

# **THE SUPPLY OF DEEP-SEA CONTAINERISED SHIPPING SERVICES IN THE NORTHERN ITALIAN PORT SYSTEMS**

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## **ABSTRACT**

In this paper the pattern of deep-sea liner shipping services visiting Northern Italian port systems is analysed, with special reference to container lines, which represent essential links in the global supply-chain. The study sample is formed by the departures of containerships registered during the month of January 2011 from the ports of: Genova, Savona – Vado Ligure, La Spezia and Livorno, forming the Ligurian and Northern Tyrrhenian port cluster, and the ports of Venezia, Trieste, Ravenna and Ancona, together with Koper and Rijeka, forming the Central and Northern Adriatic port cluster. Comparisons regarding route structure and vessel capacity are carried out in order to get an insight about the actual and potential role of these port systems within the global deep-sea container network.

## **1 INTRODUCTION**

In this paper, a review of deep-sea liner shipping services to/from Northern Italian ports is performed. The paper is organized as follows. Section 2 focuses on the analysis of statistical data regarding Italian foreign trade, with special reference to incoming and outgoing freight volumes transported by sea. In Section 3 details on freight traffic at major Italian ports are provided. Containerised traffic trends during the period 2000–2010 are presented, with a special focus on deep-sea North-Eastern and North-Western multiport gateways [1]. Some comparisons are conducted between different port nodes and port systems.

## **2 THE GLOBAL ECONOMIC CRISIS AND ITS EFFECTS ON MARITIME FREIGHT TRAFFIC: A FOCUS ON ITALIAN PORTS**

In Figure 1, the foreign trade by sea and by air regarding both the EU27 and the US with respect to June 2008 is reported. A sharp decrease in the foreign trade until June/July 2009 can be observed; then foreign trade of US and EU has begun to increase again but the June 2008 trade values have not been reached yet. According to OECD statistics [2], it should be also noticed that China, which has traditionally been an exporting country, has become a major importer from the US during the period of global economic crisis. This evidence is in line with the shift towards the Far East of the major industrial centres and the global logistic chain.

In Table 1 the Italian import and export volumes with the rest of the world during the years 2000 – 2010 are reported. The effects of the economic crisis are clearly highlighted by a decrease in maritime trade in 2009, which sometimes is slight but sometimes is severe, and a subsequent increase of trade in 2010. Only in some cases the values registered before the crisis are reached again, most often trade remains less developed than before the crisis. In this table, the word “import” means the freight that Italy has imported in a given year from a given part of the world, while the word “export” means the exportations of Italy towards a given part of the world. From the data reported in Table 1, the following aspects can be noticed:

- for trade between Italy and Europe, exports have substantially followed the turn of the crisis, whereas imports have experienced a peak in 2005 and have begun to decrease thereafter so that they have already fallen below the year 2000 values at the start of the economic crisis in 2008;
- for trade between Italy and Africa, imports have constantly decreased, especially under the effect of the economic crisis; on the other hand, exports to Africa, have grown continuously despite the crisis;
- for trade between Italy and America, exports have maintained constant values until 2008, showing an abrupt decrease in 2009 before increasing again in 2010; imports have maintained their level more or less constant until the year 2009, when a severe decrease can be observed, while in 2010 a slight increase can be observed. The amount of trade by sea (export plus import) has not resumed yet the values registered before the economic crisis;
- for trade between Italy and Asia, both imports and exports have been only marginally affected the economic crisis and they have increased in a nearly constant way (further details of this anomaly are provided in Tab. 4);
- for trade between Italy and Oceania, exports have maintained a constant level during the period of analysis, while imports show a decrease from 2005 to 2008, which become very sharp from 2008 to 2009; albeit a slight increase can be observed in 2010, trade figures have remained far below the 2008 level until now.

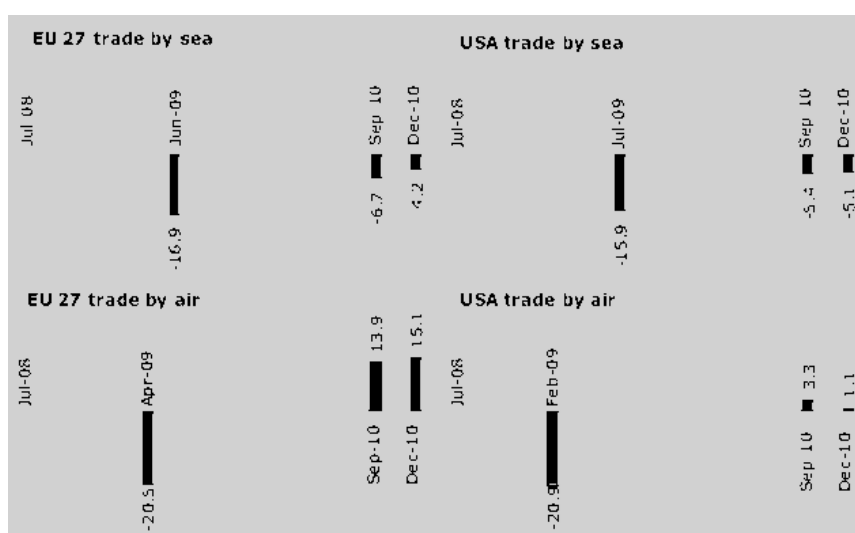


Figure 1: Percentage of increase in foreign trade in the EU27 and US, with respect to June 2008 (monthly data in tonnages, source: OECD)

**Table 1: Import and export to/from Italy with the rest of the world in the years 2000–2010 (quantities in thousands of tons, source ISTAT)**

Country	2000		2005		2008		2009		2010	
	Import	Export	Import	Export	Import	Export	Import	Export	Import	Export
Europe	57298	25863	62204	27160	51990	27252	49522	22254	47057	23536
Africa	55488	7437	55062	10082	54485	12514	45759	12003	43115	13160
America	40847	10349	39676	12141	39830	11265	27212	8000	31331	9869
Asia	47852	9268	60219	11828	66748	13305	55572	12962	70101	14259
Oceania	7675	1640	7496	1491	5676	1416	2298	1331	3009	1662
WORLD	209625	54557	224659	62705	218733	65754	180364	56552	194615	62488

**Table 2: Import and export to/from Italy with Asian regions in the years 2000–2010 (quantities in thousands of tons, source ISTAT)**

Country	2000		2005		2008		2009		2010	
	Import	Export	Import	Export	Import	Export	Import	Export	Import	Export
Middle East	36080	5045	36767	6375	37366	6978	33629	5946	42923	7168
Central Asia	4359	535	7790	810	7675	945	5971	1119	7772	1350
East Asia	7412	3687	15663	4643	21707	5382	15972	5897	19406	5741
ASIA (total)	47852	9268	60219	11828	66748	13305	55572	12962	70101	14259

In Table 2, further details about the trade by sea between Italy and Asia in the years 2000 – 2010 are reported. Firstly, it can be noticed that the majority of incoming freight volumes from Asia comes from the Middle East and they consist mainly of crude oil and gas. On the other hand, imports from East Asia, which are much less in quantity, consist of means of transport (e.g. cars, motors, etc.) and metal products. It can be also noted that all imports from Asia have been heavily influenced by the effects of the economic crisis, with a decrease in their amounts in 2009, and a recover in 2010.

In Table 3, the development of containerised traffic at Italian ports is reported, which represent the vast majority of global non-bulk freight flows. Table 3 deserves many comments. Firstly, trends in container throughput at the North-Western Italian multiport gateway can be analysed [1]. The most important port in this cluster is the port of Genoa, which has registered a constant increase during the years 2000 to 2007, reaching a maximum in 2007, with a decrease after the beginning of the economic crisis. A similar trend has been registered at the port of La Spezia, which has closely followed the development of the economic crisis as well. The port of Savona - Vado Ligure has experienced an impressive growth from 2000 to 2010, as it has increased the scale of its operations in 2005. However, a decrease in its traffic in 2009 can be observed, the same decrease that has been observed in the statistics of trade between Italy and all world destinations. Actually, this decrease in containerised traffic in 2009, in response to the economic crisis, and an increase in the following year can be seen in all Italian ports, hinting at a near end to the crisis. The port of Livorno is located in the Northern-Thyrrhenian Sea and can be considered to belong to the same cluster including Ligurian ports [1]. Container throughput at Livorno has not changed relevantly until 2003,

then it has increased significantly its amount up to 2008, decreased in 2009 and has increased again in year 2010.

**Table 3: Container throughput at Italian ports, in n. of TEUs, with reference to the period 2000 – 2010 (data regarding 2010 are provisory; source: Assoporti)**

PORTS	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
ITALY (total)	7051579	7272001	8228781	8911152	9482593	9702708	9864375	10609108	10549886	9513014	9786589
Italian hubs	2677732	2711995	3553925	4121026	4525546	4564764	4518136	4748607	4562006	4335852	4009289
North-Western gateway	2948838	3053176	3080806	3206772	3391509	3527801	3678566	4030343	4044445	3368057	3899283
North-Eastern gateway	784145	801100	832644	794841	914347	976979	1088821	1340042	1571084	1410861	1582255
Gioia T.	2652701	2488332	3008698	3148662	3261034	3208859	2938176	3445337	3467824	2857440	2851261
Genova	1500632	1526526	1531254	1605946	1628594	1624964	1657113	1855026	1766605	1533627	1758858
Spezia	909962	974646	975005	1006641	1040438	1024455	1136664	1187040	1246139	1046063	1285155
Livorno	501339	501912	519751	540642	638586	658506	657592	745557	778864	592050	635270
Taranto	3400	197755	471570	658426	763318	716856	892303	755934	786655	741428	581936
Cagliari	21631	25908	73657	313938	501194	639049	687657	547336	307527	736984	576092
Napoli	396562	430097	446162	433303	347537	373626	444982	460812	481521	515868	532432
Venezia	218023	246196	262337	283667	290898	289860	316641	329512	379072	369474	393459
Trieste	206134	200623	185301	120438	174729	198319	220310	265863	335943	276957	281629
Salerno	275963	321304	374868	417477	411615	418205	359707	385306	330373	269300	274940
Savona	36905	50092	54796	53543	83891	219876	227197	242720	252837	196317	220000
Ravenna	181387	158353	160613	160360	169432	168588	162052	206786	214324	185022	183041
Ancona	83934	90030	94315	75841	65077	64209	76458	87193	119104	105503	110395
Other Italian ports	63006	60227	70454	92268	106250	97336	87523	94686	83098	86981	102121
Koper	85742	93187	114863	126237	153347	179745	218970	305648	353880	343165	476731
Rijeka	8925	12711	15215	28298	60864	76258	94390	145040	168761	130740	137000

Note that the so-called North-Western gateway is formed by the ports of Genova, Savona, La Spezia and Livorno, while the so-called North-Adriatic gateway is formed by the ports of Venezia, Trieste, Ravenna, Ancona, Koper and Rijeka and, finally, the Italian transshipment hubs are Gioia Tauro, Taranto and Cagliari.

Regarding the North-Adriatic multiport gateway, it is formed by the following ports: the Slovenian port of Koper, the Croatian port of Rijeka and the Italian ports of Venezia, Trieste and Ravenna [1]. With reference to the Italian ports, Ravenna has remained quite constant between 2000 – 2010 with values between 160 000 and 200 000 TEUs. Containerised traffic in Venice has registered a slight but constant increase and it has been only slightly affected by the global economic crisis. The port of Trieste is characterised by a severe decrease in container throughput during the years 2002 – 2003 and an increase in the subsequent years, with only a slight reduction of traffic in 2009. Regarding the ports of Koper and Rijeka, they have both experienced a very impressive increase. In particular, the port of Koper has become the first of the North Adriatic ports for its container throughput.

Regarding the Italian transshipment hub ports, i.e. Gioia Tauro, Taranto and Cagliari [3], it can be noted that Gioia Tauro is characterised by the highest container throughput in Italy, with a maximum workload of about 3.5 TEUs in 2008 and 2.8 millions of TEUs in 2010,

whereas Taranto and Cagliari follows with about 580000 TEUs after Genova, La Spezia and Livorno.

### 3 DEEP-SEA SERVICES IN THE NORTHERN ITALIAN PORT SYSTEMS

This research has been accomplished through a collection of data from L' Avvisatore Marittimo [4] and the major global shipping companies' websites, with reference to ship departures registered at Italian ports between 23 December 2010 and 25 January 2011. Containership arrival data have not been collected, but this lack of information does not create relevant bias in the analysis as most containership routes calling at gateway port systems are two-way and the time window considered is enough large compared to typical route frequencies.

**Table 4: Number of direct deep-sea connections for containerised traffic operated in the North-West Italian multiport gateway system during January 2011 (source: "L' Avvisatore Marittimo")**

World regions	Genova	La Spezia	Savona	Livorno	Total
West Africa	8	0	0	3	8
Red Sea	27	18	1	2	40
East / South Africa	2	3	0	0	5
North America	18	8	0	14	24
Central America	17	8	6	21	32
South America	7	0	3	6	7
America / Pacific coast	13	4	2	13	19
Arabic / Persian Gulf	17	11	1	0	24
South East Asia / East Asia	38	23	1	6	54
Australasia / Pacific	0	11	0	0	11
Total	80	43	10	40	120
Average DWT 50983 tons / Average Draft 10.15 m					

**Table 5: Values of the total DWT of the containerships departed from the North-Western Italian multiport gateway system during January 2011 (source: "L' Avvisatore Marittimo")**

World regions	Genova	La Spezia	Savona	Livorno	Total
West Africa	201731	0	0	76797	201731
Red Sea	1645158	1291870	22747	108356	2572650
East / South Africa	54987	222150	0	0	277137
North America	817105	473668	0	618522	1182904
Central America	637682	470890	99995	697123	1251167
South America	412834	0	154668	340834	412834
America / Pacific coast	464878	203858	46027	407340	714763
Arabic / Persian Gulf	1100095	832069	22747	0	1660460
South East Asia / East Asia	2527289	1491258	22747	363926	3566360
Australasia / Pacific	0	446044	0	0	446044
Total	4005659	2572361	277410	1468481	6117959

**Table 6: Number of direct deep-sea connections for containerised traffic operated in the North-Eastern Italian multiport gateway system during January 2011 (source: "L' Avvisatore Marittimo")**

World regions	Ancona	Ravenna	Venice	Trieste	Total
West Africa	0	0	0	0	0
Red Sea	0	2	6	6	9
East / South Africa	0	0	0	0	0
North America	0	0	0	0	0
Central America	0	0	0	0	0
South America	0	0	0	0	0
America / Pacific coast	0	0	0	0	0
Arabic / Persian Gulf	0	0	0	0	0
South East Asia / East Asia	0	1	2	2	3
Australasia / Pacific	0	1	5	6	8
Total	0	2	6	6	9
Average DWT 50898 tons / Average Draft 9.82 m					

Tables 6 and 7 depict deep-sea containerised traffic at Adriatic ports. Venice and Trieste are the largest ports for deep sea direct traffic. It can be noticed the huge gap to be filled by North Adriatic Italian ports to reach the North-Western Italian ports respect to direct services. Actually North Adriatic Italian ports operate their deep-sea container traffic volumes mainly being connected, through feeder services, to Gioia Tauro hub [1], [5].

**Table 7: Values of the total DWT of the containerships departed from the North-Eastern Italian multiport gateway system during January 2011 (source: "L' Avvisatore Marittimo")**

World regions	Ancona	Ravenna	Venice	Trieste	Total
West Africa	0	0	0	0	0
Red Sea	0	23820	270245	369606	458086
East / South Africa	0	0	0	0	0
North America	0	0	0	0	0
Central America	0	0	0	0	0
South America	0	0	0	0	0
America / Pacific coast	0	0	0	0	0
Arabic / Persian Gulf	0	0	0	0	0
South East Asia / East Asia	0	8320	63810	107790	116110
Australasia / Pacific	0	8320	254745	369606	442586
Total	0	23820	270245	369606	458086

In Tables 4 and 5 respectively the list of deep-sea services and the values of the total DWT (deadweight tonnage, in thousands of tons) of the containerships departed from the North-Western Italian multiport gateway system are reported. Instead in tables 6 and 7 the list of deep-sea services and the values of total DWT at the North-Eastern Italian multiport gateway system is considered. Only deep-sea containerised links are taken into account. According to these data, Genoa is the largest deep-sea port in the Northern Italy, both taking into account the number of direct connections and the DWT of the containerships calling at this port. La Spezia port is second in rank and Livorno is third. Direct connections are defined as all the destinations that are reached, by sea, from the port examined, without transshipment between different ships. For example, consider a ship departing from Genova towards North America, which stops at Algeciras, where a feeder service is available towards West Africa. In this case, the link between the port of Genova and North America is a direct connection,

the link towards West Africa is an indirect connection. As transshipment is not dealt with in this study, indirect connections are not listed in the tables.

**Table 8: Summary of routes departing from North-Western Italian ports in January 2011 (data source: “L' Avvisatore Marittimo”)**

Ship destinations	Total DWT [tons]	N. of ships	Draft [m]		
			Average	Max	Min
West Africa	201731	8	9.2	11.0	7.1
Central America	316212	10	10.0	12.9	7.5
Central America and America – Pacific	390243	13	8.8	11.9	6.6
East and South Africa - Oceania	43567	1	9.8	9.8	9.8
East Asia	211878	3	11.8	12.6	10.5
East Asia and Oceania	235174	6	10.1	12.3	6.4
Arabic Gulf and East Asia	320072	4	9.9	12.2	6.6
Red Sea - East and South Africa	54987	2	8.9	9.5	8.2
Red Sea - East Asia	1327635	20	11.1	13.5	7.8
Red Sea – Arabic Gulf	83266	2	10.2	11.4	9.0
Red Sea – Arabic Gulf - East Asia	994.645	13	10.7	12.6	8.6
Red Sea – Oceania	47120	1	11.9	11.9	11.9
Red Sea - Oceania - East Asia	82613	2	10.5	10.8	10.2
North America	529370	11	10.3	13.4	7.5
North America - Central America - America Pacific - East Asia and return	193066	3	11.1	13.5	8.6
North and Central America	268324	6	7.7	10.5	6.9
Oceania	37570	1	9.7	9.7	9.7
Pendulum (America – Mediterranean – East Asia and return)	367652	7	10.7	12.7	7.9
South America	412834	7	10.9	14.5	6.5

**Table 9: Summary of routes from North Adriatic ports (data source: “L' Avvisatore Marittimo”)**

Ship destinations	Total DWT [tons]	N. of ships	Draft [m]		
			Average	Max	Min
Arabic Gulf and East Asia	8320	1	7.0	7.0	7.0
Red Sea	15500	1	6.8	6.8	6.8
Red Sea - East Asia	434266	7	10.7	6.8	12.4

Table 8 shows the routes of containerships departed from North-Western Italian ports in January 2011. Table 9 shows the routes of containerships departed from North-Eastern Italian ports (North Adriatic Italian ports) in January 2011. The deep sea destinations have been grouped according to the geographical classification proposed by “L' Avvisatore Marittimo”: West Africa, East Africa, North America, Central America, South America, America – Pacific coast, Red Sea, Arabic Gulf, South Asia – East Asia. The area from which the highest number of connections are available is South Asia – East Asia, with a total of 54 ship departures from the North-Western Italian gateway port system and 8 ship departures from Adriatic Italian gateway port system in January 2011. The West Africa and East Africa are the least connected world regions to Italy. The so-called “pendulum” services to/from Italian ports consist of 7 ship calls per month. Pendulum services are connections which directly link Asian ports to North America, and call at some Italian ports, e.g. Genova or Gioia Tauro. For example, some pendulum services start from East Asia, stop at some Mediterranean ports, then reach North America, and finally return to East Asia by stopping at Mediterranean ports. On the other hand, in tables 8 and 9 ships to East Asia only perform the

service from Italy to East Asia and transshipment is necessary to carry containers to North American ports. Several ships, particularly those belonging to MSC, operate transshipment connections with containerships directed to the US in Genova or Gioia Tauro. The majority of transoceanic pendulum routes connect the US Atlantic coast to East Asian ports, calling at North European ports and crossing the Suez Channel, but they do not stop at Italian ports. In East Asia, mainly Chinese and Japanese ports are served, but also Indian ports, such as Mumbai and Chennai, and Port Kelang (Malaysia) are major destinations connected to Italy. Other shipping routes directly connect Northern Italy to ports located in the Arabic Sea and in Central America.

Finally, Figures 2 and 3 present the frequency of DWT and draught values registered at Northern Italian ports in January 2011. From these figures it can be noted that the most frequent DWT ship-class is the one between 60000 and 70000 tons. On the other hand, ship draughts vary between 6 and 15 m, with the majority of containerships being characterised by a draft of 10-12 m.

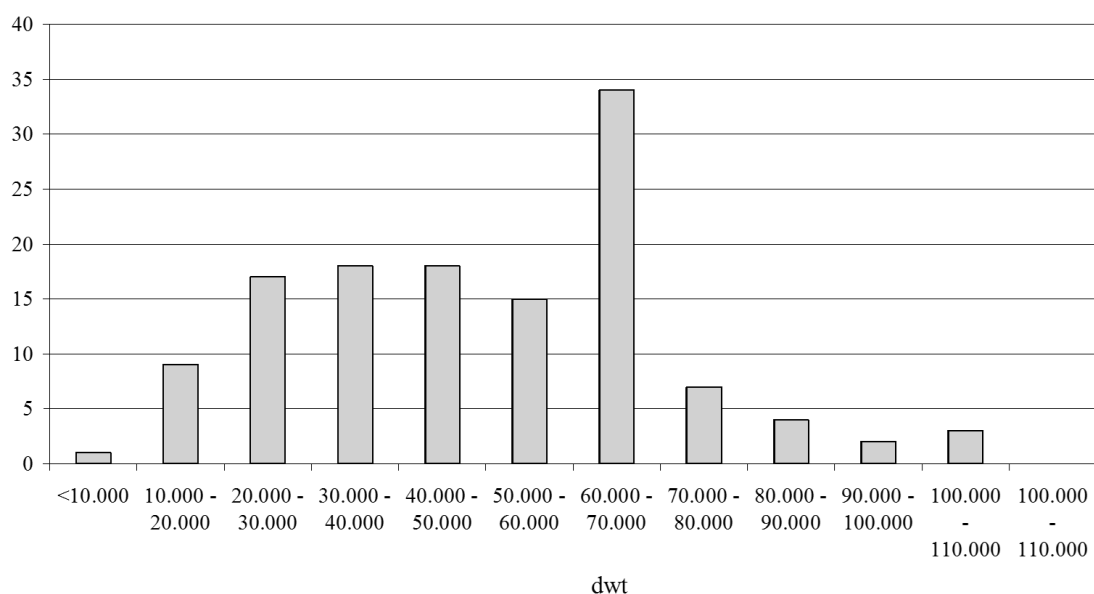


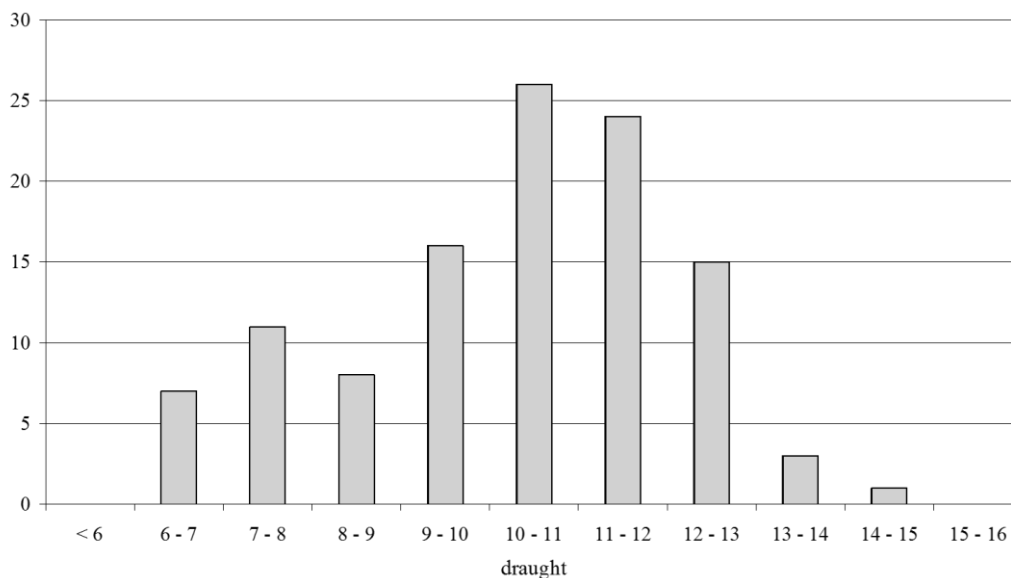
Figure 2: DWT frequencies

#### 4 CONCLUSIONS

In this paper, a survey of maritime Italian foreign trade has been performed, with particular focus on deep-sea routes and on Northern Italian ports. The statistics analysed show that the effects of the economic crisis are still in force, and the overall Italian maritime trade decreased in 2009, the year following the onset of the crisis, and rose again in 2010, although ante-crisis levels have not been reached yet. Regarding the development of traffic at each port between 2000 and 2010, it can be noted that while most ports, especially the major ones like Genova, Gioia Tauro and La Spezia, follow the overall Italian trend, some minor ports, such as Savona - Vado Ligure and the hub ports of Taranto and Cagliari, have developed considerably in the last years, multiplying their container traffic from some tens of thousand to some hundreds of thousand TEUs. In summary, a moderate but constant increase in container throughput can be observed between 2000 and 2008 at Italian ports, then a significant decrease in 2009 and a less significant recover in 2010 have been registered. The largest container port in Italy, as far as the throughput is concerned, is still the transshipment hub of Gioia Tauro, with an annual traffic of 2.5 – 3.2 millions of TEUs. Genova is only the second



largest port in Italy, with 1.5 to 1.8 millions of TEUs, and La Spezia is the third in size, with traffic volumes of 0.9 to 1.2 millions of TEUs, but they are both gateway ports. In all other ports containerised traffic is considerably smaller. The largest Italian container port in the Adriatic Sea is Venice, which is also the only Adriatic port that has maintained a steady development of trade in the last decade. The highest amount of container throughput in the North Adriatic Sea is performed by the Slovenian port of Koper.



**Figure 3: Draught frequencies**

In the main section of this paper the analysis of deep-sea ship departures from Northern Italian multiport gateways is presented. The performed survey shows clearly that the main international routes connect Italian ports to the Red Sea and East Asia as well as to US ports. Other routes which connect Italian ports to South America, to Africa and to Oceania are only minor routes. Moreover, North-western ports have several deep-sea departures, whereas Adriatic ports still play a minor role. Feeder services to transshipment hubs are not considered in the present study but the analysis clearly indicates that the deep-sea connectivity gap that separates the North-East Italian multiport gateway system to the North-Western Italian gateway system is far to be filled. Indeed, despite the container throughput at North Adriatic ports has progressively increased and its value does not appear to be negligible compared to Ligurian ports, the majority of the containerships directed to the Adriatic Sea refer to the Short Sea Shipping network. Even in the future, the largest containerships on the East-West routes will hardly de-route to serve the Adriatic Sea, for both geographical considerations and infrastructural constraints at port nodes. Nevertheless, the new giant ships, once put in operation along the trunk routes, will free smaller, but still very large, ships which will accommodate the demand growth in other routes with direct services. Among these routes, the direct links from the Far East to both the Western and the Eastern Italian deep-sea port gateway systems could benefit of some reinforcement in terms of service frequency and overall capacity. Finally, both the economic development of Central and Eastern EU countries and the extension of the Trans-European Transport Network towards the East could contribute to add and/or shift towards the Adriatic Sea some deep-sea services.

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