Container traffic flow through Gioia Tauro port in the international and italian context

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A general description of container traffic relationships, that involve the European area, constitutes a fundamental element for the evaluation of actual and potential traffic flows through Gioia Tauro hub port.

According to many researchers, container traffic volumes via sea concerning the European continent have increased from 11.3 to 15.8 million of TEUs (around 40%) during the period 1991-'96. European traffic travels through two separate port systems: the first one corresponds to the coastal range from Le Havre to Hamburg, known as 'Northern Range'; while the second, denominated 'Southern Range', includes all Mediterranean ports from Algeciras to Pireus.

This paper firstly illustrates the traffic dynamics of container freights in the European context and secondly presents the container traffic flow through the port of Gioia Tauro. The spatial, temporal and modal split of arriving and departing containers to/from Gioia Tauro are considered. Finally, the development perspectives of traffic volumes are outlined, in relation to the forecasted growth of the European port system.

Analyses have been conducted during a two-year research project, whose title is: "Evaluation of the potentialities of the Gioia Tauro intermodal terminal for the development of the Calabrian economy and role of minor Calabrian ports". The research was supported by Calabrian Region Administration (P.O.P. European Program).

1 Introduction

Container traffic has experienced a tumultuous growth in the last decade, caused by the necessity to create the greatest economies of scale from the multinational shipping companies that manage the international transport sea services. The use of container has revealed decisive in reducing handling costs, maritime and land interchange costs, and in optimizing the transportation chain from origin to destination.

Few general numbers can give an idea of the phenomenon's dimensions:

- world container traffic has passed from 37 million of TEUs in 1980 to 87 million in 1990, to 154 million in 1996;
- in Europe the growth was from 11.3 million of TEUs in 1991 to 15.8 million in 1996, with an increase of 40%;
- in Italy the traffic has increased from 1.2 million of TEUs in 1980 to 1.7 million in 1993, to 5.0 million in 1997.

Concerning the European context, the growth rates have been different in the northern and southern areas: the north-European ports (Northen Range) have received advantages by numerous factors like the presence of wide productive basins in their hinterland, the presence of an efficient inland transportation network, the high experience skill in the field of intermodal and combined traffic. However, the great activity of some Mediterranean ports (Gioia Tauro, Marsaxlokk, Algeciras) has favoured a progressive reduction of the initial gap in the last years. Such catching up depends on several factors. Among the others, we can mention the increasing ports' competitiveness caused by the acquisition of new technologies and job organization, the start up of new commercial relationships with other geographical areas as the Middle East and South-East Asia, a new organization of transportation sea services that aim to shorten the routes of "pendulum lines" that connect Far East and North America, crossing the Mediterranean Sea.

The paper draws a general description of traffic relationships that involve the European area and Gioia Tauro port. After a brief recognition on the actual container traffic volumes on a international and European scale, the attention is focused on Italian container traffic and on the role played by Gioia Tauro port. Finally, some development perspectives are discussed.

2 The international context

The world container traffic has had a remarkable increase in the decade 1987-'96, with great intensity during the nineties. It is interesting to observe how container traffic volumes increased in the main economic world areas (Tab.1): the three-year period 1993-'96 recorded the most remarkable growth in every regional context. The European area experienced an increase of 30.6% during the 1993-'96, while the growth was of 19.5% in the previous three years.

Year	*1987*	*1990*	*1993*	*1996*
Europe	19.01	23.24	27.76	36.26
East/South West Asia	22.14	32.24	47.61	67.09
North America	14.24	16.49	8.48	23.60
Others	11.77	14.47	20.66	27.32
Total	67.16	86.64	114.51	154.27

Source: DRI/McGraw-Hill (1998)

Tab. 1 Container traffic in the '87/'96 decade. Million of TEUs

2.1 Container traffic evolution in Europe

The dynamics of the world container traffic has been very active in the Euro-Mediterranean area, due to its position

along the maritime routes from Europe to the Far East.
During the period 1991-'96, the total traffic volumes show a strong prevalence of the Northern Range in absolute terms. The Northern Range accounts for 75% of the European shipping container traffic with the rest of the world. Tab. 2 shows the evolution of the market both on import and export side.

Year	Northen Europe Import	Export	Total	Var%	Southern Europe Import	Export	Total	1,5
1991	4,031	4,164	8,195	-	1,220	1,400	2,620	-
1992	4,149	4,319	8,468	3.3	1,246	1,505	2,751	5.0
1993	4,177	4,811	8,988	6.1	1,212	1,828	3,040	10.5
1994	4,527	5,003	9,530	6.0	1,465	2,014	3,479	14.4
1995	4,623	5,299	9,922	4.1	1,305	2,399	3,704	6.5
1996	5,248	5,722	10,970	10.6	1,615	2,376	3,991	10.8
1991-'96				30.1				47.2

(Elaboration from DRI/McGraw-Hill data, 1998)

Tab. 2 Container traffic dynamics in Europe in 1991-'96. (TEUsx1000)

Nevertheless, the traffic growth rate is a clear signal of the future trends: the Southern Range is seriously threatening the Northern range leadership in attracting new traffic (+47.2% in the Mediterranean ports against +30.1% in the North European ones). Furthermore, the total traffic volume involving the Euro-Mediterranean area is almost continuously increasing.
The countries of the European trade are essentially the same between Northen and Southern Ranges: United States and Far East (China, Japan, Hong Kong).
Origin and destinations of Euro-Mediterranean traffic show clearly that the amount of trans-oceanic traffic is around 85-90% (Tab.3). The transoceanic traffic accounted for 13.7 million of TEUs in 1996, while the intra-european traffic accounted for 2.0 million of TEUs. Nevertheless, the former has undergone a continuous growth during the decade, while the latter had a fluctuating trend.

Year	Total European TEUs*1000	Trans-Oceanic TEUs*1000	%	Intra-European TEUs*1000	%
1991	11,347	9,677	85.3	1,670	14.7
1992	11,778	10,318	87.6	1,460	12.4
1993	12,673	10,917	86.1	1,756	13.9
1994	13,566	11,751	86.6	1,815	13.4
1995	14,452	13,035	90.2	1,417	9.8
1996	15,862	13,778	86.9	2,084	13.1

Source: DRI/McGraw-Hill (1998)

Tab. 3 Container traffic with Europe as Origin/Destination (1991-1996)

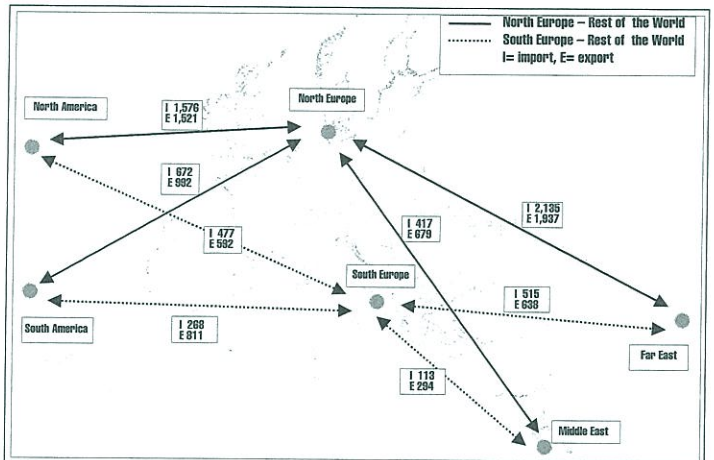
The analysis has been extended to the main routes departing from Europe to the rest of the world (ISFORT, 1998): they are usually distinguished between the East-West direction and the North-South direction. Along the East-West direction, it is possible to identify the Europe-Far East route (passing through the Suez Channel) and the Europe-North America route. Along the North-South direction, Europe-Middle East, Europe/Africa and Europe/Southern and Central America routes can be mentioned.

In Tab. 4, all the volumes related to these routes are presented dividing them between import and export traffic passing through the Northern and the Southern Ranges. Trans-Oceanic container traffic through the Northern Range accounts for 70.8% in import and 60.6% in export along the East-West direction with a slight prevalence for Europe-Far East route. In the Southern Range, East-West routes are dominant too (61.2% in import and 41.2% in export).
A graphical scheme of the traffic split along the above routes is presented in Fig. 1.

	Routes	North Europe Import TEUs	%	Export TEUs	%	South Europe Import TEUs	%	Export TEUs	%
A	Europe-Far East	2,135	40.7	1,937	34.0	515	32.0	638	21.4
B	Europe-North America	1,576	30.1	1,521	26.6	477	29.6	592	19.8
C	Europe-Middle East	417	7.9	679	11.9	113	7.0	294	9.8
D	Eur.-Africa, Cent. e South Am.	672	12.8	723	12.6	268	16.6	811	27.1
E	Intra-European	391	7.5	811	14.2	230	14.4	652	21.9
A+E	Total	5,191	100.0	5,671	100.0	1,630	100.0	2,987	100.0
A+B	East - West	3,711	70.8	34.58	60.6	992	61.2	1,230	41.2

Source: ISFORT (1998)

Tab. 4 Import/export traffic volumes to/from Euro-Mediterranean area (1996)



Source: ISFORT (1998)

Fig. 1 Import/export traffic volumes to/from Europe (1996)

2.2 The European port systems.

Container traffic through South Europe port system clearly showed, during the years 1995-'98, greater growth rates than those of North Europe (80.0% in the Southern ports against 27.6% in the Northen ports).
Among Mediterranean ports, Gioia Tauro, Algeciras and Genova had the most relevant traffic volumes, while La Spezia suffered a decrease (-24.1%). Northen Europe ports experienced increases that go between 18.5% and 40.2%; Copenaghen port was against the general trend, even if it was not remarkable in absolute terms. (Tabb. 5 and 6).

Port	1995	1996	1997	1998	Δ% 95/98	Δ% 96/97	Δ% 97/98
Gioia Tauro	16	572	1,448	2,125	--	153.3	46.7
Algeciras	1,155	1,307	1,400	1,826	58.0	7.1	30.4
Genova	615	826	1,180	1,266	105.8	42.9	7.2
Barcellona	689	767	950	1,095	58.9	23.8	15.3
Valencia	672	710	790	1,006	49.7	11.2	27.3
Fos	499	547	619	660	32.3	13.3	6.6
La Spezia	965	871	615	732	-24.1	-29.4	19.0
Phyreus	600	575	600	900	50.0	4.3	50.0
Livorno	424	417	510	535	26.2	22.5	4.9
Total	*5,636*	*6,592*	*8,113*	*10,145*	*80.0*	*23.1*	*25.0*

Source: ISFORT (1998)

Tab. 5 Container traffic in the main South European ports (1995-1998). TEUs* 1000

Port	1995	1996	1997	1998	Δ% 95/98	Δ% 96/97	Δ%97/98
Rotterdam	4,787	5,000	5,340	6,010	25.5	6.8	12.5
Hamburg	2,890	3,054	3,300	3,550	22.8	8.0	75.7
Antwerp	2,329	2,654	2,950	3,265	40.2	11.2	10.7
Brehme	1,529	1,545	1,700	1,812	18.5	10.0	6.6
Le Havre	970	1,020	1,100	1,319	35.9	7.8	19.9
Zeebrugge	528	553	640	--	--	15.7	--
Goteborg	458	488	510	--	--	4.4	--
Helsinky	296	323	350	--	--	8.3	--
Copenaghen	178	173	160	--	--	-7.2	--
Total	*13,966*	*14,811*	*16,050*	--	*27.5**	*8.4*	*10.9**

**calculated for the first five ports. Source: ISFORT (1998)*

Tab. 6 Container traffic in the main North European ports (1995-1998). TEUs* 1000

According to the Italian General Transportation Plan (AA.VV, 1999), there are several reasons of the Euro-Mediterranean ports success:

- the extensive use of transhipment technique, that allowed to approach low-demand markets to the main international traffic routes;
- handling costs reduction inside the ports, highly favoured by an increasing job flexibility and the market opening to high-skilled private operators, able to invest in advanced technologies for terminal management;
- the port logistics development that allowed to reach great levels of reliability and fluidity in the door-to-door transport.

Mediterranean ports competitiveness increased due to an elevated frequency and diffusion of liner services. This was favoured by the transhipment technique application, using some hub ports like Gioia Tauro, Phyreus, Marsaxlokk, Damietta, Algeciras. Shipping companies could choose among many lines and routes that touched a great number of feeder ports. The transhipment activity was always accompanied by the use of direct services, which transport containers with the same ship from the origin port to the destination one.

In the evaluation of the two port systems, an important role is played by transit time. As a matter of fact, distances are not measured in geographical terms, but in terms of commercial advantages and logistic requirements.

Tabb. 7 and 8 show a comparison among transit times registered in some Italian and North- European ports concerning the routes towards Far East and North America. Concerning North America relationships, North European ports have shorter transit times; while there is a substantial equilibrium concerning Far East connections.

The reason of shorter transit times of Northern European ports is the fact that the 84% of the services offered by Italian ports are transhipment ones, while the total services of the North European are direct. On the other hand, the transhipment activity of Italian ports determines greater frequencies of the services, that allowed the Mediterranean port system to reduce the initial gap with the North European port system.

Focusing the attention on the Mediterranean Sea, meaningful differences emerge between West and East Mediterranean, concerning container traffic. West Mediterranean has a relative high traffic concentration and the presence of ancient and traditional ports as Genova, Fos and Barcellona with important roles in the Southern Range, and ports which have quickly assumed an important role in the shipping market as Algeciras, Marsaxlokk and Gioia Tauro.

On the contrary, a marked traffic dispersion among numerous minor ports persists in the East Mediterranean. These ports have to face many problems concerning effectiveness and inexpensiveness of port operations, despite recent meaningful progresses.

	Departures/week		*Minimum transit time (h)*	
Port	*Total*	*Tranship.*	*Direct services*	*Tranship.*
Genova	10.5	8.0	10.0	15.0
Livorno	11.2	9.0	11.0	16.0
Salerno	7.7	7.7	--	15.0
Hamburg	12.0	--	9.0	--
Rotterdam	12.0	--	7.0	--
Antwerp	15.0	--	9.0	--
Le Havre	10.0	--	7.0	--

Source: Italian general transportation plan (1999).

Tab. 7 Departures from some Italian and north European ports toward Usa and minimum transit time

	Departures/week		*Minimum transit time (h)*	
Port	*Total*	*Tranship.*	*Direct services*	*Tranship.*
Genova	10.5	8.0	10.0	15.0
Livorno	11.2	9.0	11.0	16.0
Salerno	7.7	7.7	--	15.0
Hamburg	12.0	--	9.0	--
Rotterdam	12.0	--	7.0	--
Antwerp	15.0	--	9.0	--
Le Havre	10.0	--	7.0	--

Source: Italian general transportation plan (1999).

Tab. 8 Departures from some Italian and north European ports toward Usa and minimum transit time

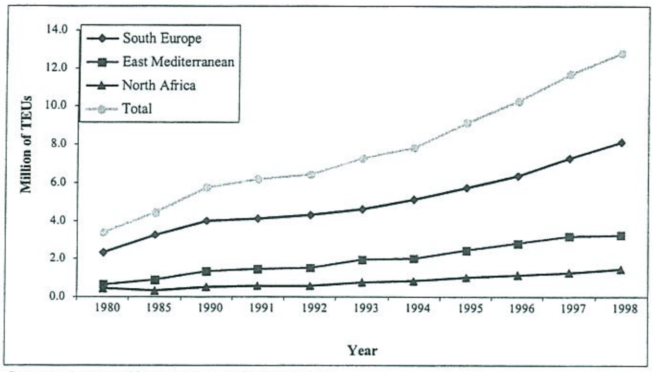
Figure 2 presents the historical series from 1980 to 1998 of container traffic volumes that involved countries which overlook the Mediterranean Sea. They have been grouped into three categories: South European countries (Italy, Spain, Greece, France, Portugal, Malta, Croazia, Montenegro, Gibiltair), East Mediterranean countries (Turkey, Israel, Lebanon, Syria, Ukraine, Romania, Slovenia, Bulgaria, Cyprus), North Africa countries (Egypt, Morocco, Algeria, Tunisia). South European countries have had the most important increases during the five-year period 1993-'98; while the two other groups showed inferior growth rates.

3 The situation in Italy

Italy is strongly dependent on maritime transport in commercial relationships with other countries: the maritime vector covers a share of around 50% of export traffic and around 60% of import. If we exclude oil products and solid fuels, these percentages go down to 10-15 %; however they remain meaningful.

Maritime transport plays a secondary role in relation to road and railway transport on the national scale (relationship 1:5).

On the whole, the Italian port system presents some weak elements, that concern an excessive number of minor ports, the lack of hierarchical organisation and high skills. There is an inertia in the transformation process towards intermodal terminals, open and free from bureaucratic ties. These problems arise because of lack of an "Italian port system" idea.



Source: Drewry Shipping Consultants (2000).

Fig. 2 Container traffic evolution in the Mediterranean Basin

On the other hand, encouraging signals are emerging: a great activity of some ports like Genova and Livorno, testified by increasing volumes of handling containers; the tendency to reduce the technological and organizational gap from the North European ports; the tendency towards a strong organization of the logistic chain at a national level (sea-land connections).

Tab. 9 presents handled TEUs volumes from 1996 to 1998 in the main Italian ports and the relative growth rates.

In 1995 the opening of Gioia Tauro port had determined the first effects on the whole national container traffic levels. It handled 29% of national transhipment traffic in 1997 and revitalized some South Italian ports like Salerno, Catania, Palermo, Bari. The statistics underline the weakness of the Adriatic ports (627.988 TEUs in 1998) in relation to Tyrrhenian ports (3.142.618 TEUs in 1998). Trieste had suffered a decrease in 1998 due to the political instability in the Balcanic region. Ravenna's decrease was partially caused by Ancona's growth, that has the same market basin. Venice port has slightly increased its traffic levels, because it constitutes an access door to the north-east Italian area. Finally, the NATO intervention in Serbia had further depressed Adriatic ports.

4 Container flow analysis through Gioia Tauro port

In the international shipping scenario, Gioia Tauro is now among the most important transhipment hub ports. Active since 1995, it quickly developed in terms of capacity and served demand and strongly contributed to redefine on a hierarchical base the role of the other Mediterranean and Italian ports. Gioia Tauro assumed a propulsive role for the other ports in the international maritime commerce, contributing to enhance their role in relation to their structural, dimensional and organizational characteristics. According to this logic, many ports manage now feeder traffic unthinkable few years ago and tend to create a wide Ro-Ro sea network.

The Ro-Ro services affirmation on the short distances can contribute to create an integrated and balanced transportation network, in which railway, road, maritime and air transport could coexist and reach a better balance.

Port	*1996*	*1997*	*1998*	*Δ% 96-98*
Ancona	44,792	69,177	75,004	67.45
Cagliari	24,450	25,485	25,626	4.81
Genova	825,752	1,179,955	1,265,593	53.27
Gioia Tauro	571,951	1,448,531	2,125,640	271.65
La Spezia	871,100	615,604	731,882	-15.98
Livorno	416,622	501,146	534,490	25.41
Napoli	246,206	299,144	319,686	29.84
Palermo	30,759	25,095	20,459	-33.49
Ravenna	190,784	188,223	172,524	-9.57
Salerno	190,032	219,454	250,846	32.00
Savona	20,081	13,465	14,495	-27.82
Trieste	176,939	204,318	174,080	-1.62
Venezia	166,947	211,969	206,380	23.62
Total	*3,778,411*	*5,003,563*	*5,918,703*	*56.64*

Source: Italian general transportation plan (1999).

Tab. 9 TEUs handling in the main Italian ports during the years 1996-'98

4.1 Spatial, temporal and modal distribution of container demand through Gioia Tauro

A statistical analysis has been conducted to determine the spatial, temporal and modal split of the containers through Gioia Tauro, with the purpose to provide quantitative indications about the role of Gioia Tauro as 'source' of traffic container.

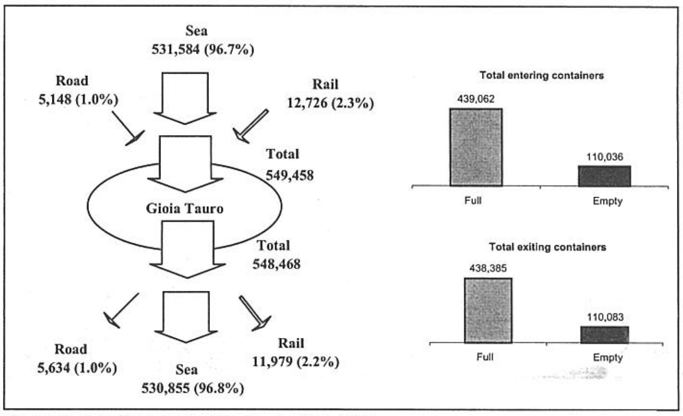
The available data-base contains information about loaded and unloaded containers from Gioia Tauro by sea, road and rail in the first six months of 1999. Containers origins and destinations have been classified in macro areas or regions for data concerning sea-rail and sea-sea intermodality, while they have been grouped in provinces for data concerning sea-road intermodality.

The Origin-Gioia Tauro and Gioia Tauro-Destination matrices have been expressed in TEUs on a six months temporal period. They present the total number of handled TEUs in Gioia Tauro (empty, full and total), via railway, road and sea. In total, Gioia Tauro handled 1,097,926 TEUs, of which 220,119 empty which represent 20%.

Figure 3 and Tables 10-11-12 show the containers split among the different transport modes: railway, road, sea with distinction between entering and exiting containers from Gioia Tauro. The data show that, in the examined period, the major amount of containers has been handled by sea (96.7%), while only a 3.3% of traffic travelled by land (2.3% by railway and 1.0% by road).

Concerning maritime mode, the most consistent traffic volumes are with Aegean area (168,700 TEUs) and Far East (171,746 TEUs); volumes are inferior with North America (88,358 TEUs) and with Middle East (62,668 TEUs) and have the same entities with North European ports (85,941 TEUs). Finally, Gioia Tauro exchanges 143,277 TEUs with all Italian ports.

The strongest railway traffic is with Puglia region as origin and destination (85.0%), followed by Lombardia (8.0% entering and 12.0% exiting). In both cases, the containers are full toward Gioia Tauro, while they make an empty return.
Concerning road mode, the most remarkable datum is the traffic with Calabria, followed by Sicily: 1,423 container (33.0%) arriving at Gioia Tauro, have Calabria as final destination; while 2.923 (28,0%) containers are sent to Gioia Tauro from Calabria. Sicily sends 316 containers to Gioia Tauro and receives 1,450 containers.



(Elaboration from Medcenter Container Terminal data, 2000).

Fig. 3 Container modal split entering-exiting from Gioia Tauro (first six months, 1999)

	Gioia Tauro					
	Origin			Destination		
Origin/Destination	*Full*	*Empty*	*Total*	*Full*	*Empty*	*2*
Italy - Adriatic	18,131	5,340	23,471	17,349	2,052	19,401
South Italy	14,014	8,339	22,353	16,267	2,833	19,100
Italy - Thyrrenian	30,371	10,333	40,704	14,778	3,470	18,248
Adriatic	6,872	1,345	8,217	6,598	1,533	8,131
Aegean area	78,959	5,328	84,287	59,179	25,234	84,413
Black Sea	14,282	2,546	16,828	14,128	4,365	18,493
West Mediterranean	28,302	8,661	36,963	23,077	5,123	28,200
East Mediterranean	31,251	883	32,134	9,696	21,745	31,441
North Europe	33,866	9,909	43,775	41,687	479	42,166
Africa	946	0	946	2,432	1,874	4,306
North Africa	47,665	1,347	49,012	12,561	25,231	37,792
Middle East	38,121	2,271	40,392	21,120	1,156	22,276
North America	43,245	1,496	44,741	38,593	5,025	43,618
Central America	1,523	25	1,548	2,713	5,328	8,041
South America	2	199	201	319	0	319
Far East	38,345	21,856	60,201	110,688	857	111,545
India	7,258	1,948	9,206	31,106	131	31,237
Other	2	15,874	15,876	2,337	520	2,857
Total	*433,155*	*97,700*	*530,855*	*424,628*	*106,956*	*531,584*

Source: Medcenter Container Terminal (2000).

Tab. 10 Spatial distribution of container movements (TEUs) with Gioia Tauro as O/D via sea (first six months, 1999)

	Gioia Tauro					
	Origin			Destination		
Origin/Destination	*Full*		*Total*	*Full*	*Empty*	*Total*
Sicilia	87	121	208	99	131	230
Puglia	1,222	9,005	10,227	10,665	94	10,759
Campania	381	69	450	144	0	144
Toscana	0	2	2	0	0	0
Lazio	0	0	0	2	0	2
Emilia Romagna	2	0	2	0	0	0
Veneto	1	0	1	0	0	0
Lombardia	15	978	993	1,580	9	1,589
North Europe	6	2	8	2	0	2
Other	88	0	88	0	0	0
Total	*1,802*	*10,177*	*11,979*	*12,492*	*234*	*12,726*

Source: Medcenter Container Terminal (2000).

Tab. 11 Spatial distribution of container movements (TEUs) with Gioia Tauro as O/D via rail (first six months, 1999)

	Gioia Tauro					
	Origin			Destination		
Origin/Destin.	*Full*	*Empty*	*Total*	*Full*	*Empty*	*Total*
Calabria	457	966	1,423	1,341	1,582	2,923
Sicilia	1,119	331	1,450	125	191	316
Puglia	230	133	363	73	297	370
Campania	11	312	323	718	653	1,371
Emilia Romagna	284	51	335	0	0	0
Liguria	207	0	207	0	0	0
Lombardia	0	99	99	0	0	0
Austria	185	264	449	0	0	0
Other	935	50	985	45	123	168
Total	*3,428*	*2,206*	*5,634*	*2,302*	*2,846*	*5,148*

Source: Medcenter Container Terminal (2000).

Tab. 12 Spatial distribution of container movements (TEUs) with Gioia Tauro as O/D via road (first six months, 1999)

5 Development perspectives

As said before, container traffic has grown in a tumultuous way in the Mediterranean ports during the nineties, reaching 19 Million TEUs totally handled in 1998. Some estimates (Drewry Shipping Consultants, 2000) point out that there are still considerable growth margins: forecasted container volumes are 53 Millions in 2015 with an annual growth rate of 6.2% (Tab.13).

	Exchange traffic	*Transhipment*	*Total*
1998	12.8	6.5	19.3
2015	29.3	24.0	53.3
Annual growth rate	5.0%	8.0%	6.2%

Source: Drewry Shipping Consultants (2000).

Tab. 13 Container volumes through Mediterranean ports. Forecastings until 2015. Million of TEUs

The deep changes of West Mediterranean ports, especially the private management of the container terminals, have not interested the East Mediterranean countries yet (Israel, Turkey, Greece, Egypt and Cyprus), where ports are state owned and managed. Moreover, the most efficient and dynamic ports need to increase their container handling capacity and to enlarge their structures in order to be able to receive ships of increasing dimensions. According to the Drewry estimates, container exchange terminals should be more convenient than transhipment ports in the future; in fact the transhipment sector is strongly competitive and presents reduced profit margins, while exchange ports, providing elevated profit margins, seem able to offer more opportunities to economic operators. There is a risk to over-size the infrastructures, creating a not exploited capacity. Researchers believe that by 2005 the utilization level of transhipment terminals will reduce because of the predicted capacity increase of about 8.6 Millions of TEUs for some of them (Algeciras, Sines, Tangeri, Gibilterra). Utilization levels will also grow in the exchange terminals. If the short term picture is not positive for transhipment sector, on a longer time horizon (up to 2015), it will require an additional capacity of at least 13 Million of TEUs to face the forecasted demand and guarantee acceptable service levels (Tab.14).

	Exchange traffic	Transhipment	Total
1998	21.6	8.4	30.0
Increment at 2005	7.6	8.6	16.2
Increment at 2015	7.5	13.0	20.4
Total Capacity at 2015	36.6	30.0	66.6

Source: Drewry Shipping Consultants (2000).

Tab. 13 Container volumes through Mediterranean ports. Forecastings until 2015. Million of TEUs

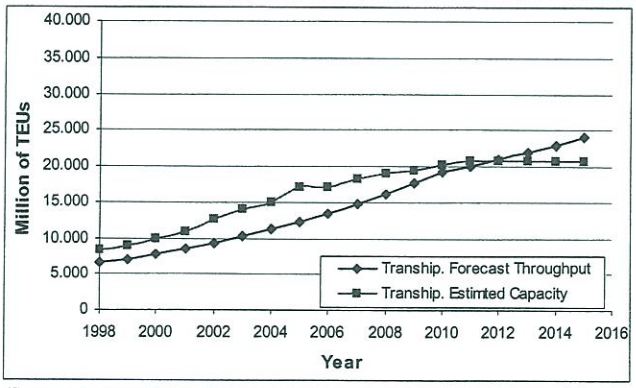
Drewry Shipping Consultants conducted some container traffic projections up to 2015, comparing them with the whole port system capacity during the same period. In the demand forecast, a distinction between transhipment and origin-destination traffic has been operated. The estimates concern the penetration degree of the container market, correlating the freight traffic to the Gross National Product of each country. Origin-destination container flows are generated assuming an annual average growth of 2%. Such value corresponds to the annual average growth of 1.9% of European countries in the period 1990-'98. Transhipment traffic has been forecasted assuming an increasing incidence in the Mediterranean shipping market, on the base of historical series.

Capacity estimates are based on development perspectives of different ports, making a distinction between transhipment and origin-destination traffic ports. These estimates take into account the realization times of the forecasted projects, generally only projects with reasonable probabilities to be realized have been included.

As emerges from Figure 4, transhipment terminals will reach the saturation in 2011; while the capacity of the ports which manage origin-destination traffic will always be superior to traffic volumes (Fig. 5). Therefore, adding transhipment and origin-destination traffic, the difference between handling port capacity and traffic volumes will progressively reduce until it will annihilate in 2015 (Fig. 6).

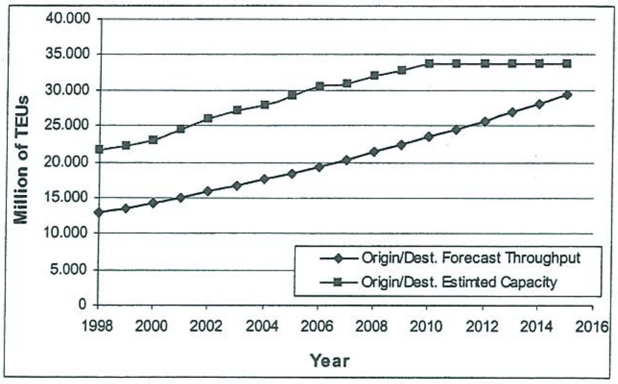
Meersman et alii (1997) proposed some forecasts concerning traffic demand. They showed that the tendencies of container traffic are a clear consequence of the economical globalization process and of the logistic revolution.

The whole process will have implications on the future port system configuration. SuyKens (SuyKens, 1998) identified some elements related to the Mediterranean basin:



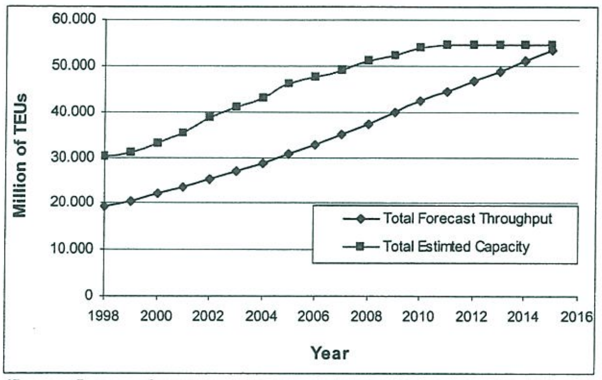
(Source: Drewry Shipping Consultant, 2000).

Fig. 4 Forecasted supply-demand balance for transhipment traffic in the Mediterranean Sea



(Source: Drewry Shipping Consultant, 2000).

Fig. 5 Forecasted supply-demand balance for exchange traffic in the Mediterranean Sea



(Source: Drewry Shipping Consultant, 2000).

Fig. 6 Forecasted supply-demand balance for total container traffic in the Mediterranean Sea

* the ports concentration in North Europe has been recently limited by the growth of Mediterranean ports. This phenomenon has led to a redistribution of the 'north-south' feeder traffic, particularly in the markets of Northen Italy, Switzerland, Southern Germany, Spain, Southern France. It is clear that the competition between the North Europe and Mediterranean ports will continue in the future;
* some ports as Algeciras, Gioia Tauro, Marsaxlokk are by now important transhipment nodes along the Suez-Gibiltair route, which is the most important one with Asia; new ports are emerging in the Mediterranean basin, like Cagliari and Taranto;
* numerous international shipping companies are acquiring shares in the Mediterranean ports; some of them are also showing great interest for Italian ports. This phenomenon points out the role of the Italian port system for the penetration in the European market;
* other elements are the appearance of new container-ships (Capacity of over 6000 TEUs), the opening of the East European market, the improvement of inland connections, the growth of some regional economies.

These events could determine an ulterior development of the transhipment activities.

On the base of the above considerations, Suykens elaborated some forecasts concerning the development of container traffic demand in the Mediterranean ports (Tab.15).

	Import/Export		Transhipment	
	1997	2010	1997	2010
West Mediterranean	2,558	4,951	1,734	4,625
Central Mediterranean	3,644	7,223	2,040	5,626
East Mediterranean	4,329	9,807	1,455	3,301

Source: Suykens (1998).

Tab. 15 Forecasted container demand in the Mediterranean Sea (TEUs* 1000)

The traffic forecasts, showed in Tab. 15, don't necessary imply that the current working ports will reach such objectives. The dynamic nature of port activities makes the forecasts of which port will be selected, which company will manage each terminal, which transport mode and route will follow freights to reach the final destination extremely complex.
In 1997 the Italian Transportation Ministry elaborated a Master Plan of Gioia Tauro area (AA.VV., 1997), which contains some forecasts regarding container traffic in Gioia Tauro port up to 2008. Two different scenarios, regarding container traffic levels, are defined:

- the "minimum" scenario was defined considering the 26% of transhipment market share that Gioia Tauro held in 1997 and assuming an increase of 4% due to the productive capacity growth of the terminal (for a total of 30%). Moreover, an increase of 3% of local traffic has been added;
- the "maximum" scenario foresees a 35% of market share and an increase of 8% of local traffic.

Such increases were justified as follows:
- Gioia Tauro has not a total availability of quays and storage areas yet, as some projects in progress foresee;
- the port has not completely developed its potentialities, which can derive from the enhancement of land transportation services (railway) and from the introduction of a free trade area;
- the international shipping companies seem to appreciate the geographical position of Gioia Tauro, not only for the container split inside the Mediterranean, but also for the interchange operations between mother-ships belonging to different services;
- Gioia Tauro is one of the few Mediterranean ports able to receive the most modern ships (over 6000 TEUs);
- other transhipment ports are close to saturation.

The forecasted volumes in both hypotheses are presented in Tab.16.

Year	1996(1)	1997(1)	1998(1)	1999(1)	2000(1)	2002(2)	2008(2)
Minimum scenario	571	1,448	2,125	2,196	2,620	2,145	3,232
Maximum scenario	571	1,448	2,125	2,196	2,620	2,623	3,954

(1) historical data (2) forecasts from Master Plan of Gioia Tauro (1997).

Tab. 15 Forecasted container demand in the Mediterranean Sea (TEUs* 1000)

Tab. 16 shows that Master Plan forecasts today appear understimated in comparison to the growth trends registered in the five-year period 1996-2000, in fact the forecasted traffic for "minimum" scenario by 2002 has been reached in 1999 and the one for "maximum" scenario has been reached in 2000. On the other hand, estimates developed by the present terminal management "Medcenter" forecast 4.3 million of TEUs handled by 2007.

6 Conclusions

The paper gives a description of container traffic relationships related to the European area, useful for an evaluation of the present and potential demand for Gioia Tauro hub port.
After an illustration of container traffic dynamics in the European and Italian context, the results of an analysis of traffic flows through Gioia Tauro are presented. They show that today the greatest part of containers arrive and depart through sea (over 96 %), only a minimum number of containers follow land routes (round 3.5%). These numbers confirm the great inclination towards transhipment activities of Gioia Tauro terminal, due to the high efficiency levels reached in handling containers, and the weak links of the terminal with the inland (road and rail) networks.

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