Total	54.13%	53.15%	53.07%	32,9070
				0015
Baliksir	1991	1995	2005	2015
31 Fóod	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 Wetal	0.00%	0.00%	0.00%	0.00%
38 Machinery	0.13%	0,19%	0.22%	0.24%
39 Other	9.00%	0.00%	0.00%	0.00%
Total	2.43%	2.03%	1.87%	1.78%
iotai	2.4370	2.0378	1,0170	1.7070
	1001	1005	2005	2015
Canakkale	1991	1995	2003 0.20%	0.18%
31 Food	0.32%	0.23%		
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%
Total	1.93%	1.63%	1.41%	1.30%
.0.44	1.73/4			

TABLE 1.3.7 Value Added of manufacturing Group by Area

1102317 2000	funit: Bril	lion II. in	1994 price)	
Thrace	1991	1995	2005	2015
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
Total	176,960	206,554	398,459	792,458
				-
Iznit	1991	1995	2005	2015
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
31 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
Total	230,721	254,196	484,309	955,603
			•	
Baliksir	1991	1995	2005	2015
31 Food	5,649	4,730	7,593	13,552
32 Textile	338	485	1,021	2,135
33 Wood	21	26	64	130
31 Paper	410	618	1,157	2,272
35 Chemicals	3,375	2,972	5,192	9,691
36 Wineral	0	0	0	0
37 Metal	0	0	0	0
38 Machinery	564	901	2,019	4,339
39 Other	0	0	0	0
Total	10,358	9,733	17,045	32,119
Canakkale	1991	1995	2005	2015
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	o	0	0	0
39 Other	o	0	0	0
Total	8,227	7,819	12,832	23,538

TABLE 1.3.8 Marmara Industry by Area

Value /	Added	(Billion TL	in 1994 pr	ices)
	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, 35 l	514, 304	981, 340	1, 939, 483
	Distributio	n 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 A	.rea (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

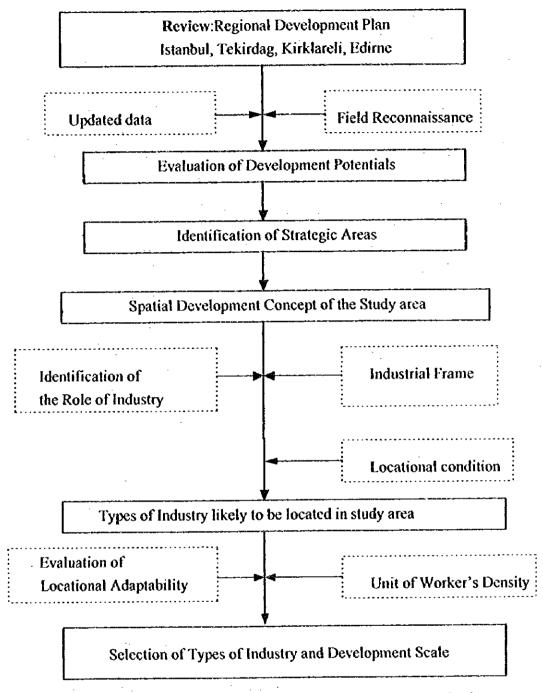


FIGURE 1.3.3 Selection of Industries and Development Scale

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

	Existin	ng			Future	Plan		
-	Area (ha)	Value-Ad	ded Emp (number				Value Added (bill.TL) (r	
Istanbul	240	9806	16564		800	32687	55215	
Tekirdag	440	17978	30368		2070	84578	142868	
Kirklareli		. <b>O</b> .	. 0	. 0		400	16344 2	7607
Edirne	0	0	0		295	12053	20360	:

TABLE 1.3.10 Industrial Outputs of Small Scale Industrial Estates

	Existi Area	ng Value-Add	ed Empl	loyee	Future	Plan	Area	Value Added
Employee	(ha)	(bill.TL)	(number)	F	• ,	(ha)	(bill.TL)	(number)
Istanbul	1066	1530	5330		151	217	755	
Tekirdag	1518	2178	7590		1042	1495	5210	
Kirklareli		402	577	2010		500	718	2500
Edirne	. 0	. 0	0		0	0		

**TABLE 1.3.11** Industrial Outputs of Free Zone

	Area		dded Employe (number)	e Area	Future Pl Value (ha)	Added	Employee (number)
Istanbul	11.4	6960	2850	0	0	0	
Tekirdag	0	0	2850 0	200	21275	18123	* :
Trade Area	F. 17			20	13920	5700	
Manufacturing	g Area				180	7355	12423
Kirklareli		0 .	0 1 2 0		: 0 -	0	1
Edirne	0	.0	· · · • • • • • • • • • • • • • • • • •	0	., u <b>Ģ</b> .	., <b>0</b> .,	

and the contract of the expectation of the expectat

10 1 Facility

Bridge Charles and Kristyker Charles

TABLE 1.3.12 Planned industry

The second se	Whole IDP	Planned	Share in	Contrib. to
·	(bill.TL)	(bill.TL)	region	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

		Thrace			Gline		-	Letterford - Eur	Topenn Side		Kirklaneli			Tokanana		
	Year	1661	2005	2015	1061	2005	2015	1661	2005	2016	1661	2005	2107	1061	2006	5100
	(soci	14.91%	7.95%	5. 99%	C. 37%	O. 8:3%	0. 76%	11. RIX	5. 5.3%	3.61%		0. A7%	(1.19.)	0.01%	0.77%	7000
를 당	11 i i i	28, 77%	31.61%	35, 50%	0. KUK	1.05%	#25 O	21 2 14	2.4. 7.5%	27 C		2 2 2		2 2		
· =	-				W 10		2	9	20.	×		2	4.1.7	× 5 5 7	2.5	10, 07%
-	 X	0.408	O. 183	0.48%	0.00%	× 0	200	0.25	56c	0		0.2%	0 22%	0.074	0.0	0.07%
<u> </u>	aper.	5, 75%	6,50%	6.283	0.00X	0, 03%	0.028	5, 66%	5, 90%	5.94%		0, 11%	0.10%	5	0.40%	20.7.00
3	Chemical	20, 75%	12, 76%	11.68%	0,00%	0.0%	0.0%	20.06%	816.11	10, 21%		504	1 20%		, i	20 C
∓ 2	ineral	2. 86%	1, XG\$	1. GG#	50.0	0.06%	20.0	212	200	0.074		2000		200		80° 'O
-	-								200	ē		100 TO	2 0	6.03%	<u>.</u>	C. 15%
₹ :	-	3. 5. 5.	7. 70%	2 X	0.00%	*/O C	8 0 0	3, 30%	× 0	. 6.1%		0.00%	0	0.0%	0,0XX	0.14%
≠ 35	web lucity	22, 58%	22, 25%	200 EE	C. CC3.	0.023	S 00.28	20, 13%	27. 95%	25, 48%		1. 1.5%	2.55%	2, 433%	ر این این	36.00
S S	ther.	0, 56%	K. 3.7%	5.7	0.00%	0.0%	0.0%	0.52%	1.22%	1. 22%	0,02%	0.06%	Š	0.0%	0.087	1 C
۲	olul	100,00%	100,00%	100,00%	1. 68%	2.05%	35°C	87, 29%	80, 50%	69, 48%		6,03%	10.11%	5.47%	11. 45%	200 X

#### 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).

International economic Turkey's economic situation (EU, EE, CIS) situation in 2005, 2015 in 2005, 2015 Scenarios as frame to estimate cargo volume (4 case) Calculation of trade value by world trade matrix according to the scenarios Forecast of World Cargo Volume Correlation analysis by region in 2005, 2015 with cargo volume and economic indicators Calculation of cargo volume Forecast of World Container related to Turkey's ports Throughput by region in 2005, 2015 Calculation of cargo volume of ports at Sea of Marmara Calculation of transit cargo (container) Macroscopic demand forecast of cargo volume of ports at the Sea of Marmara in 2005,2015

FIGURE 1.4.1 Flow Chart for Demand Forecast

TABLE 1.4.1 Framework of Scenario Making

	Trade with EU	Accelera	ated case	Lolv	case
	East Europe & CIS	High growth	Low growth case	High growth case	Low growth case
Turkish GDP	High growth	study			
	Medium growth	study	study .	. • ;. <sup>*</sup>	
	Low growth				study

Each key factor will be treated in depth later.

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# 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

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 Puture GDP Growth

<del></del>		1995	<u> </u>	2000		2015
•			1995-		2000-	
	Į l	. :	2000		2015	
High	rate		6.60		7.60	
	levei	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

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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 G	DP Gro	owth (2	%)		Note
İ	1990	1991	1992	1993	1994	1995	1996	1989=
						Estm.	Proj.	100
Eastern Europ	oe, the I	Baltic's	and th	e CIS				
	-5	-12	-10	-6	-7	-1	3	66
Eastern Euro	ope and	the Ba	ltic'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.

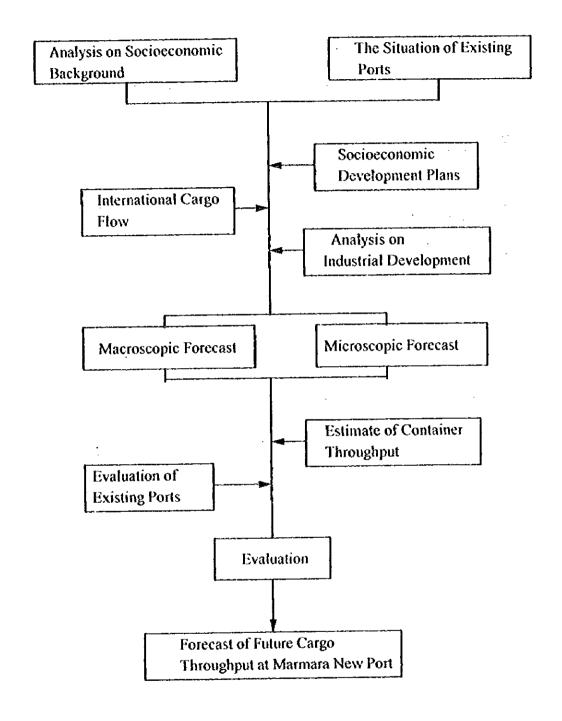
The former method forecasts the total cargo volume as a whole by statistical correlation between the cargo volume and socio-economic indices such as GDP(gross domestic products) of the hinterland of the port and/or population and the past time trend.

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



Total cargo of Turkey Except for crude oil Domestic cargo volume: Import cargo volume Export cargo volume except for crude oil except for crude oil except for ende oil Sum of Turkey cargo volume Creste oil volume Total cargo forecast volume of Turkey Total cargo volume of Marmara sea Public cargo of Marmara sea Public Export cargo Public Import cargo Public domestic cargo Dry bulk cargo volum Dry bulk cargo volume Dry bulk careo volume Liquid bulk cargo volume Liquid bulk cargo volume Liquid bulk cargo volume General cargo volume General cargo volume General cargo volume Containerization ratio Container cargo volume

FIGURE 2.1.2 Flowchart of Macroscopic Demand Forecast

#### 2.2 Hinterland

# 2.2.1 Cargo Movement to/from Marmara Sea Ports

At Haydarpasa 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 Mustafakemalpasa 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 Eskischir 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 is 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.

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 is 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 thruoghput 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.

Burney of the party of the control of the control of

#### 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.

But the state of the second of the second of the second

TABLE 2.2.1 Hinterland Share of Marmara Sea Ports by Province

Case 1 With Filyos Port

Port	Distance	1/Distance/Distance	istance/Distance   Berth Length (BL)	BL/d/d	Ratio	Share 8
	Ę	1/4/9	Ħ			%
	342	8.54964E-06	4.500	0.0385	0.425	42.5
	280	2.9726SE-06	2,500	0.0074	0.082	
-	482	4,30433E-06	- -	0.0099	0.109	-
Filyos	263	1.44573E-05		0.0347	0.383	
Totai			:	\$060.0		
Izmit	151	4.38577E-05	4,500	0.1974	0.603	60.3
	136	5.40657E-05	2,400	0.1298	0.397	
Total				0.3271		
	219	2.08503E-05	4,500	0.0938	0.827	82.7
	414	5.8344E-06	2,500	0.0146	0.129	
Mersin	672	2.21443E-06	·	0.0051	0.045	:
Total				0.1135		
Izmit	249	1.61288E-05	4.500	0.0726	0.725	72.5
	336	8.85771E-06		0.0221	0.221	
ď	657	2.3167E-06		0.0053	0.053	
Total				0.1001		

Distnce: 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

Share	%	689				100.0		82.7		Ξ		72.5			
Ratio		689.0	0.133	0.177		1.000		0.827	0.129	0.045		0.725	0.221	0.053	
BL/d/d		0.0385	0.0074	0.0099	0.0558	0.1974	0.1974	0.0938	0.0146	0.0051	0.1135	0.0726	0.0221	0.0053	0.1001
Berth Length (BL)	ш	4,500	2,500	2,300		4,500		4,500	2,500	2,300		4,500	2,500	2,300	·
1/Distance/Distance   Berth Length (	1/4/4	8.54964E-06	2.97265E-06	4.30433E-06		4.38577E-05		2.08503E-05	5.8344E-06	2.21443E-06		1.61288E-05	8.85771E-06	2.3167E-06	
ခွ	Ę	342	280	482		151		219	414	672		545	336	657	-
Port		Izmit	Izmir	Mersin	Total	Izmit	Total	Izmit	Izmir	Mersin	Totai	Izmit	Izmir	Mersin	Total
Province		Ankara				Bolu		Eskisehir				Kutahya			

Distnce: 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

Area Share (%) 42.5 60.3 82.7 72.5 Hinterland Area Share of Province Province ANKARA BOLU ESKISEHIR KUTAHIYA Four Hinterland Areas BALIKESIR CANAKKALE Area CASE 1 With FILYOS Port SAMSUN IZMIT MERSIN KARA FILYOS ISTANBUL 以孫 11-67

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

CASE 2 Without FILYOS Port

Hinterland Area Share of Province 100.0 82.7 72.5 ESKISEHIR KUTAHIYA Province ANKARA BOLU Four Hinterland Areas SAMSUN BALIKESIR CANAKKALE THRACE IZMIT MERSIN FILYOS ISTANBUL II-68

TABLE 2.2.2 Marmara Sea ports Hinterland GDP throughput at 1987 constant prices

Casel With Filyos port

allica T L

											LOGIC P	Faire Cartains and a
) car		1987			168			158			1790	
pr.Ans.c	1 aluc	share	Higherland to Dr	Value	share	Hintaless GDP	ا ماند	31.22	Indian CCP	Nathe :	1901	Hiptorland GDP
Balkesir	1.321,554	1.000	1,321,554	1.417,254	1.000	1,417,254	1.437,154	1 000	, 1,437,B54	1,452,161	1 000	1.452,161
Block	320,831			353,778	1 000	133,778	328,832	1 (4)0	328,822	377.583	1 000	377.583
Burst	2,778,974	. ,		2.984.366	100	2.786, 766	3 (157) 815	1 (20)	3,082,415	7377811	1 (4/2)	3,452,977
Canalitare	651,760	,		733,124		733,124	791,729	1.000	751,729	798,999	1 000	758,559
				455,579					195,661	198,172	1 000	199.877
Fairre	158,254	•		15,411,495			15.818.332	,	15.818.132	17,333,961	1,000	17 333,961
isturbul.	15.464.563	. 1							707,402	790.880	1.000	790 88 1
kirklareli	534,574			543,336					3, 238, 459		1 000	3.643.981
Kecach	3.335,170			3,260,143	: 1						1.000	856,483
Sakarya	739,653	1 000	729,663	771.025	1 000	1	78.7.869		780,869	856.483	- 1	
1 ckirday	741,615	1.000	711,615	159,257	1 000	, ,			13351	KS3,G35		
.vlar	6,477,501	0 425	2,152,938	6,475,681	0.425	- 2,752,161	6,159,347	0.425	2,613,722	6,579,837	0.425	27% (3)
Bolu	622685	6 603	375,479	677,579	0 603	438,580	706,738	0.603	426,163	767,034]	0.643	462 522
Està chù	931,908			915,636	0.527	782 041	895,893	0 827	7 10.129	991.376	0.827	\$19.567
Kutahya	770,365	ė.	i l	880,949		493 688	669,986	0.725	<b>485,7</b> 40	671.252	0 725	136,663
Enmi)3	170,300	1	3.2,303	:					,			
(ctal	35152258	<u> </u>	30,806,943	35,484,227		31,147,856	35,953,987		31,792,567	38,978,346		34,534,323
16(3)	33137538	<u> </u>	379,07445	3-3-3-1,221	<u> </u>							

		*			159			199.	1		1991	
}c#(	Š	1591			177			1		·		he a later
persione.	Value	share	Hinterland GDP	Value	औ.सट	HinterLevi GDP	Value	share	Haterland GDP	Value	sp.r.c	Linterma GDP
ि. <b>बोक्रे</b> ट्रपं	1,449,597	1 060	1,449,597	1,489,652	1 000	1,489,052	1,543,496	1 000	1,543,4%	1 564,822	1 000	1,564,822
Bikrik	379,455		379,455	412,831	1 000	412,831	458,494	1.000	458,401	\$63,701	LOUG,	463,701
Dure	3,400,361			3,778,433		3,778,433	4,149,500	10.0	4,149,800	3,650.519	1.000	3,682,919
Carollare	826,846			888,125		888 125	\$92,839	1.000	192 199	879,830	1 000	479,830
t-direc	536,358					524,467	556.352	1 000	556,352	514,805	1.000	544,805
istanitui	17.572.946			1			20 706,501	1,000	20,706,501	18,518,939	1000	18 51 8.939
	747,197			782,821			724,253	1.000	724,253	719.959	1.000	719,959
Kirklardi	1 .						4,635,3 <sup>1</sup> 8		4,635,378	1,233,1652	1.000	4 230,165
Kocadi	3.771.598			924,336			952.036		952,086	943,518	1 000	913,518
Sakarya	862,164						1,053,537			987,485		
Lindag	931,513	Linn									2	3,080,595
. krkwa	6,608,432	0.425	2,868,584	6,964,055	0.425	2,959,723	7,666 776	: .	3.258,380	7.248.458		
Bolu	125,029	0603	497,492	907,674	0.603	547,327	889,226	0.603	5,16,203	902,023	v 603	543,921
Eskischir	1 017 336			998 [10	0 827	875,437	1 066,366	0277	881,884	T 108,909	0.11.7	91707.8
Kutarya	706,902			730,916		ī l	781,313	0.725	565,45?	843,184	0.725	611,308
Russy	1 ~~~		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,									
Tetal	37,530,731		35,133,817	42,100,856		37,362,513	45.085,317		49,925,626	42,616,719		37,687,035

Source SIS News Palletin 1996 Gerl

Case2 Without Filyos port

Millson T.L

):ar		1987			1981			1989			1290	
previoce	Value	share	HinterLand GDP	* alue	share	Limiterland GDP	Value	share	Historiand GDP	Value	share	Hinterland GDP
Balilesir	1.321,554		1.321.554	1,417,254	1 000	1,417,251	1.437,854	1.000	1,137,651	1,452,161	1 000	1.452,161
Biked	320,831	1 600	320,831	333,778	1000	333,778	328.822	1 000	328,822	377,583	1 000	377,583
Bursa	2,778,974	1 000	2.778,974	2.985,366	1,600	2,986 366	3,639,216	1 000	3,087,616	3,322,877	1 000	3,322,677
Canalkare	651,760	1 600	651,760	733,124	1 000	133,124	791,729	1.000	791.729	798.999	LOW	798,959
Edure .	453,254	1 000	458 254	455,599	1 1	· .	495,668	1 000	195,668	458,877	1 (00	498,877
biadai	15,454,563	1 000		15,111,195			15,818,132	1,000	15,419,332	[7,333,96]	1 000	11111361
Kirtari	534,574	1 000	534,574	543,336			707,402	1000	707,492	790,880	1.000	790,880
Kocash	3,335.170			3,260,148	: :	3 260,148	3.238.460	1000	3 238 456	3.643.984	1.000	3,643,981
	729.663	1 900		771.025	:		780,869	1.000	78,7,260	ièèè fés	1 ((1)	856 483
Salaria Turka	741.615			759,257	2		833,361	•	833,361	893,035	1 000	893,035
Tekring			4.452.998	6,475,681		4,461,741	6,159,347		4 243,750	6,579,137	0 687	- 4.533.508
Arthura	6,477,501			677,579			736,738	, ,	706, 738	767,031	1,000	767,934
Polu	622.685			945,636	•		895,803	: :	740,829	991.376	0.127	819.868
Eshocher	934,908		773,169		1 :		669,985	: : :	485,740	671.259		136,661
Kutabya	770.206	0.725	558,3%	680,919	0 125	437003	(151,180	( "	103,770	3,1,2,2		
[ctal	35152258		32,764.209	35,484,227	!	53,119,434	33,933,987	{ <b>-</b> -	33,699,210	38,778,310		36,575,912

		الدوار الدالا شد							***************************************		1991	
3 car		1961			_ 139.	F	4-2-0-	199				Hinterland GUP
province	Value	share	Uniterland GDP	Value	5 45	Halerand CDP	Value	share	1Enterland GOP	Value	share :	
Halikesir	1,419,597	1 000	1,449,597	1,489,052	1 000	1,489.652	1,543,496	1006	1,543,496	1,564,122	1 000	
Riccia	379,455		379,455	412831	1 600	412.831	458,304	1 000	450,404	<b>45.3 761</b>	1.00	\$63.701
Bursa	3,400,361			3,778,433	1 000	3,778,433	4,119,800	1000	4,149,800	1,680,919	1 000	3,680,519
	836,846		#25.E46	884.125	1 000	• • • • • • • • • • • • • • • • • • • •	892,899	1 000	F97, F99	879,830	1.000	879.830
Canalitate				324,457		f : '. 1	356,352		556,352	544,805	1 000	544,805
t-firme	536,354	;		18,761,393		,	20,706,501	1 000	20,706,501	18,518,939	1 000	18 518,939
k*anbul	17.572.946		17,572,946		1	;	724,253		724,253	719,959	1 000	
Kirk Grofi	747,197	•	747,197	782,821	1 500				1 635,378	1,230,165	1 000	
Kecach	3,771.598	1000	3,771.598	3,917,917		, , , ,	4,635,378					
Salarya	252,161	1000	862 [63	011 114	I UA		951.086		951 086	911,414	1 000	
Tekis Jag	931.513	1 000	931,513	1.020,666	100	1,020,666	1.053,537	1000		987,485		ì
Anlara.	6,608,432	,	4,553,710	6,964,055	0 689	4,758 234	7,666,716	0.689	. 5 282,409	7,248,458	0.689	4,954.188
Bolu	825.029	1		907,674	1 000	907,674	889,226	1.000	889,226	901,025	1.000	902,025
Eskischir	1,612,336		137,202	998.110		3	1,065,366	0.827	881,885	1,108,909	6.827	917,068
		1	512,504	730,916			781,313		566,452	843,184	0.725	611,369
Kutabya	1(6,902	0.725	312.504	7317,710,	3.27	1 ""			[			i
	30 7 80 330	<del> </del>	37,205,979	42 100 855		32.561.370	46,085,387		43,302,677	62,636,719		37,958,732
Telas	32,630,731		27, 202, 272	4	<u>:                                    </u>	27, 201, 370			and are not a second	and the second		property despression of the second

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

Case 1 With Filyos port

	Low C	asc	Medium	Case	High C	ase
Year	GDP	growth rate	GDP	growth rate	GDP	growth rate
	milion T.L.	%	million T.L.	%	million T.L.	%
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	• 1	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	:	126,091,478	: .	155,220,658	=
2015	107,294,554	5.0	134,035,241	6.3	167,017,428	7.6

Case 2 Without Filyos port

	Low C	ase	Međium	Case	High C	ase
Year	GDP	Growth rate	GDP	Growth rate	GDP	Growth rate
	million T.L.	%	million T.L.	%	million T.L.	%
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	: :	42,875,719	;
1996	45,019,505	5.0	45,362,511	5.8	45,705,516	<u> </u>
1997	47,270,480	5.0	47,993,537	5.8	48,722,081	;
1998	49,634,004	5.0	50,777,162	: ·	51,937,738	•
1999	52,115,704	5.0	53,722,237	5.8	55,365,629	1
2000	54,721,490	5.0	56,838,127	5.8	59,019,760	1
2001	57,457,564	5.0	60,418,929	:	63,505,262	1
2002	60,330,442	5.0	64,225,322	•	68,331,662	•
2003	63,346,964	5.0	68,271,517	:	73,524,868	<del>,</del>
2004	66,514,313	5.0	72,572,622	6.3	79,112,758	:
2005	69,840,028	5.0	77,144,698	6.3	85,125,328	:
2006	73,332,030	5.0	82,004,814	6.3	91,594,852	I
2007	76,998,631	5.0	87,171,117	6.3	98,556,061	2
2008	80,848,563	5.0	92,662,897	6.3	106,046,322	7
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	•
2012	98,271,933	5.0	118,314,762	•		:
2013	103,185,530	5.0	125,768,592	: :	152,952,636	7
2014	108,344,807	5.0	133,692,013	6.3	164,577,037	1
2015	113,762,047	5.0	142,114,610	6.3	177,084,891	7.6

Main ports are Hydarpasa, Derince, and Gemport.

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

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

		Domestic cargo			Import cargo			Export cargo	
year	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	12,941,086
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	53,613,953	23,212,402	56,826,355	27,290,283	6,379,579	33,669,862	15,307,500	000'09	15,367,500
1990	32,639,125	14,474,678	47,113,803		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	-	20.174.562

		Transit cargo			TOTAL	
year	No Crude oil	Crude oil	Total	No Crude oil	Crude oil	Total
1987	4,045,682	51,767,825	55,813,507	68,068,360	83,021,304	151,089,664
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

			UIII. 1000 1011
*	-	Oil volume	
year	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

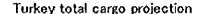
Crude oil future domestic volume is assumed to be the 2 times of the production volume. Table 2.3.3 shows crude oil projection volume in Turkey

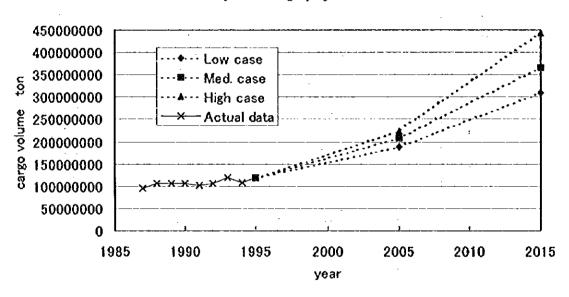
TABLE 2.3.3 Crude Oil Cargo Volume Projection

		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





# (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

X1: Hinterland GDP taking into consideration of Filyos port

X<sub>2</sub>: Dummy

TABLE 2.3.4 Turkey Cargo Throughput Projection

3	<b>1</b>	Domestic cargo			Import cargo			Export cargo	
vear	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	
6861		33.613,953			27,290,283			15,307,500	
0661	dekri-id-	32,639,125			31,780,549			15,185,654	
1991	g er er e two	27,483,412		-	32,493,299		148-1-1-1	20,343,438	-
1992	81- I- MBW	29,920,691		**************************************	31,391,949		-	21,775,110	
1993	·······································	33,009,537		14: -1	43,932,621	, -		18,089,165	
1994		29,795,947			31,609,295	•		21,961,870	
1995	P-0  -49E/	31,055,063		. Traffyth c.	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

	Crude oil			Total cargo	
year	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	
1661	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	21,021,493	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

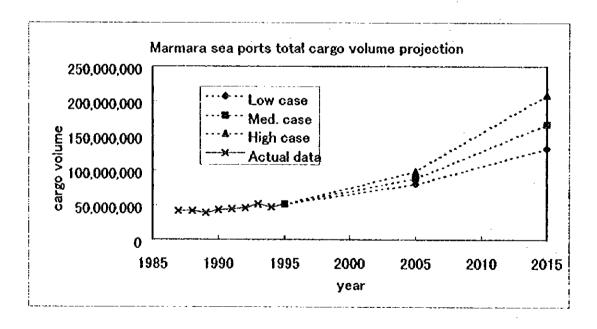
															F	
			Competite cared	,		nocm			Export			l ransıt		į	TELLO T	destruction of the property pages of
		0.5515	Daylare	Total	Public	Private	Total	Public	Private	Total	Public	Private	Total	Public	Private	Total
		•	- 1	18 364 536	4 888 680	11105 304	19 384 074 2 316 144	2316,144	2 227.563	4.543.707	34,002	0	34,002	34,002 15,296,067	27,032,252	42,328,319
<u> </u>	cargo comu		C	00000000	000,000,	0720	2	0.50	0.490	 :	1.000	0000		0.361	0.639	
	Spare	P. 4.0	100.0	- 1	7.7.0	0.7.7	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		2000	011 500 3	50 207	C	42 202	730 307 14 408 287	75 085 767	41.584.054
1988	cargo volum		9,022,564 10,274,222 19,296,786 3,114,097	19,296,786	3,114,097	12,846,755	15,960,852 3,408,529	7.408.529	2×/40%;	6,4,5,1,5	127.00	> 9	1000	1040	20,000	
	char		0.532		0.195	0.805		0.543	0.457		1.000	0000	•	0,375	0.020	1
1000	Carrotte Column	950 625 0	0	20.125.858	3.814.444	10.201.800	14,016,244 2,815,875	2,815,875	2,253,580	5,069,455	115,838	Ö	115,838	15,838 16,319,213	23,008,182	39,327,395
	2 mm	2000	40,0		0.777	0.728		0.555	0.445		1.000	0000		0.415	0.585	
	Silarc	0/1/2	Ċ	10 230 561	4 8 1 7 2 8 0	56x 966 51	18 044 264 2 108 672	2.108.672	3.079,665	5,188,337	10,000	0	10,000	10,000 17,192,239	25,389,923	42,582,162
3	cargo volum	071,007,01	2000	, C	736.0	0.733		0.406	0.594		000	000.0		0,404	0.596	
	Share	0000	2	1	107.0		000		000000000000000000000000000000000000000	737 366 6		Ċ		13 610 712	30 336 936	43.947,648
1661	cargo volume	0.58,965,0	6,596,850 9,182,407 15,579,257 3,707,586	15.579.257	3,707,586	17.325,149	21,032,730,3,300,276	9/7'900'5	08. 678	000,000,		>	>	77.010.01		
	share	0.411	0.589		0.176	0.824		0.478	0.522					0.510		
1007	corno volum		8 129 518 9 565 542 17 695 060 4 478 311	17.695.060	4.478.311	16.143,859	20,622,170 3,702,227	3,702,227	3,745,006	7,447,233	13,522	0	13,522	13,522 16,323,578	2	c86.///.ct
	chara cana		0.541		0217	0.783		0.497	0.503	•	1.000	000		0.357	0.643	
5003	mulos ones		30.5	19 045 261	6 009 094	19.783.865	25,792,959 2,542,268	2.542,268	3,626,165	6,168,433	37.622	0	37,622	37,622 17,041,476	34,002,799	51,044,275
	obere		0.556		0.233	0 767		0.412	0.588		1.000	0.00		0.334	999.0	
	Succession	200 610 6	10.03	17 046 145	12240:5	16.481.381	20 706 296 3 694 878	3 694 878	4 183 204	7,878,082	O	Ö	0	0 15,833,878	30,696,645	46,530,523
<u> </u>	carries volume	10/11/1/1	000,450,01	OF 4 (VF C ) 1	2000	907.0		0.469	0.531	•				0.340	099'0	
	Share	1	1000 N		104.0	?				* 00 304 4	14 00 4	· · ·	1.4 002	075 609 71 200 21	24 872 312	S1 676 507
8	cargo volume		7,451,672 11,597,680 19,049,352 6,231,598	19,049,352	6.231.598	18,594,664	24,826,262 3,102,025	3.102,022	4.0%U.VOV.	すんかいめん	t c .		107.11	V 23. C 00.01	3600	*
	chare	0 391	0090		0.251	0.749		0330	0.601		1.000:	0.000		V.525	0.075	

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

unit: ton Total cargo volume Med. case Low case High case year 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 80,000,000 89,000,000 2005 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<sub>1</sub>: Hinterland GDP taking into consideration of Filyos port

X<sub>2</sub>: 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  $\sim$  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

			Domestic	stic			Impor	nt.			Export	ort.	
7697		Dry bulk	Dry bulk I jonid bulk General cared	eneral cargo	Total	Dry bulk L	Dry bulk Liquid bulk General cargo	eneral cargo	Total	Dry bulk 1	Dry bulk Liquid bulk General cargo	eneral cargo	Total
1980		7 959 962	237.310	1.375,784 9,573,056	9.573,056	1.635,484	244,678	1.934,282	3,814,444	3,814,444 1,215,346	0	1,600,529	2,815,875
861		8,723,369	332,728	1,200,081	1,200,081 10,256,178	1.898,006	435,760	2,483,623	4,817,389	733,079	69,258	1,306,335	2,108,672
1991		5.275.040	252,939	868.871	6,396,850	1,342,143	511,035	1,854,408	3,707,586	3,707,586 2,202,228	80,371	1,223,677	3,506,276
1992		6.791,660	338,350	999,508	8,129,518	1,382,067	853,448	2,242,796	4,478,311	4,478,311 2,675,032	6,987	1,017,208	3,702,227
182		6.950.231	445,485	1,056,776	8,452,492	2,667,358	397,842	2,943,894	6,009,094	6,009,094 1,277,506	8,760	1,256,002	2,542,268
186		6.806.352	279.350	828,383		1,623,565	308,339	2,293,011	4,224,915	4,224,915 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	200,000	6,200,000	11,600,000 3,500,000	3,500,000	100,000	4,200,000	7.800,000
	Med case	Med. case 10,400,000	400,000	1,500,000	1,500,000 12,300,000	6,100,000	500,000	6,900,000	13,500,000 3,700,000	3,700,000	100,000	4 600 000	8,400,000
	High case	High case 11.600,000	400,000	1,700,000	,700,000 13,700,000	6.800,000	500,000	7,900,000	15,200,000 4,100,000	4,100,000	100,000	5,100,000	9,300,000
2015	Low case	Low case   12,700,000	400,000	1,800,000	.800,000 14,900,000	9,000,000	500,000	11,500,000	21,000,000 7,000,000	7,000,000	100,000	10,100,000	17,200,000
	Med case	Med. case 16,100,000	400,000	2,400,000	2,400,000 18,900,000	12,700,000	500,000	14,800,000	28,000,000 7,300,000	7,300,000	100,000	10,700,000	18,100,000
	High case	High case 20,400,000	400,000	3,000,000	3,000,000 23,800,000	16,000,000	500,000	19,000,000	35,500,000 9,200,000	9,200,000	100,000	13,700,000	23,000,000

			Transit				Total	31	
Vear	,	Dry bulk Liquid bulk General cargo	id bulk Ger	eral cargo	Total	Dry bulk	Dry bulk Liquid bulk General cargo	eneral cargo	Total
6861		57,919	ō	57,919	115,838	10,868,711	481,988	4,968,514	4,968,514 16,319,213
1990		5,000	0	2,000	10,000	11,359,454	837,746	4,995,039	17,192,239
1991		0	0	0	0	8,819,411	844,345	3,946,956	13,610,712
1992		3,522	0	10,000	13.522	10,852,281	1,201,785	4,269,512	4,269,512 16,323,578
1993		10,000	0	27,622	37,622	10,905,095	852,087	5,284,294	17,041,476
1994		0	0	0	0	0 10,293,953	090,099	4,879,865	15,833,878
	ow case		<u> </u>			17,700,000	1,000,000	11,700,000	30,400,000
	Aed. case					20,200,000	1,000,000	13.000,000	34,200,000
; ;X	Tich case					22,500,000	1,000,000	14,700,000	38,200,000
2015 L	ow case					28,700,000	1,000,000	23,400,000	53,100,000
	Aed. case	************				36,100,000	1,000,000	27,900,000	27,900,000 65,000,000
щ	High case					45.600,000	1,000,000	35,700,000 82,300,000	82,300,000

FIGURE 2.3.3 Marmara Sea Public Dy Bulk Cargo Volume Projection

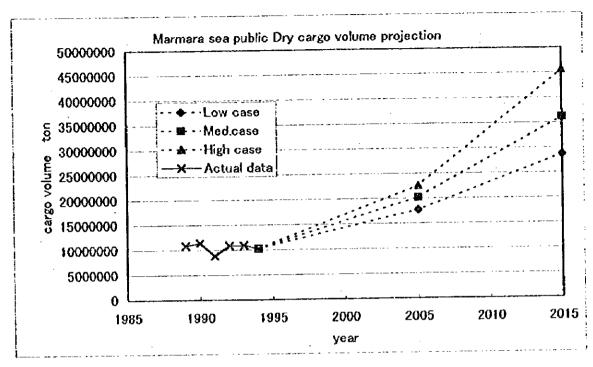


FIGURE 2.3.4 Marmara Sea Public General Cargo Volume Projection

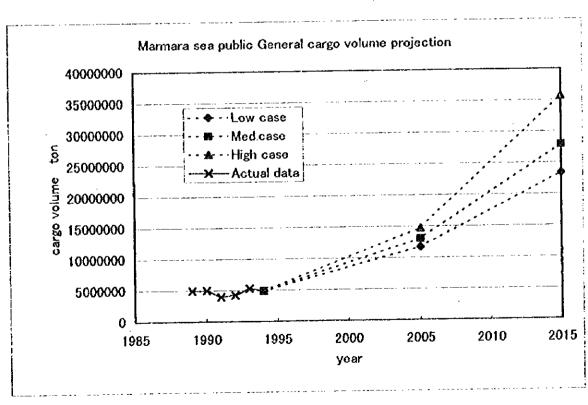


FIGURE 2.3.5 Marmara Sea Public Liquid Bulk Cargo Volume Projection

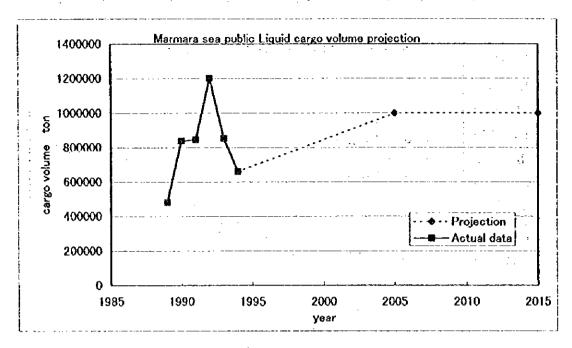
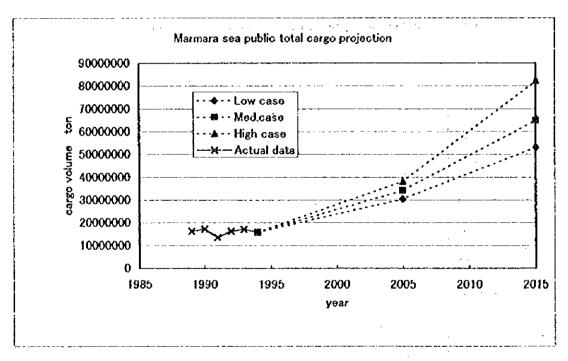


FIGURE 2.3.6 Marmara Sea Public Total Cargo Volume Projection



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

#### 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.

Import 
$$Y = \frac{0.80}{1 + 0.664^{1-1.352}}$$
Export  $Y = \frac{0.80}{1 + 0.568^{1-3.478}}$ 

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

		Haydarpasa			Derince			Bandirma	
year	Load	Unload	Total	Load	Unload	Total	Load	Unload	Total
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

					ສ	unit : ton
		Gemport			Total	
year	Load	Unload	Total	Load	Unload	Total
1988	0	0	0	169,559	187,334	356,893
1989	0	0	0	246,926	277,198	524,124
1990		0	0	331,866	558,394	890,260
1991	0	0	0	349,298	644,189	993,487
1992	0	0	0	568,224	\$13,164	1,381,388
1993	14,610	14,610	29,220	648,004	1,264,458	1,912,462

domestic.

FIGURE 2.3.7 Import Cargo Containcrization Ratio

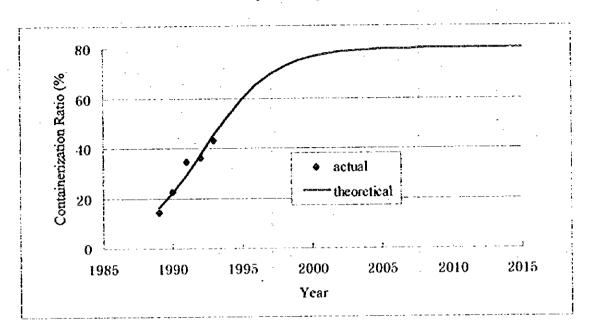
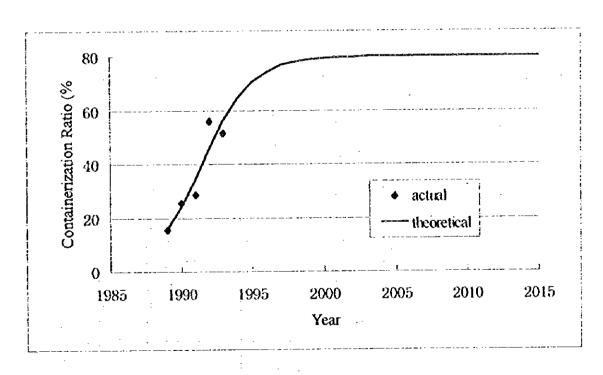


FIGURE 2.3.8 Export Cargo Containerization Ratio



Container cargo projection volume is shown in Table 2.3.10.

TABLE 2.3.10 Marmara Sea Ports Container Cargo Volume Projection

		Import			Expon	
vear	General cargo	ratio	Container cargo	General cargo	fatio	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
						1

unit: ton Domestic General cargo ratio Container cargo Total container cargo 2005 Low case 520,000 0.400 1,300,000 8,815,200 1,500,000 0.400 600,000 Med. case 9,772,400 1,700,000 680,000 High case 0.40011,048,400 1,800,000 2015 Low case 0.400 18,000,000 720,000 2,400,000 Med. case 0.400 960,000 21,360,000 3,000,000 1,200,000 High case 0.400 27,360,000

ratio: ratio of containerization

TABLE 2.3.11 Mamara Sea Ports Container Cargo Throughput and Projection

unit: ton Total Import Domestic year Export 186,210 356,893 1988 168,372 2,311 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 4,953,200 3,360,000 520,000 2005 Low case 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 9,200,000 2015 Low case 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

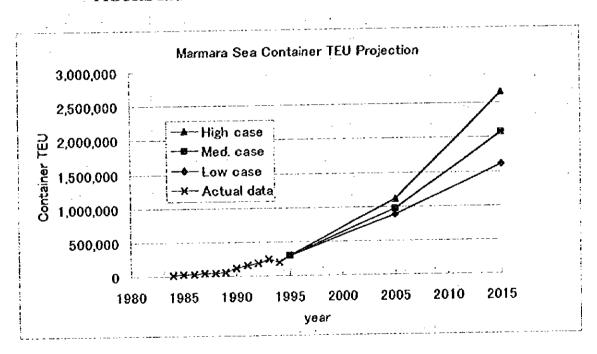
Table 2.3.12 and Figure 2.3.9 show result of Marmara sea ports Container cargo TEU projection.

TABLE 2.3.12 Marmara Sea Ports Handling Container TEU Throughput

unit: TEU

	Inta	rnational Tra	ade	Do	mmestic Tr	ade		Total	
year	Low case	Med. case	High case	Low case	Med. case	High case	Low case	Med case	High case
1984	Lon caso	19,234		,				19,234	
1985		23,270					- :	23,270	
1986		35,095						35, <del>0</del> 95	:
1987	İ	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	j	201,329		-	2,251			203,580	
1995	1	293,552	<u>.</u>	·	4,204			297,756	;
2005	832,000	` i	1,056,000	43,680	50,400	57,120			ŧ,113,120
2015		1,989,000			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

# (1) 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

	GDP in Turkey	Cement consumption volume	Population	Per capita consumption
year	in million TL	ton	-	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.

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
1991	1992	1993	1994	1995
145,424	27,130	106,670	39,975	140,086
- 1	29,133	28,400	6,489	3,134
	41,544	38,813	0	0
345	7,311	34,142	0	0
18,559	715	19,548	50,875	187,518
0	o	0	18,332	57,904
	145,424 35,063 60,526	145,424 27,130 35,063 29,133 60,526 41,544 345 7,311	145,424     27,130     106,670       35,063     29,133     28,400       60,526     41,544     38,813       345     7,311     34,142	145,424     27,130     106,670     39,975       35,063     29,133     28,400     6,489       60,526     41,544     38,813     0       345     7,311     34,142     0       18,559     715     19,548     50,875

Export

					unt : 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

13 1994 1995

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	บ	U
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	1991	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: I 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.

Year 2005 4,300,000 
$$\times$$
 3 / 2.5 = 5,160,000 tons  
Year 2015 6,810,000  $\times$  3 / 2.5 = 8,172,000 tons

#### 3) Clinker

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

Year 2005 
$$150,000 \times 40,000 / 19,241 = 311,834 \text{ tons}$$
  
Year 2015  $150,000 \times 84,000 / 19,241 = 654,851 \text{ tons}$ 

#### 4) Scrap steel

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

Year 2005 
$$380,000 \times 8,761 / 5,899 = 564,363$$
 tons  
Year 2015  $380,000 \times 14,789 / 5,899 = 952,673$  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

Year 2005 980,470 
$$\times$$
 820,900  $/$  603,700 = 1,333,224 tons  
Year 2015 980,470  $\times$  1,102,900  $/$  603,700 = 1,791,221 tons

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

Year 2005 145,424 
$$\times$$
 31,851  $\angle$  26,380 = 175,584 tons  
Year 2015 145,424  $\times$  55,367  $\angle$  26,380 = 305,220 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 Region. 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.

Year 2005 92,429 
$$\times$$
 7,329  $/$  5,061 = 133,849 tons  
Year 2015 92,429  $\times$  13,166  $/$  5,061 = 240,450 tons

#### 8) Sunflower seed

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

Year 2005 187,518 
$$\times$$
 31,851  $/$  27,943 = 213,743 tons  
Year 2015 187,518  $\times$  55,367  $/$  27,943 = 371,553 tons

#### 9) Cotton seed

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

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

Year 2005 35,063 
$$\times$$
 1,917  $/$  709 = 94,804 tons  
Year 2015 35,063  $\times$  3,787  $/$  709 = 187,283 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	
	Domestic	trading	International trading		
Year	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		
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
Рарег	6,030	8,669	28,991	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 . (Oii
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
Alminium	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.

Year 2005 126,135 
$$\times$$
 31,851  $\angle$  26,380 = 152,294 tons  
Year 2015 126,135  $\times$  55,367  $\angle$  26,380 = 264,735 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.

```
Year 2005 40,637 \times 25,919 / 10,253 = 102,728 tons
Year 2015 40,637 \times 49,777 / 10,253 = 197,287 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
	Export v	olume in 1994	year	2005	2015
Chapter	Haydarpasya	Tekirdag	Total		<u> </u>
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

	Impo	rt volume in 19	2005	2015	
Chapter	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	ŀ
--------	---

	Havdemasy	a custom o	ffice h	andling volu	ne	Tekirdag	Thrace Region
Chapter	Total			Europe side		_	total
Chicpetti	ton	ton		ton	_	ton	ton
1	0		0	. 0	0	0	9
2	2	0	0	2	j	0	2
3	645	0	0	645	1	113	758
4	163	82	0.5	82	ł	. 0	82
5	98	98	i	. 0	0	0	0
6	Q	. 0	Ò	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	917
13	137	69	0.5	69	0.5	} 0	69
14	98	19	0.5	49	0.5	0	1
15	10,316	3,095	0.3	7,221	0.7	10,487	17,708
16	245	:		123	0.5	0	l .
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	
20	14,960	11,968	0.8	2,992	0.2	1	
21	4,894	2,447	0.5	2,447	0.5	362	•
22	7,184	1,437	0.2	5,747	0.8		
23	19	8	0.4	11	1	1	
24	100	70	0.7	30	ŧ		1
25	26,373	18,461	0.7	<del>•</del>	Ī		
28	8,921	5,353	0.6	3,568	Ŧ		- 4
29	3,892	2,724	0.7	<u>.</u>	•	l .	-,
30	1,161	581	0.5	;	0.5		1
32	3,804	2,282	<b>1</b>	:	1		F -
33	453	227	0.5	•	<u> </u>	1	E .
34	19,376	7,750	1	ž.	ž.	1	1
35	700	•	•	± .			1
36	705	:	Ŧ	•			
37	14	1	÷	1	1	1	Di contra di con
38	2,845	•	1	•			
39	11,463		*	<b>T</b> .			1
40	33,164				i		
41	2,669	801	*			1	1
42	99	1	1	•	•		E .
43	99	30	ŧ	\$	•	B.	li .
45	2		1	-	0.5		1
46	0	i .	1	:	1		
47	50	Ŧ .	ł			1	L
48	19,325			į.			
49	19	}	0.4	11	0.6	j	12

	<del></del>	<del></del>	<del></del>			· .	
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	O)	14
66	23	9	0.4	14	0.6	1	15
67	1	0	0.0	1	1.0	0	j
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	ı	0	0.4	l	0.6	0	i
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	111	0.6	0	11
total	639,846	368,789	L	270,730		389,270	660,000

Import

<del>`</del>	Hayderpasya custom office handling volume Tekirda Thrace Region								
Chapter	Total	Asia side	share	Europe side	share		total		
Chapter	ton	ton	Gitta	ton		ton	ton		
1	200	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		1,209	· 1	208	1,417		
. 5	576	576	1	0	0	0	. 0		
- 6	11	0	.0	. 0	: 0	- 44	. 44		
	912	471	0.5	471	0.5	12			
7	1,478	739	0.5	739	0.5	3	l .		
9	5,144	0	0	5,144	•	10	, ·		
11	1,847	924	0.5	z	I				
12	2,525	. 0	0.0	2,525	ŧ				
13	375	188	0.5	188	5	•	i .		
14	1,021	511		;	•		•		
15	10,933	3,280	:	:	Ī	I .	1		
16	4		0.5	7	:	E .			
17	1,282	256	2	:	:	1	1 '		
18	2,132	-	2	1	1		1		
20	403		:	•	;	B			
21	1,211	606	1	:	•		1		
22	609		<u> </u>	1	•		1		
23	3,721	1,488	•	3	2		1		
24	3,865	<b>:</b>	<u> </u>	1	:	E			
25	54,346	3	ŧ	Ī	2				
28	74,414	•	ž.	i.	÷				
29	50,913	1	•	:	•				
30	: 299	Ŧ	7		1				
32	18,459	•	:	•	:		1		
33	1,342	Ī	i	1	£	1	ř		
34	10,585	•		E	:	1	1		
35	2,329	1	:	2		1	1		
36	103	•	ž.	1	<u> </u>	1			
37	1,715	3		•	1		l .		
38	20,135	i .	1	•	3 .				
39	140,530 48,379	7	Ŧ.	7	1				
40	29,593	1	:	1	:				
41 42	1	2	<u> </u>	Ŧ.	5	1	4		
42 43	- 6	I	1	:	7	1			
4.5	129	Ē	t	1					
: 46	276	3	:		•		1		
46 47	23,465	<b>.</b>	:	1	1	i .	I .		
48	114,105	1	1	i	t	1			
49	5,837	ì	ł	ŧ	€	1			
47	J. 2,637	1 2,000	1 0.7	3,502	3	<u> </u>	1		

50	28		0.4			0	17
51	5,704	2,282	0.4			5	3,427
52	15,043	- 1	0.4			632	9,658
53	6,111	- 1	0.4			. 0	3,667
54	16,587		0.4	9,952	0.6	22	9,974
55	35,947					16	21,584
56	1,103	441		: :	I	0	662
57	52	47	0.9			. 0	- 5
58	277	111	0.4	: :		0	166
59	2,647	· · · · · · · · · · · · · · · · · · ·		,		. 0	1,588
60	2,463	985	0.4	, ,	. k	0	1,478
- 61	429	172		:		0	257
62	98	39	0.4			0	59
63	2,322	929			1	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			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		0.5		0.5	0	2,044
96	4,450	1,780	0.4	2,670	0.6	0	2,670
97	0		0.4		0.6	0	0
	1,217,905	627,979		589,713		299,245	888,958
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Source: SIS Foreign Trade Statistics 1994

### CHAPTER CODE LIST

1 Live animals 2 Meal and eRbit meal offal 3 Fish and criticates modures and other aquatic invertebrates 4 Dary produce, bird's eggs; natural honey; edible products of animal origin not disputers especified or included contacted and origin not disputers especified or included contacted and origin not disputers especified or included contacted.  By Potacts of arbinal origin, not decorate especified or included contacted in the products of animal origin, not describe especified or included contacted.  By Potacts of arbinal origin, not decorate especified or included contacted.  By Contact and origin products with the first of the militing industry, mait, stanches; inuliny heat glute.  Coffee feavante and spices or contact and decorations from the militing industry, mait, stanches; inuliny heat glute.  Coffee feavante and disagnous fruits miscellances guite, several and objects of the militing industry, mait, stanches; inuliny heat glute.  Coffee feavante and disagnous fruits miscellances guite, several and objects of the militing industry, mait, stanches; inuliny heat glute in the militing industry, mait, stanches; inuliny heat glute in the militing industry, mait, stanches; inuliny heat glutes guite, several and objects of an original products of the principal paint guite in the principal guite guite in the principal guite guite in the principal guite guite in the principal guite guite in the principal guite guite	Code	Chapters	Code	Chapters
Meal and erible meet offal   Fish and crustaceass, mobuses and other aquate   Invertebrates				
Fish and crustaceans, moltuses and other aquisite inveleturals of animal origin, not electrice specified or included of included origin, not electrice specified or included.  Products of animal origin, not electrice specified or included.  We there and other planis bubs zools and the like; out, flowers and ornamental foliage.  Eithie great deep reaching bubs zools and tubers.  Eithie flutt and notispeed of circus firuits or melons.  Outlier, fear, and earnemental foliage.  Coffice, fear, and earnemental foliage.  Outlier, fear, and earnemental foliage.  Doubt and articles of leather, subtractives of stawy of espates or of other planising materials.  Products of the milling industry, mait; stanches; inuliny/metel teaching and observable and earnemental foliage.  I begins and observable and earnemental foliage.  I begins and observable and earnemental foliage.  I begins and observable and observable and earnemental foliage.  I begins and observable and observable and earnemental foliage.  I begins and observable and observable and earnemental foliage.  I begins and observable and observable and earnemental foliage and earnemental foliage.  I begins and observable and observable and earnemental foliage.  I begins and observable and observable and earnemental foliage.  I begins and observable and observable and earnemental foliage.  I begins an earnemental foliage.  Outli				•
invertebrates  Dairy produce; birds eggs, natural honey, edible products of animal origin, not elsewhere specified or included  Every product of animal origin, not elsewhere specified or included  Every products of animal origin, not elsewhere specified or included  Every products of animal origin, not elsewhere specified or included  Every products of animal origin, not elsewhere specified or included  Every products of animal origin, not elsewhere specified or included  Every products of animal origin, not elsewhere specified or included  Every products of the miling industry, mail; stanches; inuliny, wheat gluben  Corepls  Corepls  Corepls  Corepls  Corepls  Edible fruit and notispeed to citrus funits or meions  Developes and obeagenous fruit, miscellaneous grains, seeds and furtipidustrial or medicinal plants, stara and tooler or specified or included  Animal or regetable last and oils and their devinetives; proported and obeage products, prepared entitle fails, animal or vegetable was and some plants and toolers or other aquatic cinvertebrates  Preparations of reveals for hor or crustaceans, molluscs or other aquatic cinvertebrates  Preparations of reveals for hor or sustaceans, molluscs or other aquatic cinvertebrates  Preparations of reveals, fourt, such or other parts of plants  Every products products  Preparations of reveals fourt, such or other parts of plants  Every products of the preparations or eversels, fourt, such or other parts of plants  Every products of the products of their distillation bluminous substances mineral waters  Every products by the preparations of preparations or preparations and their devinetives; of preparations of previous fourth or products of their distillation bluminous substances mineral waters  Every products products of their distillation bluminous substances and their devinetives; of preparations of preparations of preparations of preparations of preparations or preparations and their devinetives; of preparations, briteching preparations, and their devinetives; of pr				
4 Disry produce; burds eggs; natural honey; edible products of animal origin, not elsewhere specified or included  5 Products of animal origin, not elsewhere specified or included  6 Uve trees and other plants; bulbs nots and the fixe; cut. flowers and ornamental fissings  7 Edible regelables and centar roots and tubers  8 Eddbe fruit and nutspeed of clinis fluits or melons  9 Outree, learnable and spices  10 Coreals  10 Coreals  11 Products of the milling inclusing, malt; starches; inufuy-heat or the milling inclusing in control or sparse and fluit inclusivation or medicinal plants; attaches and footer or control of their products of the products or deservine approaches; passing seeds and fluit inclusivation or medicinal plants; attaches a	3	·		
of animal origin not elsewhere specified or included  Products of animal origin, not elsewhere specified or included  Live trees and other plants, bubs proofs and the fike; cut fowers and ornamental foldage  Edible regarbles and certain roofs and tubers  Edible regarbles and certain roofs and tubers  Cofree learnate and spices  Cortes and ornamental folding industry, mait; starches, inuliny-heat glutien  Original plants, seeds and full industrial or medicinal plants stard and specified or included and starches of two door of other planting industry, mait; starches, inuliny-heat glutien  Season and observations of the milting industry, mait; starches, inuliny-heat glutien  Season and observations of the milting industry, mait; starches, inuliny-heat glutien  Season and observations of the milting industry, mait; starches, inuliny-heat glutien  Season and observations of the milting industry, mait; starches, inuliny-heat glutien  Season and observations of the milting industry, mait; starches, inuliny-heat glutien  Season of the milting industry, mait; starches, inuliny-heat glutien  Season of other same of the might be associated and starches of versions or compared to final starches, inuliny-heat glutien  Season of the milting industry, mait; starches, inuliny-heat glutien  Season of the milting industry, mait; starches, inuliny-heat glutien  Season of the milting industry, mait; starches, inuliny-heat glutien  Season of the milting industry, mait; starches, inuliny-heat glutien  Season of the milting industry, mait; starches, inuliny-heat glutien  Season of the milting industry, mait; starches, inuliny-heat glutien  Season of the milting industry, mait; starches, inuliny-heat glutien  Season of the milting industry, mait; starches, inuliny-heat glutien  Season of the milting industry, mait; starches, inuliny-heat glutien  Season of the milting industry, mait; starches, inuliny-heat glutien  Season of the milting industry, mait; starches, inuliny-heat glutien  Season of the milting industry, mait; starches, inu				Kaw nides and signs joiner than to some fravel confs
(giber than silkoverm gut) included  1. Products of animal origin, not elsewhere specified or included  1. Express and other plants builts note and the like; cut flowers and ornamental foliage  2. Edible fruit and nutspeel of clinus fruits or metens  3. Coffeel a make and spices  4. Coffee learnate and spices  5. Coffeel a make and spices  6. Coffeel a make and spices  7. Coffeel a make and spices  8. Edible fruit and nutspeel of clinus fruits or metens  9. Coffeel a make and spices  10. Coreals  11. Products of the miting industry, malt; starches; inuliny-heat glutin  12. Coreals  13. Lacgums reins and other vegetable saps and extracts  14. Vegetable plating materials, vegetable products not elsewhere specified or included  15. Animal or vegetable fasts and oils and their cleavage products; prepared cible fast, animal or vegetable waves  16. Preparations of meal, of fish or of crustaceans, mollusos or other aquatic invertebrates  17. Sugars and sugars confolionery  18. Cocoa and coops preparations  18. Escentials and residence of vegetables fruits, nats or other parts of parts  19. Preparations of meal, of fish or of crustaceans, mollusos  19. Preparations of meal, of fish or of crustaceans, mollusos  19. Preparations of meal, of fish or of crustaceans, mollusos  19. Preparations of meal, of fish or of crustaceans, mollusos  19. Preparations of meal, of fish or of crustaceans, mollusos  19. Preparations of meal, of fish or of crustaceans, mollusos  19. Preparations of meal, or fish or of crustaceans, mollusos  19. Preparations of meal, or fish or of crustaceans, mollusos  19. Preparations of vegetables fruits, nats or other parts of parts  19. Preparations of vegetables fruits, fished or crustaceans, mollusos  19. Preparations of vegetables fruits, make or offer plating and the vegetable and crustal parts  19. Preparations of vegetables fruits, and original companies or of the products of the crustal parts and the vegetables of the par	4		42	Articles of feather, saddlery, and namess, dave gover.
5 Products of alimital origin, not elsewhere specified or included 6 Like trees and other plants shults yould and the like; cut fowers and ornamental risking. 7 Edible regulables and certain roots and tubers 8 Edible regulables and certain roots and tubers 9 Coffree (earmale and spices) 10 Coreals 11 Products of the milling industry, mait; starches; inuliny-heat gittlen 12 Oil seeds and oleaginous finits; mixellaneous grains, seeds and fluit-industrial or medicinal plants; straw and folder 13 Lacgums, reins and other regetable sape and extracts 14 Vegetable plating metistials, vegetable postures not established and revealther lists and oils and their cleanage products, preparations of metal of fish or of crustaceans, molluscs or other aguits in metal rate of the grain of cereals. Flour, starch or milk; pasty-cooks' products 12 Miscellaneous echile preparations 13 Preparations of metal of fish or of crustaceans, molluscs or other aguits in metal-tures. 14 Miscellaneous echile preparations 15 Preparations of sereals, flour, starch or milk; pasty-cooks' products 16 Preparations of sereals, flour, starch or milk; pasty-cooks' products 17 Sugars ans sugars confectionery 18 Beverages, spirits and write from the food industries; prepared animal fooder 19 Reparations of the regelables, fluits, nuts or other pasts of plant 20 Reparations of sereals flour, starch or milk; pasty-cooks' products 21 Miscellaneous echile preparations 22 Reverages, spirits and write from the food industries; prepared animal fooder 23 Toloacco and manufactured foliaccs outstatives; elements or of incopes 24 Toloacco and manufactured to plants and variable spirits, speaks products of their distillation behavior and concerned to the preparations of the preparations of the preparations of the preparations of the preparations of the preparations of the preparations of the preparations of the preparations of the preparations of the preparations of the preparations of the preparations of the preparations of the preparations of the preparations of th		of animal origin, not elsewhere specified or included		
inclusted  1	_			
6 Liber Livers and other plants, judios; prots and the like; cut. 6 Powers and ornomental flosing 7 Edible vegetables and certain roots and tubers 8 Edible fruit and nuispeed of citrus firuls or melons 9 Coffee, lear, nuise and spices 10 Cereals 11 Products of the milling industry, mait; stanches; inulinywheat gluten 12 Dia seeds and decapionus fruits, miscellaneous grains, seeds and fruit, industrial or medicinal plants, straw and todder 13 Lacgums, resins and other vegetable saps and extracts 14 Vegetable plating materials, vegetable products not elsewhere specified or included 15 Animal or vegetable learn and services of paper page pubp. of paper page products, preparations of meat of fish or of enustaceans, mollusos or other aquatic investbardes 16 Preparations of meat of fish or of enustaceans, mollusos or other aquatic investbardes 17 Sugats ans sugars confectionery 18 Cocca and occas preparations 19 Preparations of terrells, flour, stanch or milic; pashycoxis products. 20 Reverages, spirits and vinegar 21 Miscellaneous edule preparations 22 Revidues and waste from the food industries; prepared animal fodder 23 Tobacco and manufactured lobacco substitutes 24 Miscellaneous edule preparations 25 Inorganic chemicals; organic or inorganic compounds of precious metals, of rare-earth metals, of radioactive elements or of isotopes 26 Ores, shap and ash 27 Mineral fuels junieral olis and products of their distance has been substituted or process metals, of rear-earth metals, of radioactive elements or of isotopes 28 Inorganic chemicals; organic or inorganic compounds of precious metals, of rare-earth metals, of radioactive elements or of isotopes 28 Inorganic chemicals; organic or inorganic compounds of preparations, characterial products 29 Organic chemicals; organic or inorganic compounds of preparations, characterial products of their distance and one programic compounds of preparations, characterial products of their distance and one programic compounds of preparations, characterial products of their distance	5		-	
Powers and ornametal foliage Fig. Edible froit and nuispect of circus fruits or melons Colfee tea make and spices Colfee tea make and sport board of spaper pulp, of paper or of paperboard of paperboard and spices of paper pulp, of paper or of paperboard of paperboard and spices of paper pulp, of paper or of paperboard of paperboard and spices of paper pulp, of paper or of paperboard of paperboard and spices of paper pulp, of paper or of paperboard of paperboard and spices of paper pulp, of paper or of paperboard of paperboard and spices of paper pulp, of paper or of paperboard of paperboard and spices of paper pulp, of paper or of paperboard of paperboard of paperboard and spices of paper pulp, of paper or of paperboard of paperboard and spices of paper pulp, of paper or of paperboard and spices of paper pulp, of paper or of paperboard and spices of paper pulp, of paper or of paperboard and spices of paper pulp, of paper p				
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Preparations of vegetables, fruits, nuts or other parts of plants  2	19	Preparations of cereals, flour, starch or milk;		tapestries;trimmings;embroidery
plents  It Miscellaneous edible preparations  Residues and waste from the food industries; prepared animal fodder  Residues and waste from the food industries; prepared animal fodder  Tobacco and manufactured lobacco substitutes  Salt, sulphur, earths and stone; plastering materials, time and cement  Mineral fuels, mineral oils and products of their distillation; pittuminous substances; mineral waxes longanic chemicals; organic or inorganic compounds of precious metals, of rare-earth metals, of radioactive elements or of isotopes  Organic chemicals  Tanning or dyeing exracts; tannins and their derivatives; dyes, pigments and other colouring matter, paints and varnishes; putty and other mastics; inks  Saltisulation; fubricating preparations, candles and similar articles, modelling pastes, dental waxes, prepared waxes, polishing or scouring preparations, candles and similar articles, modelling pastes, dental waxes, and dental preparations with a basis of plaster  Albuminoidal substances, modified starches, glues, enzymes  textite articles of kind suitable for industrial use knitted or crocheted  Articles of apparel and clothing accessories knitted or crocheted  Articles of apparel and clothing accessories knitted or crocheted  Articles of apparel and clothing accessories knitted or crocheted  Articles of apparel and clothing accessories knitted or crocheted  Articles of apparel and clothing accessories, not knitted or crocheted  Articles of apparel and clothing accessories, not knitted or crocheted  Other made-up textile articles, sets, worn clothing and worn textile articles, sets, worn clothing and worn textile articles, sets, worn clothing and worn textile articles, sets, worn clothing and worn textile articles, sets, worn clothing and worn textile articles, sets, worn clothing and worn textile articles, sets, worn clothing and crocketed  Tobacco and parts thereof  Theadgear and parts thereof  Timbrellas, sun umbrellas, variating-les, seat- sticks, whisp, riding-crops and parts thereof  Timbrellas, sun umbrell		pastrycooks* products		4 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
Miscellaneous edible preparations Beverages, spirits and vinegar Residues and waste from the food industries; prepared animal fodder Tobacco and manufactured lobacco substitutes Salt; sulphur, earths and stone; plastering materials, lime and cement Cores, stag and ash Mineral fuels; mineral oils and products of their distillation; platfuminous substances; mineral waves Inorganic chemicals; organic or inorganic compounds of precious metals, of rare-earth metals, of radioactive elements or of isotopes Corganic chemicals Pharmaceutical products Fertilizers Tanning or dyeing exracts, tannins and their derivatives; dyes, pigments and other mastics, inks Sesential oils and resinoids; perfurnery, cosmetic or toilet preparations, subficeting preparations, subficeting preparations, subficeting preparations, subficeting preparations, subficeting preparations, subficeting preparations, andles and similar articles, modelling pastes, dental waves and dental preparations with a basis of plaster Albuminoidal substances, modified starches, pyrophoric alloys, certain combustible preparations  Knitted or crocheted of Articles of apparel and clothing accessories knitted or crocheted  Articles of apparel and clothing accessories knitted or crocheted  Articles of apparel and clothing accessories knitted or crocheted  Cher made-up textile articles, sets, worn clothing and worn textile articles, sets, worn clothing and worn textile articles, rags  Footwear, gaiters and the like, parts of such articles  Feducies, of rare-earth metals, of radioactive elements or of some and parts thereof  Umbrellas, sun umbrellas, walking-sticks, seat-sticks, whips, riding-crops and parts thereof  Headgear and parts thereof  Umbrellas, van umbrellas, walking-sticks, seat-sticks, whips, riding-crops and parts thereof  Feathers or of down; artifices of human hair Articles of stone, plaster, cerment, asbestos, mica or similar materials  Geramic products  Sas and glassware  Natural or cultured pearis, precious or semi-precious stones, precious metals, meta	20	Preparations of vegetables fruits, nuts or other parts of	59	Impregnated coated covered or laminated textile labels,
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animal fodder  74 Tobacco and manufactured lobacco substitutes  75 Sati, sulphur, earths and stone; plastering materials, time and cement  76 Ores, stag and ash  77 Mineral fuels, mineral oits and products of their distillation; bituminous substances; mineral waxes  78 Inorganic chemicals; organic or inorganic compounds of precious metals, of rare-earth metals, of radioactive elements or of isotopes  79 Organic chemicals  70 Organic chemicals  70 Organic chemicals  71 Fertilizers  72 Tanning or dyeing exracts, tannins and their derivatives; dyes pigments and other colouring matter; paints and varnishes; putty and other mastics, inks  70 Essential oils and resinoids perfumery, cosmetic or toilet preparations, lubricating preparations, artificial waxes, prepared waxes, possibling or scouring preparations, candles and similar articles, modelling pastes, dental waxes' and dental preparations with a basis of plaster  70 Explosives, pyrotechnic products, matches, pyrophoric alloys, certain combustible preparations  70 Explosives, pyrotechnic products, matches, pyrophoric alloys, certain combustible preparations  71 Tobacco and manufactured lobacco substitutes or crocheted crocheted  72 Other made-up textile articles, sets, worn clothing and worn textile articles, sets, worn clothing and worn textile articles, sets, worn clothing and worn textile articles, sets, worn clothing and worn textile articles, sets, worn clothing and worn textile articles, sets, worn clothing and worn textile articles, sets, worn clothing and worn textile articles, sets, worn clothing and worn textile articles, rags  72 Footwear, gaiters and the like, parts of such articles freeof  73 Headgear and parts thereof  74 Headgear and parts thereof  75 Urmbrellas, sun umbrellas, valking-sticks, seat-sticks, whips, riding-crops and parts thereof  76 Urmbrellas, sun umbrellas, valking-sticks, seat-sticks, whips, riding-crops and parts thereof  78 Fertilizers  87 Estableary articles made of feathers and down and articles made of feathers or of down; ar	22		<del>5</del> 1	
Tobacco and manufactured tobacco substitutes  Salt sulphur, earths and stone:plastering materials, time and cernent  Ores, stag and ash  Tomineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes inorganic chemicals; organic or inorganic compounds of precious metals, of rare-earth metals, of radioactive elements or of isotopes  Organic chemicals  Tanning or dyeing exracts, tannins and their derivatives; dyes, pigments and other colouring matter; paints and variishes; putty and other mastics, inks  Salt Supporganic surface-active agents, washing preparations, candles and similar articles, modeling paster, dental waxes, prepared waxes, polishing or scouring preparations, candles and similar articles, modeling pastes, dental waxes and dental preparations with a basis of plaster  Explosives, pyrotechnic products, matches, pyrophoric alloys, certain combustible preparations  Salt supposition and stone; plastering materials, time and content waxes and dental preparations.  Total articles articles, sets, worn clothing and worn textile articles, sets, worn clothing and worn textile articles, sets, worn clothing and worn textile articles, sets, worn clothing and worn textile articles, sets, worn clothing and worn textile articles, sets, worn clothing and worn textile articles, rags  Chemicals of souch salticles, rags  Footwear, gaiters and the like, parts of such articles  Headgear and parts thereof  Umbrellas, sun umbrellas, watking-sticks, seat-sticks, whips, riding-crops and parts thereof  Prepared feathers and down and articles made of feathers or of down; artifical flowers; articles of human hair Articles of stone plaster; cernent, asbestos, mica or similar materials  Ceramic products  Gass and glassware  Natural or cultured pears, precious or semi-precious stones, precious metals, metals clad with precious and articles thereof in the fixe parts of our cultured pears, precious or semi-precious stones, precious metals metals and articles thereof  Nickel and articles thereo	23	Residues and waste from the food industries; prepared		
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Pharmaceutical products  Fertilizers  Tanning or dyeing exracts tannins and their derivatives; dyes pigments and other colouring matter paints and varnishes; putty and other mastics, inks  Essential oils and resinoids: perfumery, cosmetic or toilet preparations  Soap, organic surface-active agents, washing preparations, candles and similar articles, modelling pastes, dental waxes, and dental preparations with a basis of plaster  Albuminoidal substances, modified starches, glues, enzymes  Feathers or of down; artificial flowers; articles of human hair Articles of stone plaster, cement, as bestos, mica or similar materials  Ceramic products  Glass and glassware  Natural or cultured pearls, precious or semi-precious stones, precious metals, metals clad with precious metal and articles thereof; imitation jewellery; coins  Fertilizers  Articles of stone plaster, cement, as bestos, mica or similar materials  Ceramic products  Followers; articles of human hair  Articles of stone plaster, cement, as bestos, mica or similar materials  Ceramic products  Followers; articles of human hair  Articles of stone plaster, cement, as bestos, mica or similar materials  Ceramic products  Followers; articles of human hair  Articles of stone plaster, cement, as bestos, mica or similar materials  Ceramic products  Followers; articles of stone plaster, cement, as bestos, mica or similar materials  Ceramic products  Followers; articles of stone plaster, cement, as bestos, mica or similar materials  Ceramic products  Followers; articles of stone plaster, cement, as bestos, mica or similar materials  Followers; articles of stone plaster, cement, as bestos, mica or similar materials  Followers; articles of stone plaster, cement, as bestos, mica or similar materials  Followers; articles of stone plaster, cement, as the specials of the materials  Followers; articles of stone plaster, cement, as the specials of the stone plaster, cement, as the specials of the materials  Followers articles of stone plaster, cement, as the specials of the ston		· · · · · · · · · · · · · · · · · · ·		Mississing the parts district made of the parts of the pa
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dyes pigments and other colouring matter paints and varnishes; putty and other mastics; inks  Essential oils and resinoids: perfumery, cosmetic or toilet preparations  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  Albuminoidal substances, modified starches, glues, enzymes  Ceramic products  Glass and glassware  Natural or cultured pearls, precious or semi-precious stones, precious metals and articles thereof; imitation jewellery; coins  tron and steel  Copper and articles thereof  Nickel and articles thereof  Nickel and articles thereof  Aluminium and articles thereof  (Reserved for possible future use in the harmonized system)  Lead and articles thereof			50	
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Essential oils and resinoids perfumery, cosmetic or toilet preparations  34 Soap organic surface-active agents washing preparations, fubricating 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  35 Albuminoidal substances, modified starches, glues, enzymes  36 Explosives, pyrotechnic products, matches, pyrophoric alloys, certain combustible preparations  37 Natural or cultured pears, precious or semi-precious stones, precious metals and articles thereof (imitation jewellery; coins tron and steel (iron and steel)  37 Articles of iron or steel (iron or steel)  38 Copper and articles thereof (includes thereof)  39 Albuminoidal substances, modified starches, glues, enzymes  30 Explosives, pyrotechnic products, matches, pyrophoric alloys, certain combustible preparations  31 Natural or cultured pears, precious or semi-precious stones, precious metals and articles thereof; imitation jewellery; coins (iron and steel)  30 Articles of iron or steel (iron and articles thereof)  31 Natural or cultured pears, precious or semi-precious stones, precious metals and articles thereof; imitation jewellery; coins (iron and steel)  32 Articles of iron or steel (iron and articles thereof)  33 Albuminoidal substances, modified starches, glues, enzymes (iron and steel)  34 Copper and articles thereof (iron or steel)  35 Albuminoidal substances, modified starches, glues, enzymes (iron and steel)  36 Explosives, pyrotechnic products, matches, pyrophoric system)  38 Lead and articles thereof		, ,,		·
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Soap organic surface-active agents washing preparations, fubricating preparations, subficial waxes, prepared waxes, polishing or scouring preparations, candles and similar articles, modelling pastes, dental waxes' and dental preparations with a basis of plaster  35 Albuminoidal substances, modified starches, glues, enzymes  36 Explosives, pyrotechnic products, matches, pyrophoric alloys, certain combustible preparations  37 Articles of iron or steel Copper and articles thereof Nickel and articles thereof Aluminium and articles thereof (Reserved for possible future use in the harmonized system) Lead and articles thereof	33		/1	etable procious metals metals clad with precious metal
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  35 Albuminoidal substances, modified starches, glues, enzymes  36 Explosives, pyrotechnic products, matches, pyrophoric alloys, certain combustible preparations  72 Iron and steel 73 Articles of iron or steel 74 Copper and articles thereof 75 Nickel and articles thereof 76 Albuminium and articles thereof 77 (Reserved for possible future use in the harmonized system) 78 Lead and articles thereof				
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candles and similar articles, modelling pastes, dental waxes' and dental preparations with a basis of plaster  Albuminoidal substances, modified starches, glues, enzymes  Explosives, pyrotechnic products, matches, pyrophoric alloys, certain combustible preparations  74 Copper and articles thereof Nickel and articles thereof Aluminium and articles thereof (Reserved for possible future use in the harmonized system)  Read and articles thereof  18 Lead and articles thereof		• • • • • • • • • • • • • • • • • • • •		
waxes' and dental preparations with a basis of plaster  3S Albuminoidal substances, modified starches, glues, enzymes  36 Explosives, pyrotechnic products, matches, pyrophoric alloys, certain combustible preparations  75 Nicket and articles thereof  76 Aluminium and articles thereof  77 (Reserved for possible future use in the harmonized system)  78 Lead and articles thereof		• • • • • • • • • • • • • • • • • • • •		
Albuminoidal substances, modified starches, glues, enzymes  Albuminoidal substances, modified starches, glues, enzymes  Explosives, pyrotechnic products, matches, pyrophoric alloys, certain combustible preparations  Aluminium and articles thereof (Reserved for possible future use in the harmonized system)  The system of the harmonized system (Reserved for possible future use in the harmonized system)		• • • • • • • • • • • • • • • • • • • •		
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alloys certain combustible preparations 78 Lead and articles thereof			"	
and/sicertain communicae brehararous	36		78	
37 Photographic or cinematographic goods			10	file and integra and ex.
	37	Photographic or cinematographic goods		

#### **CHAPTER CODE LIST**

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

TABLE 2.3.21 Import Consumer Goods Forecast Volume in Thrace Region

unit : ton

-	Impo	rt volume in 19	2005	2015	
Chapter	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 cargo volume as materials and products are adopted from the data of Standard unit rate of "Overview of Port input and output cargo volume classified by type of industry from 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

	Dom	estic	Internati	International		
	Loading	Unloading	Export	lmport		
Sand	0	5,160,000	0	0	5,160,000	
Cement	o	500,000	. 0	0]	500,000	
Clinker	0	0	312,000	0	312,000	
Coal	o	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	o	0	95,000	95,000	
Wheat	0	0	1,333,000	176,000	1,509,000	
Sunflower seed	0	n	0	214,000	214,000	
Cotton seed	1 0	o	0	41,000	41,000	
total	Ō	5,794,000	1,645,000	1,280,000	8,719,000	

Liquid bulk

ton

-	Dom	estic	Inter	Total	
	Loading	Unloading	Export	Import	
Food oil	0	30,000	•	162,000	192,000
total	0	30,000		0 162,000	192,000

Non container general cargo

ton

	Dom	estic	Interna	Total	
	Loading	Unloading	Export	Import	
Stecl	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	o	0	152,000	0	152,000
Fertilizer	0	90,000	0	0	90,000
Wheat	50,000	o	0	0	50,000
กงก	0	82,510	0	371,295	453,805
Machinery	39,719	0	59,578	36,316	135,613
Stones	3,366	. 1	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

ton

	Dom	estic .	Internat	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

Dry bulk				, te	on
	Dome	estic	Internati	onal	Total
	Loading	Unloading	Export	Import	
Sand	0	8,172,000	0	0	8,172,000
Cement	l o	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	o	0	953,000	953,000
Lumber	0	0	0	187,000	187,000
Wheat	0	ol	1,791,000	305,000	2,096,000
Sunflower seed	l o	0	0	372,000	372,000
	Ö	0	0	72,000	72,000
Cotton seed total	0	11,422,000	2,446,000	2,079,000	15,947,000

# Liquid bulk

Liquid Ottik					ton
	Dom	estic	Interna	itional	Total
÷	Loading	Unloading	Export	Import	The state of the s
Food oil	0	30,000	0	162,000	
total	0	30,000	0	162,000	192,000

# Non container general cargo

Non container genera	ii Caigo			to	n
	Dome	estic	Internati	onal	Total
	Loading	Untoading	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	ol	265,000	0	265,000
Fertilizer	0	90,000	0	o	90,000
Wheat	50,000	0	0	0	50,000
	0,000	69,159	0	564,802	633,961
Iron	83,229	0	124,842	76,099	284,170
Machinery	5,995	29,044	11,989	0	47,028
Stones	3,993	27,011	0	197,000	197,000
Pulp	236,054	242,853	636,807	1,007,064	2,122,778
total	230,034	212,035		<del></del>	<del>~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~</del>

# Container general cargo

Container general cargo					on
	Dome	estic	Internati	ional	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
· · · · · · · · · · · · · · · · · · ·	0	lo	165,392	4,974	170,366
Agri, products	0	أه	0	140,179	140,179
Consumer goods 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;

$$X_n = (x_n + a \times G_n)/(1+a) + b \times (G_n - g_n)$$
  $n=1 \sim 4$ :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
- 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;

 $\mathbf{X}_{\mathbf{n}} = \mathbf{x}_{\mathbf{n}} + \mathbf{b} \times (\mathbf{G}_{\mathbf{n}} - \mathbf{g}_{\mathbf{n}})$ 

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.

TARIE 23.23 Distribution of cargo volume by type in 2005

TABLE	<b>2.3.23</b> Distrib	ution of car	go volume b	y type in 20	U3 <u>(</u>	Unit ton)
***********	Hinterland	1.Thrace	2 (zmit	3 Balkesir	4.Canakkale /	\rea Total
Export	<b>ਰਿਜ਼ਵਾ</b> ਡੀ	1,121,000	3,001,000	445,000	33,000	4,600,000
•	i Uniceland share?	24 33	65.23	967	0.7 <i>t</i>	
Export	Dry	1,161,000	1,004,000	1,535,000	0	3,100,000
•	Hiptoriend share**	31 39	25.11	41.48	603	
Export	Liquid	0	100,000	. 0	0	100,000
•	1 linterland share**	0.00	100 00	. 0.00	0.00	
Export	Sub total	2,282,000	4,105,000	1,980,000	33,000	8,400,000
-	Hinterland thate's	27.17	48.87	2357	039	
Import	General	1,921,000	4,496,000	424,000	58,000	6,900,000
•	ો ક્લિલ્લો કહે કોસ્ટલ્લ્લ	27.84	65 17	6.15	024	
Import	Dry	1,127,738	4,224,506	632 594	115,000	6,100,000
•	Herderland share*•	18.6	69.25	10 3 <sup>-</sup>	1.89	
Import	Liquid	(	495,000	5,000	0	500,000
- •	{{interland share*	0.00	98.96	1.04	0 00	
Import	Sub total	3,049,000	9,216,000	1,062,000	173,000	13,500,000
-	l Enterioral Marcas	22.53	68.26	; <u>7.9</u> -	1.28	
Domestic	General	481,000	860,000	93,000	67,000	1,500,000
	l linteriared share*-	32 0:	5 57.30	, K19	4,43	
Domestic	Dry.	7,632,000	1,955,000	508,000	305,000	10,400,000
	Hinterland share**	73.3	9 7.0.75	, 1,89	2 93	
Domestic	Liquid	3,000	324,000	73,000	0	400,000
	Hinterland share*	0.8	3 81.0	18.13	0.00	
Domestic	Sub total	8,116,000	3,138,000	674,000	372,000	12,300,000
	l Enterland share*	65.9	8 25.5	5.48	302	
Total		13,447,00	16,459,600	3,716,000	578,000	34,200,000
	Hinterland sharens	39.3	2 481.	3 1087	1.69	
Total	General	3,523,00	8,357,000	962,000	158,000	13,000,000
	Hinterland share*s	27.8	0 64.2	g 7.45	121	
	Container(TEU)	274,00	633,000	60,000	10,000	978,000
3	Trasshipment(TEU)	46,00	0 4	) (	0	46,000
1	Non Container(ton)	897,00	0 2,015,000	230,000	58,000	3,200,000
Total	Dry	9,921,00	0 7,183,000	2,676,000	420,000	20,200,000
	โลยสาสส์ รักลาร <sup>®</sup> •	19.1	g 35.5	6 13.25	208	
Total	Liquid	3,00	0 919,00	78,000	0	1,000,000
	{ Enterland share*s	0.3	9.79	0 7,7	. 000	

TABLE 2.3.24 Distribution of cargo volume by type in 2015

<b>FABLI</b>	. 2.3.Z4 1	Astrib	mon of car	go volume	by type in 2	2015	(Unit: ton)
	Hinterland		t.Threce	2 Izmit	3.Belkesir	4 Canakkale	Area Total
Export	• .	General	2,608,000	6,980,000	1,035,000	76,000	10,700,000
	Historiand Gares		2438	65 23	<u></u> ያል፣	0.77	
Export		Dry	2,291,000	1,981,000	3,028,000	0	7,300,000
	Hinterland share?	÷	11.38	21.14	1).43	0 30	
Export		Liquid	0	100,000	0	0	100,000
	Hinterland share*•		0.00	100.00	0.00	a.oo	
Export		Sub total	4,899,000	9,061,000	4,063,000	76,000	18,100,000
	Hinterland there		27.07	50.06	22.45	0.42	·
Import		General	4,120,000	9,644,000	910,000	125,000	14,800,000
	Hanterland share*		27.84	65 17	615	0.84	
<b>I</b> mport		Dry	2,348,000	8,795,000	1,317,000	240,000	12,700,000
	Haterland share's		15.49	69.25	103"	1.89	
Import		Liquid	0	495,000	5,000	0	500,000
_	Hinterland share%		0.00	58.96	1.04	0.90	
Import		Sub total	6,468,000	18,935,000	2,233,000	- 365,000	28,000,00
	Hinterland share 6		2310	67.52	797	130	
Domestic		General	769,000	1,375,000	149,000	107,000	2,400,00
	Historiand share*		32 63	37.30	419	4.45	
Domestic		Dry ·	11,815,000	3,026,000	787,000	472,000	16,100,00
	! (ભાવોકાર્ય ક્રોસ્ટ <b>'</b> •		73.35	18 79	4.89	293	
Domestic		Liquid	3,000	324,000	73,000	Ó	400,00
	Hinterland share %		0.83	81.04	18 13	0.00	
Domestic		Sub total	12,587,000	4,725,000	1,008,000	579,000	18,900,000
	Hinterland share*•		66.60	25 00	534	3.96	
Total			23,955,000	32,721,000	7,304,000	1,020,000	65,000,00
	Hinterfand share a		36.85	50 34	11:24	1.57	
Total		General	7,498,000	18,000,000	2,094,000	308,000	27,900,00
	l linterland share o		26.87	64 52	7.51	1.10	
	Container(IEU	)	580,000	1,342,000	127,000	20,000	2,070,00
1	rasshipmen!(TE	ប)	108,000	0	0	o	108,00
ı	Von Container(to	ก)	1,807,000	4,150,000	478,000	104,000	6,540,00
Total		Dry	16,454,000	13,802,000	5,132,000	712,000	36,100,00
	। शिल्लाकर्व और १९७०	-	45,58	38 23	1422	197	
Total		Liquid	3,000	919,000	78,000	0	1,000,000
	Hinterland share%	-	0 33	91.00	7,77	0.00	-

FIGURE 2.3.10 Share of Hinterland by Cargo Type

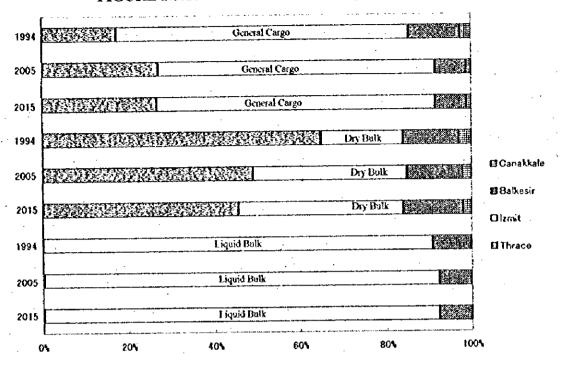
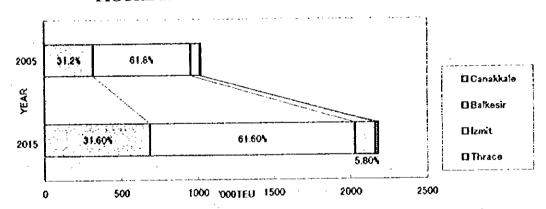


FIGURE 2.3.11 Share of Container Cargo Volume



## 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 transshipped 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 mites 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.

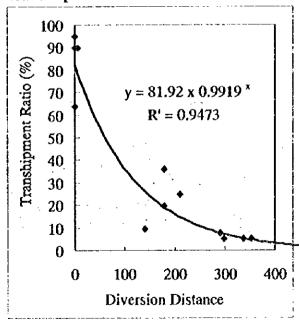
On the other hand, the future total volume of container traffic which goes in and out from the Black Sea by passing through the Sea of Marmara is shown in Table1.2.21. Based on the share of the Black Sea region and the other area of Russia in 1994, it amounts to 493,000 TEUs in 2005 and 849,000 TEUs 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 Transhipment Ratio and Diversion Distance at Mediterranean

	Container	Transhipment	Transhipment	Diversion D	istance
	Traffic	Traffic	Ratio	Required to Call at	
	('000')	TEU)	(%)	(Nautical Miles)	(Hours)
West Mediterranean					
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		
East Mediterranean					
Damietta	520	493	95	<b>0</b>	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
Grand Total	6,439	2,364	37		

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

			7 01 010							
			1991							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

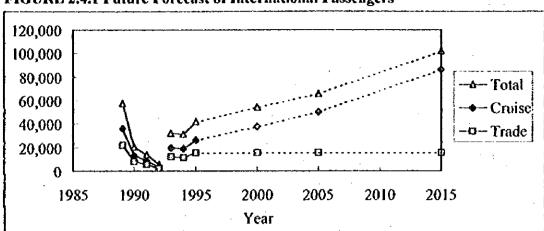


FIGURE 2.4.1 Future Forecast of International Passengers

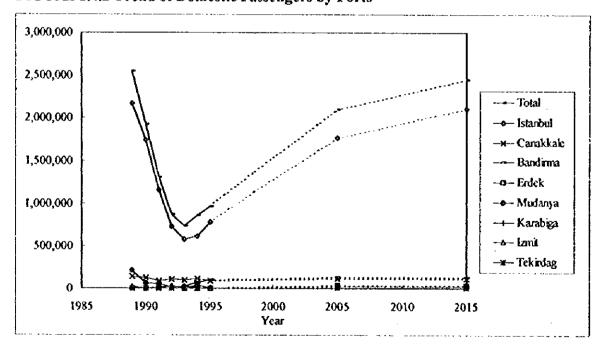
### 2.4.2 Domestic

E

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 Bosporus Bridge in 1988 but rebounded once the capacity of the bridge was reached

Dise CanakkaleEml Dise Erdek Emb Dise Istanbul Emb	Fotal mbarked	n.a. 74,563 68,859 143,421	1990 n a 62,387 57,356 119,743	40,987	1992 n.a. 53,832 50,578 104,410	47,898	35,913 73,851 55,504 54,407	49,032 98,116 42,287	2005 127,039	2015 127,105
Disc CanakkaleEmb Disc Erdek Emb Disc Istanbul Emb	oarked Fotal embarked oarked Fotal embarked oarked Fotal	n.a. 74,563 68,859 143,421	62,387 57,356 119,743	44,885 40,987	53,832 50,578	12,660 29,275 49,759 47,898	35,913 73,851 55,504 54,407	49,032 98,116 42,287	127,039	
Disc Canakkale Emb Disc Erdek Emb Disc Istanbul Emb	Fotal mbarked parked Fotal embarked parked Fotal	74,563 68,859 143,421	62,387 57,356 119,743	44,885 40,987	53,832 50,578	29,275 49,759 47,898	73,851 55,504 54,407	98,116 42,287	127,039	127,105
Disc Canakkale Emb Disc Erdek Emb Disc Istanbul Emb	embarked parked Fotal embarked parked Fotal	68,859 143,421	57,356 119,743	40,987	50,578	49,759 47,898	55,504 54,407	42,287	127,039	127,105
Canakkale Emb Dise Erdek Emb Dise Istanbul Emb	oarked Fotal embarked oarked Fotal	68,859 143,421	57,356 119,743	40,987	50,578	47,898	54,407			
Erdek Emb Disse Istanbul Emb	Fotal embarked parked Fotal	143,421	119,743					41.318		
Erdek Emb Dise Dise Istanbul Emb	embarked oarked Fotal	.,,		85,872	104,410	ሰን ፈረን				
Erdek Emb Dise Istanbul Emb	arked Fotal		n a			77,007	109,911	83,604	109,911	109,911
Dise Istanbul Emb	Fotal	n.a.	n a			1,059	19,375	1,020		
Dise Istanbul Emb			<del></del> -	n.a.	n.a.	856	19,123	1,062	•	
Istanbul Emb	mbarked					1,915	38,498	2.082	38,498	38,498
		964,784	779,402	517,700	336,317	278,457	306,289	379,586		
	arked	1,205,443	962,032	633,507	389,912	297,257	304,172	398,867		•
	<b>Fotal</b>	2,170,228	1,741,434	1,151,207	726,229	575,714	610,461	778,452	1,763,197	2,106,557
Izmit Dise	mbarked	7,110	9	2,904	2,770			0		
(Kocaeli) Emb	arked	9,507	1	9,400	22,966	553	81	0		
	l'otal	16,617	11	12,304	25,736	1,680	244	0	25,736	25,736
Dise	mbarked	0	0	1,185	2,038	2,794	3,988			·
Karabiga Emb	parked	0	0	1,132	1,473	2,920	2,532	n a.		
, , , , , , , , , , , , , , , , , , ,	[otal	0	0	2,318	3,511	5,714	6,520		6,986	6,986
Dise	mbarked	108,173	28,956	29,573	4,833	9,549	8,787			·····
Mudanya Emb	varked	102,722	31,739	21,275	3,789	3,783	7,864	n.a.		
	Fotal -	210,895	60,695	50,847	8,621	13,332	16,651	100	24,393	24,556
Dise	mbarked	1,747	397	0	0	4,154	0	0		
Tekirdag Emb	arked	1,395	412	0	0	1,993	0	0	•	
	Fotal ·	3,141	808	. 0	0	6,147	0	. 0	6,147	6,147
Disc	mbarked	1,156,377	871,151	596,247	399,790	363,514	432,044	471,976		
Total Emb	arked	1,387,926	1,051,539	706,301	468,718	367,920	424,092	490,278		
	Total :	2,544,303	1,922,6911						2 101 007	ኃ ለለፍ ለሴፍ

FIGURE 2.4.2 Trend of Domestic Passengers by Ports



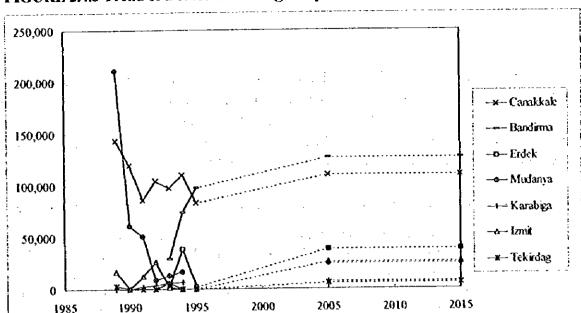


FIGURE 2.4.3 Trend of Domestic Passengers by Ports

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.

Year

## 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 Haydarpasa, Derince and Bandirma over the last 11years 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 Haydarpasa (1985-1995)

NR'	ľ	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		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	l .	24	142	11	17	32	81	90	99	172	127
5,001 -	6,000	•	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
Tota	1									2,116		
Average			2,398	3,035	2,582	2,058	2,007	2,117	2,047	2,371	2,437	2,556
Cargo Thre	oughput	n.a.	2,953	3,275	3,170	2,897	3,231	3,411	3,566	4,074	3,563	4,727

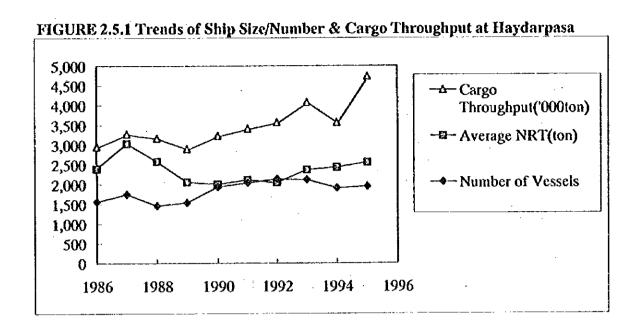


TABLE 2.5.2 Number of Ship Arrivals by NRT Group - Port of Derince (1985-1995)

NR	r	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
Tota	al	301	311	531	475	476	728	462	496	702	571	818
Average	NRT	2,529	2,293	2,422	2,193		2,196	3,892			1,815	
Cargo Thr	oughput	n.a.	434	1,037	598	866	2,381	824	975	1,590	1,000	1,223

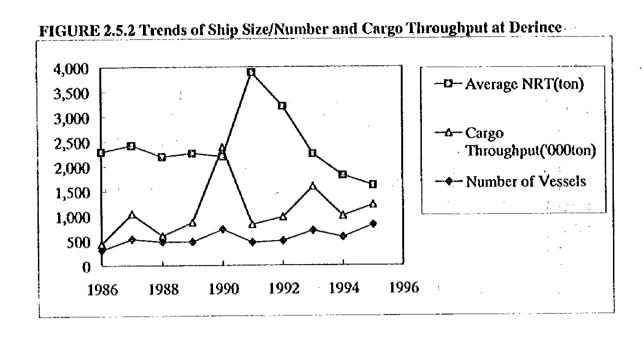
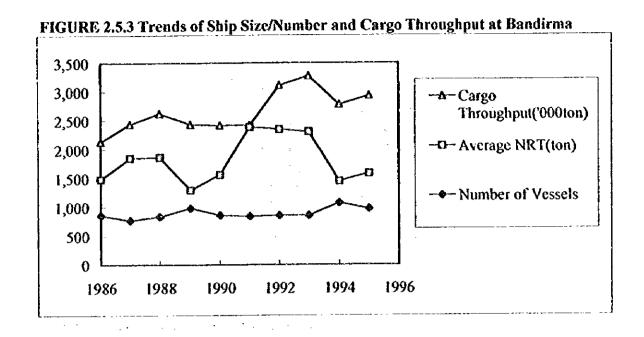


TABLE 2.5.3 Number of Ship Arrivals by NRT Group - Port of Bandirma (1985-1995)

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		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		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
•	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
Total	1	1,197	858	771	838	981	858	843	856	857	1,073	972
Average	NRT		1,484							2,304		
Cargo Thro		n.a.	2,133	2,440	2,619	2,433	2,417	2,423	3,108	3,270	2,778	2,928



#### 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.

$$Log G.R.T = -0.670 + 1.140 log D.W.T$$

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 vesel 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  $\sim$  6,800 TEU or 75,000  $\sim$  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

<del></del>	
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 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	200	5	20	15
	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

yea	:r	quantity	Total D.W.T.	Ave. D.W.T.
198	6	446	1,309,145	2,935
198	7	454	1,393,105	3,069
198	8	457	1,388,738	3,039
198	9	452	1,340,782	2,966
199	0	454	1,335,411	2,941
199	1	453	1,367,741	. 3,019
199	2	460	1,344,362	2,923
199	3	472	1,404,568	2,976
199	4	479	1,468,784	3,066
199	5	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  $2,001\sim3,000$  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 Calis

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 2005				
	Vessel ty	pe	Loading ratio	Calling times
	DWT	TEU		/ year
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	3,000	•	0.5	123
International	15,000		0.6	105
Dry bulk cargo				
Domestic	2,000		1.0	2,897
International				
Grain	30,000		0.6	84
Sunflower	2,500		0.9	114
Other dry bulk	9,500		0.7	175

Year	201	4
r ear	201	Э

	Vessel type		Loading ratio	ratio Calling times	
	DWT	TEU		/ year	
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

## 3.1Evaluation 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" (hereinaster the Report), which had been implemented by Istanbul Technical University, Faculty of Civil Engineering on behalf of DLH. 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

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  $30,000DWT \sim 35,000DWT$  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.

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