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THE COAST PORT INDUSTRY IN THE U.S.A.

A KEY FACTOR IN THE PROCESS OF ECONOMIC GROWTH

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Abstract

The coast port industry in the USA: a key factor in the process of economic growth[1]

The aim of this paper is to analyze the capacity of the USA coast port industry to sustain the development of the US economic system, which is predicted to undergo further strong expansion throughout the period up to 2020. The analysis is based on the observation that GDP depends on international trade, which in turn depends on maritime transport and therefore on the efficiency of the United States coast port industry system.

The paper also points out that in many respects the US coast port industrial system is very efficient. It boasts a large number of ports, strategically located, efficient in their production specialization and competitiveness; in addition, the US coast ports are integrated with the national intermodal system. Despite this, the system reveals numerous weaknesses that need to be addressed. The most evident deficiencies involve land access to the ports, inadequate modernization of the intermodal system, dredging and its funding, the power the liner shipping companies wield over the ports, container terminal productivity, the organization of dock work and labour. A number of interesting proposals emerge, to some extent favourably re-assessing the role of

[1] A short form of this paper, double – blinded referred and titled " The coast port industry in USA. A benchmark for E.U?", has been presented at the at the 2004 WCTR – World Congress on Transport Research, held in Istanbul in July.

federal coordination in the maritime transport sector and putting forward the suggestion of a form of specific financing for the transport sector rather than generic funding; this could be achieved by setting up a purpose-created bank and the subsequent emission of transportation bonds.

The paper concludes with the assertion that although the US coast port industry is the most powerful in the world, measures need to be undertaken for technological, organizational and financial rationalization in the coast ports, considered synergically with the intermodal system. Such measures are vital in order to sustain the development that is expected for the period up to 2020; nevertheless, if the proposed measures are not carried out or prove to require a longer time period for completion, this would not lead to an irremediable breakdown, although it would certainly cause a noticeable slow-down of development..

Classificazione JEL: L95, F19
Keywords: US coast ports, US maritime transport, intermodality, ports weaknesses, dredging, naval gigantisms, transport bonds

THE COAST PORT INDUSTRY IN THE USA. A KEY FACTOR IN THE PROCESS OF ECONOMIC GROWTH

1. Introduction

The USA is the world's greatest importer and exporter, with roughly one billion metric tons of goods, that is, roughly 20% a year of international maritime trade. The overall quantity of commodities traded by importation and exportation and within the United States amounts to roughly 15 billion tons for a value of about 9,100 billion US $. Although the majority of goods are traded at a national level, international commerce amounts to roughly 2,000 billion US $, of which almost half is composed of container-transported manufacts. These data represent about 27% of total GDP, totally dependent on international trade. As from 2020, even at moderate rates of development, the total tonnage of freight transported nationally by the US transport system will increase by roughly 67%, while international tonnage is expected to virtually double. Over the same period of time, it is predicted that each of the major United States ports will at the very least double the volume of freight throughput and some of the main East Coast ports (e.g. New York/New Jersey, Hampton Roads) will see a threefold increase in volume, while the major West Coast ports (e.g. Los Angeles/Long Beach, Oakland) will undergo a fourfold increase.

Only by engaging in an aggressive development policy will these ports be able to face up to this growing demand for services, and the development of the North American port system, and that of the United States in particular, represents an enormous challenge that cannot be overlooked. The construction of ever greater landfills for port expansion and the implementation of major projects for access channel dredging are difficult and costly processes that will require at least ten years for completion, with a significant environmental impact that may also involve massive costs. For example, the costs for a recently completed project for depth dredging of the Port of Oakland involve costs for engineering works, authorizations and environmental conformity adjustments that are in excess of the current expenditure, which is already

extremely high. Furthermore, such projects will also have a substantial impact on local communities (i.e. electors), especially since the latter are likely to be concerned with the more immediate and direct effects of damage resulting from development that is designed to ensure the future growth of the economy, which will bring them indirect benefits in the longer term.

It is widely argued that the United States has reached a situation in which the country can no longer continue to manage its own ports and terminals with the procedures that have been adopted so far. Henceforth, it is claimed, more must be done, faster and with fewer resources than has been the case so far. The opinion is also frequently voiced that it is unfair for the requirements of the large liner shipping companies - which are exploiting the strategy of naval gigantisms as a means to reduce unit transport costs - to be paid by the collective population as a whole, through dredging funds which actually are allocated by the Federal Government. Furthermore, federal dredging funds are decreasing, since dredging funds now compete with funds for port security.

Coastal ports are only one of the subsystems of the United States intermodal transport-distribution system. The entire system, which includes railroads, roads and freeways and intermodal hubs, is vulnerable to an impending capacity crisis, but also to sabotage and destruction. Although more and more freight loads are traded through the North American container ports, very little capacity has been added to the entire intermodal freight distribution system. At the key checkpoints of the intermodal system, freeways, railroads and ports appear to be increasingly congested, as the concentration of freight transportation has absorbed almost all available capacity. Over the last twenty years, the number of vehicle miles covered on the road and freeway transport system has virtually doubled, whereas total available freeway mileage has increased by no more than 1%.

The same holds true for the railway network, a private industry that transports 40% of national intercity freight. Since 1980, the total volume of freight transported has risen by over 50%. At the same time, total available track mileage has as been reduced by 35%. In 1999, rail freight stood at 1,720 billion tons, an amazing record volume, yet this figure is 45% lower than that predicted for 2020, which is expected to rise to 2,500 billion tons. Despite major restructuring works and rationalizations, the rail industry is currently facing a capacity deficit in certain congested metropolitan areas, in particular around Chicago and on other priority lines. Out of the total amount of freight, roughly 9% is transported via the national network managed by MTS and by the feeder barges along the coastal maritime legs.

It thus seems clear that in many areas the United States port system is working at its minimum capacity limit. Moreover, the USA lacks a national program for freight transport planning and development capable of highlighting the bottlenecks affecting key gateways and corridors. Many authoritative sources have pointed out that there exists no coordinated approach to a single all-encompassing intermodal system. In effect, rather than being a genuine intermodal system, the situation at present is an aggregation of multiple public and private modalities, each of which is centred on its own individual areas of activity. Each modality has its own vertically integrated information system, its own planning, management and development

programs, which are likewise vertically integrated, without any intersecting dialogue between the modalities.

What is now being proposed is that the United States should develop a systematic National Freight Policy which will have the task of institutionalizing and coordinating a freight transport program within the United States Department of Transport (US DOT), and this program should be separate from general transport planning and policy. It should plan and promote a national intermodal system based on accurate, up-to-date traffic figures and on efficient IT systems, with the aim of devising new financial options for relaunching the intermodal infrastructures of the freight transport system. One such option would involve expansion of financing within the Transportation Infrastructure Finance and Innovation Act, with the creation of a National Freight Transportation Bank or a new series of Transportation Bonds. The industrial power of the USA has always been founded on rapid growth of the economic system, in which transport plays a crucial role. However, in its present condition it is an "over-weighted" system, surrounded by narrow-minded and parochial approaches to planning and by outdated productivity and working standards, which cannot keep abreast with the dictates of the global development model.

These considerations are developed in greater depth in the body of the paper, above all in the following sections: - section 2 investigates the link between GDP, international trade and maritime transport; - section 3 describes the port system in general and then focuses on container ports and highlights their localization and production specialization; - section 4, drawing on current debate, describes the main strengths and weaknesses of the coastal port industry, considering the issues both from the terrestrial and the maritime perspective; - section 5 puts forward some proposals for possible actions that could be undertaken, both of a technical-organizational and also financial nature, in order to increase the ability of ports and the intermodal system to sustain US economic development; finally, some conclusions are drawn on the strength of the United States coastal port industry.

2. International trade, maritime transport

2 .1. International Trade

The United States is the leading import and export country in the world. As can be seen in Table 1, exports total 12.3% in value (current US $) and imports 18.9% of the world total.

Table 1 –TOP Leading Exporters and Importers in World Merchandise Trade:2000- (Billions of current U.S. dollars)

Rank in 2000	Exporters	Value	%	Rank in 2000	Importers	Value	%
1	U.S.A.	781	12,3	1	U.S.A.	1.258	18,9
2	Germany	552	8,7	2	Germany	503	7,5
3	Japan	479	7,5	3	Japan	380	5,7
4	France	298	4,7	4	France	337	5,1
5	U.K.	284	4,5	5	U.K.	305	4,6
6	Canada	277	4,3	6	Canada	245	3,7
7	Cina	249	3,9	7	Cina	236	3,5
8	Italy	238	3,7	8	Italy	225	3,4
9	Netherlands	213	3,3	9	Netherlands	214	3,2
10	Hong Kong	202	3,2	10	Hong Kong	198	3,0
	Total *top* 10 countries	**3.573**	**56,1**		**Total *top* 10 countries**	**3.901**	**58,5**
	all countries*	6.364	100,0		all countries*	6.669	100,0

* Includes significant re-exports or imports for re-exports

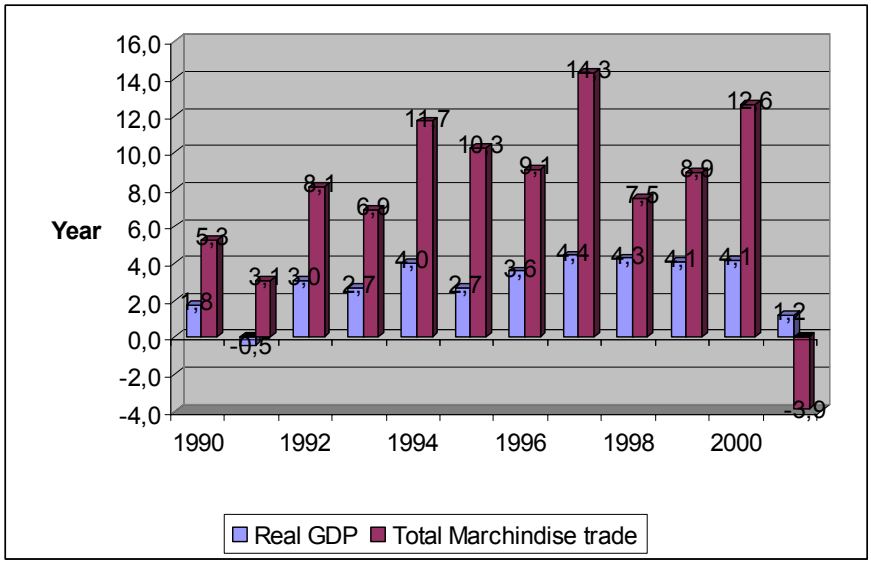
Source: Author processed data compiled by *U.S. Department of Transporation, Bureau of Transportation Statistics*, March 2002, based on data from the *World Trade Organization*, "*Table 1.5. Leading Exporters and Importers in World Merchandise Trade*", 2000

From 1990 to 2001 the value of traded goods rose 8% a year on average compared with a 3% average annual growth of the GDP (Figure 1), even though the events of September 2001 caused a recorded drop in international trade leading to a negative variation of almost 4%.

The total weight of freight transported in national territory (local or international circulation) is about 15 billion *short tons* for an approximate value of 9.100 billion $US. Although the majority of freight moved is national, the international quota totals 2.039 billion $US, of which *almost half is composed of container transported goods*. .

As already mentioned at the Introduction, *by 2020*, even at moderate rates of growth, *the total tonnage of freight transported nationally by the American transportation system will increase by about 67% while the international tonnage will almost double.*

Figure 1. Trend of the value traded goods and of GDP in real terms– % data*



*the data on which percentages have been calculated are in US $ base year 1996.

Source: Author's data from *U.S. Department of Commerce, National Income and Products Accounts basis* (2002)

2.1.1. Main trading partners

The United States has trade relations with around 200 countries; 77% of this trade is concentrated in the top 15 in order of size. 54% derives from trade with the top five, that is, Canada, Mexico, Japan, China and Germany. 33% is conducted with NAFTA countries. Canada is in the lead with 25%.

Foreign trade in the last thirty years has suffered many variations and the most conspicuous regard trade with Mexico and China (Table 2). Mexico, which in 2001 was in second place following Canada, was in fifth position in 1970. Yet by 1980 it had already earned third place. In 1970 China did not appear at all, not even in the official United States statistics, since it was listed in separate statistics, those of the so-called "Communist countries". In 1980 China was in twenty-fourth position, in 1990 in tenth place and in 2001 in fourth place. If this growth trend continues it is foreseen that relations with China will exceed those with Japan.

These striking changes in the geography of US trade relations emphasize the growth of trade in North America (Canada, Mexico) and of the land routes relating to this trade, but also the *strong trade growth with countries of the Pacific – Rim*[2] *and, consequently, the ever greater role played by ports of the West-Coast, indeed of ports in general, in foreign trade.*

As can be seen from Table 2, in 1970 Japan was the only country that came into the top 10 trade partners, but currently there are no fewer than four Asiatic countries (Japan, China, Taiwan and South Korea) in this rating.

[2] Far Eastern countries and those bordering the Pacific Ocean.

Table 2 –TOP 25 U.S. International Merchandise Trade
(Millions of current $US)

Classification in 1970	Classification in 1980	Classification in 1990	Classification in 2001	Countries	Total trade 2001	Variations % 2002/2001
1	1	1	1	Canada	380.693	-6,1
5	3	3	2	Mexico	232.942	-5,9
2	2	2	3	Japan	184.241	-13,0
	24	10	4	Cina (1)	121.515	4,5
3	4	4	5	Germany	89.265	1,5
4	5	5	6	United Kingdom	82.195	-3,3
17	13	7	7	South Korea	57.381	-15,9
15	9	6	8	Taiwan	51.543	-20,6
7	7	8	9	France	50.191	0,3
6	11	9	10	Italy	33.740	-8,8
38	23	12	11	Singapore	32.671	-10,6
36	26	20	12	Malaysia	31.717	-12,0
12	16	17	13	Brazil	30.391	-4,1
8	14	11	14	Netherlands	29.025	-0,6
45	47	30	15	Ireland	25.689	-1,5
13	17	13	16	Hong Kong (3)	23.722	-2,0
9	15	14	17	Belgium (4)	23.653	-2,0
10	10	18	18	Venezuela	20.920	-12,4
44	38	23	19	Thailand	20.724	-10,0
22	33	25	20	Israel	19.453	-14,4
14	21	19	21	Switzerland	19.409	-6,3
56	6	15	22	Saudi Arabia	19.304	-5,6
21	27	26	23	Philippines	18.995	-5,6
11	20	16	24	Australia	17.424	-7,8
19	35	27	25	India	13.502	-5,9
				Remaining partners partner	242.680	-3,2
				Top 25	**1.630.305**	**-6,7**
				Top 25, % out of total	87,0	
				Total	**1.872.985**	**-6,2**

[1] In 1970, China was not listed separately in official U.S. trade statistics. It was listed as part of the "Communist World".
[2] For 1970, 1980, and 1990, Germany includes both West Germany and East Germany.
[3] Hong Kong has officially been a part of China since 1997. However, the United States continues to publish merchandise trade statistics separately for Hong Kong.
[4] Merchandise trade figures for Belgium include Luxembourg for 1970, 1980, and 1990 but not 2001.

Source: Author processed data compiled by *U.S. Department of Transportation, Bureau of Transportation Statistics, March 2002.*
2001 data—Department of Commerce, U.S. Census Bureau, Foreign Trade Division, U.S. Exports of Merchandise CD and U.S. Imports of Merchandise CD, December 2001.
1970, 1980, 1990 data—U.S. Department of Commerce, U.S. Census Bureau, Statistical Abstract of the United States (Washington, DC: 1982, 1985, and 1991).

Whilst trade relations with Mexico and China strengthened, those with Europe decreased, in relative terms, yet continuing to maintain a growing trend. In this regard what happened to Germany, the United Kingdom, France, Italy, the Netherlands and Belgium is significant. It is obvious that these geographical variations of US trade relations have strong repercussions on the national and international transport network, and, simultaneously, on production models and trading of goods. This occurs because these goods, being produced and assembled in various places, depend on the extent and reliability of the world logistic network. An example is the automobile industry that assembles components coming from a range of different countries (indeed car manufacturers depend on factories that are located in various parts of the world). For example, General Motors manufactures cars in Thailand for the Japanese and European markets; Daimler Chrysler and Volkswagen

manufacture cars in factories in South Africa that are then sold on European markets; BMW produces vehicles in South Africa for the United States market. Since the motor industry will maintain this organization, which in fact is destined to grow further, this example significantly confirms the growing trend of international trade.

2.2. Maritime transport

Of all methods of transport that of "transport on water" is dominant both in value and in volume as we can infer from Table 3. In second position, by value, one finds air transport: given the imbalance of the percentages in value and in volume of air transport, it immediately becomes clear that the goods with greatest unit value are those transported by air, even though in terms of weight the share does not reach 1%. In third position one finds lorries with 21.1%, followed by rail transport. The transport of oil by pipeline is also fairly substantial, particularly in volume.

Table 3 Shares of individual methods of transport out of the total in international. (in %).

	In value			In weight		
Mode	1997	2000	2001	1997	2000	2001
World trade						
Water	40,2	37,0	38,4	73,3	77,3	77,7
Air	27,8	29,7	27,7	0,4	0,4	0,4
Road	20,8	21,5	21,1	11,3	11,5	11,0
Rail	4,5	4,7	4,9	5,4	5,7	5,9
Pipeline	0,9	1,2	1,4	4,8	4,9	4,8
Other	5,9	5,9	6,5	4,9	0,1	0,2
Total	*100,0*	*100,0*	*100,0*	*100,0*	*100,0*	*100,0*
Imports into the U.S.						
Water	46,1	44,4	45,5	73,1	78,1	78,7
Air	24,5	25,4	23,4	0,3	0,4	0,3
Road	18,0	17,8	17,8	8,4	8,3	7,9
Rail	5,9	5,8	6,1	6,2	6,4	6,5
Pipeline	1,6	1,9	2,3	7,2	6,7	6,5
Other	4,0	4,7	5,0	4,8	0,1	0,2
Total	*100,0*	*100,0*	*100,0*	*100,0*	*100,0*	*100,0*
Esports from the U.S.						
Water	32,7	25,5	27,2	73,5	75,5	75,1
Air	32,0	36,4	34,4	0,5	0,6	0,6
Road	24,3	27,2	26,3	16,6	18,8	18,5
Rail	2,7	3,0	3,2	4,0	4,1	4,6
Pipeline	0,04	0,1	0,1	0,5	0,8	0,8
Other	8,3	7,8	8,9	4,9	0,2	0,4
Total	*100,0*	*100,0*	*100,0*	*100,0*	*100,0*	*100,0*

Source: Author Processed data *U.S. Department of Transportation* (May 2002)

The majority of raw materials and sources of energy – petroleum and derivatives, agricultural products and products for and from agriculture – mainly grain– timber products, such as semi-manufactured and final goods (*general freight)* are transported by ship. The type of product traded determines the choice of vessels, the services offered and the ports called at. The value, weight, and type of freight are factors that determine the use of bulk vessels, tankers or full-container ships, ro – ro, ferries, or mixed vessels; and also influence the choice of tramp services or liner services. The majority of general freight, (which includes the greatest unit value goods among those

transported by sea), is transported mainly by container on vessels managed by liner shipping companies.

This affects the production specialization of ports.

3. Maritime ports and maritime container ports

3.1. Maritime ports

In the United States there are 183 deep-water trade ports[3] distributed along the coasts, in the Gulf of Mexico and on the Great Lakes. For statistical reasons these have been grouped into six areas: the North Atlantic, the South Atlantic, the Gulf, the South Pacific, which in fact corresponds to California, the North-West Pacific and the Great Lakes. As well as these areas the island ports must also be considered and in particular Puerto Rico, the Virgin Islands – which in some statistics are grouped in the South Atlantic area – those of Hawaii – which are grouped together with those of the South Pacific – and the ports of Alaska – grouped in the North-West Pacific area.

The most important and some of the minor ones are shown in Tables 4 &e 5.

[3] The ports belong to the *Marine Transportation System*. Here follows a brief explanation of this important waterway transport system. The networks used by international maritime trade are not only formed of maritime ports but rather or a vast network of lakes, rivers, canals, locks and dams that link the coasts of the United States (Atlantic, Pacific and Gulf) with over 25.000 miles of inland and coastal navigable waterways. This network of navigable water forms the *Marine Transportation System* – MTS – and is vital to the management and efficiency of ports situated on the coast. The MTS provides maritime trade with 326 public and private ports, that house 1912 terminals and other types of infrastructures that assist in the movement of goods. Besides this the MTS provides the flow of passengers with an extensive network of ferries and also leisure craft, fishing boats, cruise liners, Navy vessels as well as shipyards.

In 1999, the MTS moved 2.3 billion tons of goods, of which 1.2 billion of goods derived from international trade and 1.1 billion of goods traded on the home market. The elements relating to the transport of goods are not the only aspect of this system: the MTS also includes 168 ferries involved in passenger transport, estimated at 68 million passengers per year. The fishing industry is also considered in the MTS: in 1999 commercial fishing boats unloaded over 4.6 million tons of fish supporting thousands of direct jobs (fishermen) and indirect jobs (fish food processing industries, distributors, etc).

The leisure industry also rests on the Marine Transportation System, from yachting to cruises. In 1999 around 5.9 million passengers disembarked at American port passenger terminals (2.3 million in 1990): in the last five years the cruise industry has grown by a rate of about 5.5 % per year. As regards leisure craft, the demand for berths that is met by the construction of coastal and inland marinas is growing.

In 1999 the Marine Transportation System created 2.5 million direct and indirect jobs. These jobs are linked with the movement of goods and passengers through ports, maritime support services, true maritime operations and recreational activities. Besides these, a further 4.9 million jobs were created in the manufacturing sector in the productions of those goods that are exported by shipping. The impact of the MTS on the economy has therefore been the total creation of 7.4 million jobs, corresponding to around 6% of the entire US employment.

Table 4. Some of the most important American ports by area

North Atlantic	**South Atlantic**	**Gulf**
Boston	Charleston	Port Manatee
New York/New Jersey	Savannah	Tampa
Philadelphia	Fernandina	Mobile
Chester	Jacksonville	New Orleans
Wilmington (DE)	Palm Beach	Gulfport
Baltimore	Port Everglades	Houston
Wilmington (NC)	Miami	Galveston
Richmond	Boca Grande	Freeport
Hampton Roads		Corpus Christi

Source: CI Yearbook (2001)

Table 5. Some of the most important American ports by area

South Pacific	**North-West Pacific**	**Great Lakes**
San Diego	Portland (OR)	Buffalo
Long Beach	Longview	Erie
Los Angeles	Morrow	Cleveland
San Francisco Bay	Levistone	Toledo
Oakland	Pasco	Detroit
Stockton	Tacoma	Port Huron
	Seattle	Chicago
	Ancorage	Green Bay
	Dutch Harbor	Superior
		Duluth

Source: CI Yearbook (2001)

The ports of the United States have always been very specialized (historically they were built at the mouths of rivers or at the end of the railroads by manufacturing companies and, therefore, tailor made to their own specific requirements). In addition there are some significant regional differences in the US commercial maritime trade that obviously affect manufacturing specialization of the ports.[4]

[4] Situated in three geographical areas (the hilly east that runs along the North Atlantic, which is where the majority of heavy and mechanical industry is situated; the flat central part devoted in particular to agriculture, especially grain, and the mountainous area of the West, that divides the Pacific coast from the rest of the United States and where light industry and more technologically advanced industry is situated) , these ports are among the ten or so specialized ones according to the manufacturing characterization of the areas themselves.

It is, therefore, more usual to find container ports in the band that runs from Boston to Savannah, which is an area of high industrialization and where, however, Baltimore and Hampton Roads, as well as being container ports, are also the two main bulk ports, in particular for exports of coal, and bulk ports on the US coast of the Gulf of Mexico. The ports of the Atlantic and the Gulf are reached from the inland by a rich network of rivers, lakes and canals which, moreover, ease land access (back front) problems to the ports. Of especial importance is the Great Lakes-St. Laurence System,

An indication of the importance of the port[5] and their manufacturing specialization is the number of callers by ship type and respective tonnage.

From Table 7, shown on the following page, it can be seen that Los Angeles/Long Beach, considered together, are the most important US port, followed by Houston, New Orleans and New York/New Jersey and San

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that of the Mississippi- Missouri Rivers and the canals that lead from Boston to Key West-Florida connecting the Atlantic to the Gulf. As regards the Great Lakes they also form a system not just of support but of ports that are autonomous in themselves, which ensure considerable support for the export of grain and inland agricultural products and operate as a system of coasting trade for heavy industry between the ports of Pittsburgh (steel factories) and Chicago and Detroit (automobile companies). Many products intended for export and coming from areas far from the coast (Baton Rouge, Illinois) are transported down the Mississippi.

The Gulf is an important area for the handling of all types of bulk goods from petroleum to refrigerated goods: of significance is over 76% of petroleum import and 80% of grain, oil seed, animal fodder and coal export. Due to historical reasons the majority of oil refining and distribution plants are located in the Gulf of Mexico. Therefore the most important ports designated for the import of petroleum are situated in this area. The most specialized of these are New-Orleans (LOOP terminal) and Mobile. However, all of them (with the exception of new specialized container ports that have recently started to spring up near the largest ports, such as Houston), from Tampa to Corpus Christi, have sophisticated equipment for the unloading, refining and distribution of petroleum via pipeline or waterways. Tampa also handles phosphates; Mobile handles coal; Houston , grain, chemical products and containers.

Unfortunately the ports of the Atlantic coast and the Gulf have shallow sea-beds both as a result of sand brought into the sea by the extraordinary river network of this area, and by the movement of the tides; this prevents access of bulk vessels and tankers and large full-containers. At the most, Atlantic coastal ports enable the docking of vessels of 60.000 – 80.000 DWT gross tonnage and those of the Gulf vessels (especially tankers, up to 150.000 DWT). VLCC tankers are also excluded form the Gulf with exception being made for New Orleans, which is a port with a naturally shallow sea bottom. Because of the large number of imports from the Middle East it is even necessary to provide off-shore trans-shipment operations. In the sector of US port characteristics the problem of maintenance of the beds of ports and port access canals has been one of the most hotly debated subjects in academic, political and social circles over the last ten years.

The Pacific coast is completely different from the Atlantic coast. Lacking the network of rivers and canals that link the inland with the Atlantic coast and the Gulf, the Pacific coast and the corresponding ports may be reached only by land (roads and railroads). Save for Valdez, a petroleum export port, the true specialization of Pacific ports has been provided by containers exported and imported by all Pacific-Rim countries. It mainly concerns exported products, although imports appear to have increased considerably, causing negative balances in the trade balance. In fact many of these imports are merely semi-manufactured or final products of very famous American brands of toys (Barbie), sports clothing (Nike), etc. The ports of California are particularly specialized in handling of containers, especially Los Angeles, Long Beach and Oakland. They are ranked near the top, even though not the most important, in world transport of containers. San Francisco also handles petroleum and Portland grain. Further north, Tracoma is very specialized in containers and Seattle, which in any case handles a large number of containers, is also the main bulk port for coal and timber products.

[5] For an interesting comment on the weakness of the indicator 'volume of goods transported' in showing the importance of ports see "I porti: costi interni ed esterni, pianificazione del territorio, ruolo dei sistemi locali." by Enrico Musso. But this continues to be one of the most commonly used indicators even though for container ports reference is increasingly made to infrastructural, IT and intermodal systems.

Francisco Bay. From the data analysis *the US port industry characteristics appears as an industry of average concentration.* Thus, 85.5% of goods is handled by the leading 15 ports and over 58% is concentrated in the top 10, but if one considers the top four the share out of the total drops to 34%. The ports of Los Angeles/Long Beach together take in over 10% of goods transported from the leading 25 ports. The second largest port of the Pacific is San Francisco Bay, which with 60% is in fifth position of the general classification. In second and third place, in the Gulf, are Houston and New Orleans with similar percentages to those of Los Angeles, but unlike the two Californian ports Houston and New Orleans are particularly important for the transport of bulk goods, the former for petroleum and petroleum by-products and the latter for dry. New York is found to be the largest Atlantic coast port and is in fourth position in the national classification. Focusing on the ports from the Table of the TOP 25, it is shown that around 33% of flow is concentrated on the Atlantic coast, 19% (but only 4 out of 25 ports) on the Pacific coast and 25% in the Gulf.

Table 6 . Vessel Calls by Vessel Type – 2000

Type of ship	US	%	World	%
Tankers	14.445	24,1	101.866	18,2
Dry Bulk	12.649	21,1	126.246	22,5
Container	17.401	29,0	180.766	32,2
Ro-ro	5.543	9,2	47.709	8,5
Chem. Tankers	4.036	6,7	23.796	4,2
Gas tankers	702	1,2	12.634	2,3
Others	5.179	8,6	67.418	12.0
TOTAL	59.955	100,0	560435	100,0

Source: US Office of Statistical and Economic Analysis (2002)

In 2000 the number of vessels that called at American ports was around 10% of callers at world ports, that is 59.555 out of 560.435 (Table 6). Of the latter 29% is represented by container ships, 24% by tankers and 21 % by bulk ships (Table 7). The fact that the majority is represented by container ports has serious consequences on the strategies of the US port industry. Indeed, '*the centers of competitive strategy among ports today are the container terminals rather than the ports'. The competition between terminals and ports and the logistic systems they form a part of is brings considerable benefits and contributes to the efficiency of the supply – chain.*

Table 7 – Ranking of the top 25 USA ports according to calls

Ports	*Tankers*		*Dry bulk*		Container		Other		Total	
	n.c.[1]	DWT[2]	n.c.	DWT	n.c.	DWT	n.c.	DWT	n.c.	DWT
Los Angeles/Long Beach	911	66	783	38	2955	124	677	15	5326	243
Houston	2988	135	748	28	614	20	779	25	5129	208
New Orleans	1371	81	2676	119	388	11	655	22	5090	233
New York	1271	66	301	10	2172	87	861	23	4605	186
San Francisco Bay	787	51	626	23	1936	83	226	7	3575	164
Philadelphia	954	82	492	18	468	11	825	18	2739	129
Hampton Roads area	155	8	436	27	1557	62	348	14	2496	111
Charleston	149	6	139	5	1547	62	332	8	2167	81
Columbia Rivers (all ports)	277	14	1279	46	262	10	345	7	2163	77
Savannah	253	8	330	10	739	32	447	12	1769	62
Baltimore	151	5	426	20	409	15	650	15	1636	55
Corpus Christi	974	65	230	9	2	0,08	142	10	1348	84,08
SanJuan (PRI)	80	4	101	3	610	11	553	9	1344	27
Jacksonville	204	9	190	47	305	8	592	12	1291	76
Beaumont	1053	77	99	4			67	5	1219	86
Miami	11	0,4	65	2	766	26	370	6	1212	34,4
Texas City	1105	64	64	3	2	0,06	26	2	1197	69,06
Tacoma	68	3	218	10	568	28	342	6	1196	47
Seattle	49	3	229	10	794	31	78	1	1150	45
Port Everglades	345	15	123	5	211	6	135	2	814	28
Tampa	228	6	367	14	6	0,1	178	3	779	23,1
Mobile	140	9	408	23	5	0,08	204	8	757	40,08
Lake Charles	518	38	115	5	3	0,06	79	2	715	45,06
Honolulu	141	11	84	5	339	9	112	2	676	27
Freeport (Texas)	516	31	18	0,6	46	0,8	61	4	641	36,4
Total firts 4 ports	6541	348	4508	195	6129	242	2972	85	20150	870
Total first 25 ports	14699	857,4	10547	484,6	16704	637,2	9084	238	51034	3087
Total U.S. A. ports	19183	1271	12649	519	17401	658	10722	281	59955	2730
% first 4 out of total USA	34%	27%	36%	38%	35%	37%	28%	30%	34%	32%
% first 10 out of total USA	48%	41%	62%	62%	73%	76%	51%	54%	58%	55%
% first 25 out of total U.S.A	77%	67%	83%	93%	96%	97%	85%	85%	85%	113%

1: n.c. = number of calls
2: DWT=average Dead Weight Tonnage

Source: Author processed data from *Vessels Calls at U.S. Ports* (2002)

The average capacity (by call) (Table 8) of commercial vessels docking at U.S. ports in 2000 was around 14% greater than the world average. But of these, dry bulk vessels were around 12% smaller. In particular grain, which is usually transported in smaller vessels than those used for example for coal and ferrous minerals, represents 43% of US major bulk[6] shipments while it represents no more than 19% of world shipments considered altogether.

[6] Dry bulk freight is divided into major and minor bulk. The major types– grain, coal, ferrous minerals, bauxite and phosphates – are usually sent by volume of mixed freights that can fill the ship or at least a hold.

Table 8 Percentage difference average vessel size (DWT) per call, by Vessel Type, data 2000

Vessel type	**Tanker**	**Dry bulk**	**Container**	**Ro-ro**
Δ %	*4,7*	*- 12,4*	*26,4*	*12,1*
Vessel type	**Chem. Tankers**	**Gas carriers**	**Other cargo**	
Δ%	*15,9*	*- 23,1*	*48,8*	
ALL TYPES	**13,8**			

Source: Author processed data from *US Office of Statistical and Economic Analysis* (2002)

Port activity is growing (especially containers); thus from 1998 to 2000 the total number of calls as US ports grew on average by 3.1% and the overall tonnage handled rose by 5.4%.

3.2. Container ports

3.2.1. The TOP TEN in the United States

Container ports are the expression of the trade strength of the United States for various reasons:

- six of them – Los Angeles, Long Beach, New York/New Jersey, San Francisco/Oakland, Houston and New Orleans – are rated among the TOP 25 in the world;
- of these, three are placed in second (San Francisco/Oakland), fourth (Los Angeles/Long Beach) and sixth (New York/New Jersey) place in the ranking of the average size of ship that visits them;
- the total number of containers handled by the TOP 10 exceeds 15 million TEU out of an overall of 18 million considered in 2001.

Since 1995 the container port sector (Table 9) has been concentrated yet further. In fact container ports require substantial investments in machinery and telematic networks, greater labor specialization and other extremely costly facilities as well as very deep channels.

Three of the largest ports are on the Pacific coast; as has already been mentioned, their growth in the period 1995 – 2001 can be explained by the increase of trading with Pacific-Rim countries. Los Angeles and Savannah (Georgia) have had the highest average growth rates, 10.8% and 10.6% respectively. The high growth rates for Savannah, Miami and Houston reflect strong international trading activity with Latin American countries.

Table 9 The TOP 10 maritime container ports in the US. 1995 – 2001. Transport in millions of TEU

Ports	1995	1996	1997	1998	1999	2000	2001	Avarage number TEU per day (2001)	H % 1995 - 2001	Annual avarage growth rate %
Los Angeles (CA)	1.849	1.873	2.085	2.293	2.552	3.228	3.425	9.384	85,2%	10,8
Long Beach (CA)	2.137	2.357	2.673	2.852	3.048	3.204	3.199	8.765	49,7%	7
New York, NY/NJ	1.537	1.533	1.738	1.884	2.027	2.200	2.332	6.388	51,7%	7,2
Charleston (SC)	758	801	955	1.035	1.170	1.246	1.156	3.166	52,5%	7,3
Oakland (CA)	919	803	843	902	915	989	960	2.630	4,5%	0,7
Norfolk (VA)	647	681	770	793	829	850	885	2.424	36,8%	5,4
Seattle (WA)	993	939	953	976	962	960	824	2.257	-17,0%	-3,1
Savannah (GA)	445	456	529	558	624	720	813	2.226	82,7%	10,6
Houston (TX)	489	538	609	657	714	733	778	2.132	59,1%	8
Miami (FL)	497	505	624	602	618	684	717	1.964	44,3%	6,3
Total TOP 10	**10.271**	**10.486**	**11.779**	**12.552**	**13.459**	**14.814**	**15.089**	**41.336**	**46.9**	**6.6**
Other ports	3.057	4.308	3.777	3.005	3.106	3.124	2.993	8.200	-2,1	-0,4
Top 10, % out of Tota	77,1%	70,9%	75,7%	80,7%	81,2%	82,6%	83,4%			
Total*	13.328	14.794	15.556	15.557	16.565	17.938	18.082	49.536	35,7	5,2

* includes all maritime cntainers ports of the United States and Porto Rico

Source: Author processed data from USDOT – MARAD, 2002

The port of Houston is considered the preferential port for Texan markets and the flow has grown so much as to make the Port Houston Authority ask the U.S. Army Corps of Engineers – USACE, who are responsible for final decisions regarding construction of new infrastructures and drainage, for authorization to open a new terminal for containers and for cruise ships in a peripheral area, Bayport. The fact that these southern US ports have recently become so strongly involved in container trade springs not only from the particular intensification of trade relations with Latin American countries but also from the new organization of maritime transport. This latter change occurred in the wake of continuous development of transshipment centers in the Caribbean, which enable the use of smaller feeder vessels for the spoke legs that can also call in at ports with not very deep channels, like those of this area. The growth of Savannah and Miami is probably also due to the same reasons. The increase of trade activity has triggered further competition: the Tampa Port Authority decided to enter the container sector (Tampa is in any case the largest port of Florida) by building a new terminal where 400.000 containers can be handled each year. Mention must also be made of the port of Corpus Christi, on account of its modernity. This is named the port of La Quinta, a completely dedicated, offshore landfill. Notwithstanding the emergence of this new front of container ports in the Gulf, their containers throughput corresponds to no more than 8% of the total (Table 10).

But the majority of containers, 51%, travel along the west coast and 41% along the Atlantic coast. The large Pacific coast ports form two large

clusters, one in California (LA, LB, SF, O) and one in the state of Washington (Seattle and Tracoma).

This great concentration represents a line of weakness of the American economy because any problem whatsoever concerning these ports, or terminals, causes serious crises to the economy as a whole. For example, from the end of September to October 2002, the members of the International Longshore and Warehouse Union – ILWU, the Pacific coast port Unions, stopped all work for ten days following a job dispute with the Pacific Maritime Association – PMA representing liner shipping companies and terminal operators.

Table 10. Distribution of imports/exports to ports grouped by region - 2001

	TEU (%)			Metric tons (%)		
Ports by region	**Total**	Export	Import	**Total**	Export	Import
U.S.A.	100	100	100	100	100	100
Pacific Coast	51	43	56	47		
Atlantic Coast	41	46	37	43		
Gulf	8	10	7	10		
Great Lakes	<1	<1	<1	<1	<1	<1

Source: Author processed data from *Journal of Commerce, Port Import/Export Reporting Service* (PIERS), 2001

The consequences on the economy were considerable, especially in the agricultural, motor and final distribution sector. Agricultural products perished, assembly lines based on just-in-time were blocked as was retail distribution that rests on the same principle. The results of the stoppage were even felt in Asian countries, which are the largest freight forwarders to the West coast of the United States.

The shipping companies, however, particularly for freight destined for the East Coast and coming from Asia (it should be mentioned that the largest shipping companies, especially on those routes, are Asian) which is usually unloaded in the ports of California or in those of Washington, and later sent by rail to the central states or those of the east coast, organized an alternative service during this period, reactivating all – water services, by using the Far East – East Coast route via the Panama Canal.

This temporary requirement and the continuous growth in trade with Asia enabled the companies to rediscover the possibility of the mono-modal alternative to the intermodal one, and in the end, notwithstanding the taxes to be paid for passage along the Canal and the greater number of days of sailing, this mono-modal alternative seems to be economically more profitable. An increase in these services would turn out to be advantageous to both the port and intermodal systems considered as a whole, since this would reduce congestion of land routes and the expenses of dredging ports on the Atlantic coast, because the latter are based on the use of Panamax vessels that do not draw more than 39 feet on average.

Table 11 TOP 10 Atlantic coast ports. Movements in millions of TEU

Ports	2002	2001	Δ %
New York/ New Jersey	3,75	3,32	13,0%
Charleston (SC)	1,59	1,53	3,9%
Hampton Roads (VA)	1,44	1,3	10,8%
Savannah (GA)	1,33	1,08	23,1%
Miami (FL)	0,98	0,96	2,1%
Jacksonville (FL)	0,68	0,7	-2,9%
Port Everglades (FL)	0,55	0,62	-11,3%
Baltimore (MD)	0,51	0,49	4,1%
Wilmington (NC)	0,24	0,21	14,3%
Palm Beach (FL)	0,22	0,2	10,0%

Source: *American Association of Port Authorities . C. I.*, 2003

All the largest ports situated on the east coast have particularly benefited from this discovery, as can be seen in Table 11, so much so as to predict the necessity in the future of considerable investment in the construction of new artificial landfills.

3.2.2. Terminal productivity

Notwithstanding the great quantity of annual throughput of TEU, some observers maintain that these levels are below the actual trade potential of the United States and if they are not exceeded the reason is to be sought in the inadequate productivity of the terminals. If this were true, it would be a restriction to the growth potential of the American economic system. In terms of productivity the best Asian ports exceed the best ports of the United States by a factor of three to one (when calculating productivity it is not just the TEU movements per hour that are considered in the stages of unloading freight from the ship, but other parameters as well). Even discounting the effects of transshipment in Asian ports, the best American container ports/terminals ought in any case to double productivity in order to achieve their performance.

In the United States the average productivity of ports on the west coast is around double that of the east coast, both because of the effect of the Pacific – Rim, but especially because of the integration of intermodal rail technology in the ports. By now the largest ports are nearly all fitted with berths long enough to accommodate post – Panamax vessels, equipped with gantry cranes that can move up to 50 TEU per hour, and are fitted with the latest IT facilities (California is however the most advanced in this sector, having even adopted web-based systems called Premier Appointment System, which haulers can use to book their turn at the terminal gate. By law lorries must not wait longer than 30 minutes at the gate, under pain of a $250 US penalty payable by the terminals; these new systems should lead to less than twenty minutes waiting time, with equipped yards and good systems of internal movement.

The possibility that US productivity is low (ranging between 25 to 35 containers per hour at least with reference only to container movement) as a result of defects in work organization is quite a common idea among observers.

3.2.3. Organization of port activity

The most sensitive instrument necessary for achieving high productivity and service quality is the labor factor, which is often underestimated, especially since containerization has transformed the sector from labor to capital intensive. In 1965, i.e. with the introduction of the container, the ILWU-International Longshoremen's and Warehouseman's Union and the PMA - Pacific Maritime Association signed an agreement the result of which was that the presence of staff, calculated in waterfront man – hours per ton, was reduced by 30%, despite a 40% increase of freights. In accepting the cuts in hours of work, however, the unions signed contracts that guaranteed their members generous wages, and a range of benefits and guarantees. The same type of agreement was accepted by the ILA - International Longshore Association for the East Coast workers. However, the ILWU and the ILA tried to eliminate fluctuations in labor availability by restricting the number of memberships.

This practice guaranteed full employment for port workers but have often led to periodic shortages that must be covered either by raising the costs through overtime work or by reducing productivity. But the real serious shortcoming, in addition to those just mentioned, is the absence of a stable nucleus of persons who work with the same company every day and are able to carry out a varied number of specific tasks with the same company. Although carrying out more skilled jobs means greater labor stability in the end, the principle is still prevalent in the Unions that flexibility (distribution of people between various terminals according to necessity) constitutes a greater opportunity for work for everyone; consequently workers are rotated between different terminals.

For over forty years, since the advent of containerization, the management and the Unions have been arguing about the problems of job safety, productivity, implementation of technology. At present, with IT everywhere, as required by the shipping lines and by the terminal workers, the Unions refuse to work on introducing the most advanced skills into the world of port work. *Whatever the level of investment in infrastructures, operations and technologies, if the unions are not pro-actively involved in the improvement of terminal effectiveness, then there is no level of technology that can raise the standards to the level of productivity required for the future.*

4. Discussion regarding the most apparent weaknesses of the system

As the previous section showed, the United States port system is very specialized, has average concentration and is fairly efficient; however, it shows its greatest fragility when it is assessed in terms of its role within the national

intermodal system, where its function of collection and sorting of goods emerges. The principles of the technology of 'line production' that were applied with great success to the manufacturing industry must be valid for the port as well. Loads must circulate rapidly and in order for this to happen various types of problems need be solved - those that concern the port itself, those relating to maritime access and the others regarding land access. These are problems that every port has to face, all over the world, but they become particularly significant when one considers the enormous quantity of containers currently being handled in the United States, especially in view of the doubling expected for 2020.

4.1. Weaknesses on the maritime front

4.1.1. Naval gigantisms and power of the shipping companies

In order to reduce the unit costs of transport the large shipping companies purchase and hire larger and larger vessels. The reduction of unit costs at sea is not invalidated by the slight increase of costs in the ports. The shipping companies therefore persist in this strategy of increasing the number of mega-vessels in their fleets. There are now 6400 TEU[7] vessels on the Far East – North Europe, Far East – North Atlantic routes (such as those of Maersk – Sealand, Hanijn, P&O, COSCO and recently Evergreen as well, which for a long time preferred to constitute its fleet with Panamax[8] vessels, around 3600 – 4000 TEU) and vessels up to 9800 TEU in the trans-Pacific routes, such as those used by the China Shipping Group, on routes from China to southern California.

Since costs of capital and management increase, a growing tendency to increase the size of the companies by mergers and acquisitions is observed in this sector. An enquiry among the large shipping companies reveals that among the various motivations that drive them to these dimensional investments there is also the development and improvement of port infrastructures (in particular greater depth and more efficient cranes) that facilitate their use.

Many wonder how far port practice corresponds to the market strategies of the ports themselves and how far, on the contrary, it is instead an "indulgent" reply to the large companies' decisions, rather than the ports' own autonomous marketing policy. Companies are likely to increasingly invest in large vessels, because when dealing with an oligopolistic market it is normal to expect a rapid imitation of practices between one company and another. The average size of vessels that will seek to dock in ports will increase, consequently leading to an increase in competition among ports. Competition will be even fiercer if, continuing with this process of naval gigantisms, the companies decide to restrict their calls to a single gateway port at the two extremes of a route (the so-called pipeline route). For example, the China

[7] Twenty Equivalent Unit, unit of measure of containers, corresponds to a standard 2 foot container.

[8] Container carrying ship whose size enables it to cross the Panama Canal. The largest ones are called Post – Panamax.

Shipping Group has already announced its decision, designating Hong – Kong and Los Angeles as its ports.

The United States are especially vulnerable to this competition, in that there is no other country in the world with such a concentration of container ports on all its coasts. This makes it particularly easy for shipping companies to move from one port to another if they re dissatisfied.

The container ports that have thus taken on a crucial irreplaceable role in the national economy are, in point of fact, replaceable nodes in the global logistic chain, and from a strategic point of view are simply strategically limited to being attractive enough to be chosen. As the size of a ship increases, the port industry finds itself faced with the dilemma of meeting this change.[9]

At present it is mainly the container ports of the North West Pacific, which are naturally deeper, that receive around 97% of large vessels, such as the 9800 TEU ones mentioned above. If other operators build such large vessels, it is logical to assume that vessels of the class of the Regina Maersk (6400 TEU) will no longer be used on routes in the Pacific, but will find a more important role in trans-Atlantic routes. Ports in the eastern area are preparing themselves for this. For example, the ports of New York and New Jersey, which have in effect entered into an alliance (as moreover Los Angeles and Long Beach, San Francisco and Oakland, Seattle and Tacoma on the Pacific have also done), have decided to invest 1.7 billion $US over the next 10 years and more than 7 billion dollars over the next 40 years to retain their priority position.

Other ports such as Charleston, New Orleans and Houston have also announced similar initiatives according to an *oligopolistic model of competition that will lead to every port assume a size that depends on the capacity of supply of others.*

4.1.2. “Dredging”

Like the majority of oceanic ports, except for those having high coastlines and naturally deep waters (like Los Angeles and Long Beach), the ports of the United States also require constant dredging[10] work, in particular

[9] . For example, four or five cranes are required to unload a 6000 TEU ship in two to three days and around 8 cranes to unload a 9800 TEU ship in four to five days. To serve a very large ship means tying up facilities for an indefinite period of time on account of the large volume of freight that is unloaded and that certainly causes some diseconomies in the port. Besides these enormous investments in cranes, terminals need longer docks (a 8.000 TEU ship is 340 meters longer), deeper entrance channels and docks more than 16 meters (50 feet) deep and wide basins to turn the ship. In addition, in order to eliminate congestion on the yards, the ports and terminals should invest in infrastructures inside the port that create an easy connection with the rail and external road network. As regards the depth of water there are only two ports on the East Coast (Baltimore and Hampton Roads) that have a channel more than 50 metres deep. Since it has been forecast that by 2010, 30% of containerized traffic will be managed by Post – Panamax vessels between 4000 and 6000 TEU and 9% by 6000 – 8000 TEU Post – Panamax vessels (DRI – Mc Graw Hill – USDOT, 1998) this means that the companies have decided that ports will adapt to their requirements.

[10] Dredging is an industry that is divided into many different operations: - the so-called capital dredging, that involves the creation of new, important facilities such as the construction of new

those of the East Coast, that are naturally less deep, as can be seen in Figure 2 (see also note 3).

A very worrying fact emerges from the figure. Ports may not freely decide to dig at any depth they consider advantageous: authorization comes from the USACE. Now as can be seen from the graph many ports have reached the authorized depth. As mentioned previously, Panamax vessels have a draught of 39.5 feet and Post – Panamax of around 46 feet. At least 50 feet is what is expected for the mega-vessels of the near future (forecasts to 2015). From this it seems apparent that only the ports of Virginia (6 in Figure 2), Baltimore (13), Hampton Roads (14), Seattle (15), Oakland (16), Los Angeles (17) and Long Beach (18) can be considered as ports for the largest vessels: indeed only the latter two may become true ports of the future, the great ports on the east. If this is the forecast it is clear that the intermodal system which must then distribute goods inland, or collect goods to be shipped from onshore, must be drastically intensified.

As regards the potential depth of the port sea beds, the only ports on the Atlantic coast that can be accessible to the mega-vessels of the future are those of the district of Hampton Roads and Virginia, which are already equipped with modern, efficient infrastructures and with good inland connections, and also the port of Baltimore.

The forecast as regards the strategies of the large shipping companies, according to a typical imitative oligopolistic behavior, is expected to involve larger and larger vessels. The effects of these very large vessels on the ports is likely to induce ports to step up dredging projects in general, both for maintenance, but even more in terms of capital investment, as they will need to guarantee deeper basins and channels for access of vessels to the ports and for ship maneuvers. The costs of environmental restoration will also increase considerably, since communities living in areas around the ports are exerting greater and greater pressure regarding the use of land surrounding port areas.

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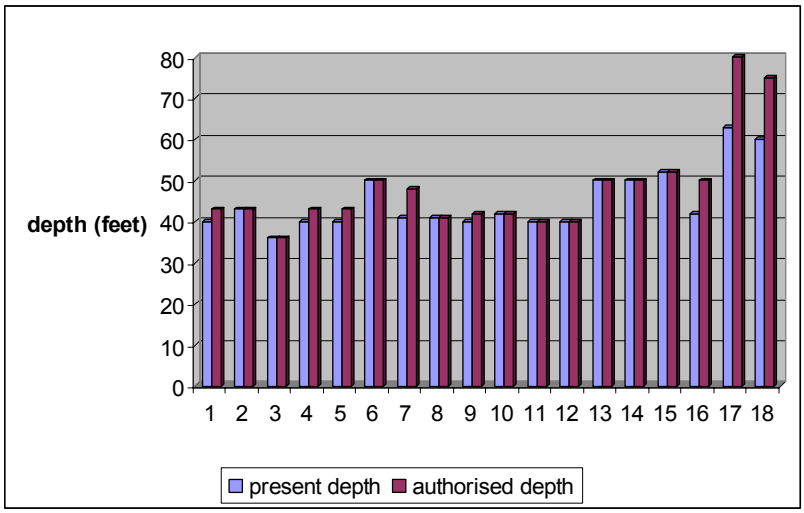
basins, deeper shipping canals, artificial lakes or reclaimed (or redeveloped) areas for industrial or residential purposes; - maintenance dredging works – such as the removal of silt from channel beds, that usually forms naturally, to maintain the planned depth of shipping canals and of ports; - remedial dredging work, i.e. remedial work that must be done to correct those operations that had previously caused forms of pollution. In addition, it constitutes rather concentrated, protected industry. The Jones Act and The Dredging Act excluded foreign dredging companies from this market; 1992 legislation authorized the chartering of ships by foreign companies; but at present there are many claims by American companies like, for example, the Dredging Contractors of America – DCA, that is presenting a claim against Bean Stuyvesant, an American – Dutch venture, which in its view chartered too many ships from the Dutch company Royal Boskalis.

Figure 2 *Present and authorized depth of the main United States maritime container ports (in feet)*



Legenda	
Houston	1
New Orleans	2
Gulf Port	3
NY/NJ	4
Charleston	5
Virginia	6
Savannah	7
Miami	8
Jacsonville	9
Port Everglades	10
Boston	11
Philadelphia	12
Baltimore	13
Hampton Roads	14
Seattle	15
Oakland	16
Los Angeles	17
Long Beach	18

Source: Author's data from *Marine Transportation System*, December 2000

The projects recently presented by the largest US ports are shown in Table 14. they involve massive expenditure, and this is destined to increase[11], both because needs are increasing, and because costs could rise even further if the protectionist attitudes of the dredging company associations were in the end taken into consideration. Dredging work would thus become increasingly restricted – indeed accessible only to American operators. The financing of dredging work, be it capital or maintenance, is shared by the federal government, local governments and the port authorities in variable proportions with respect to the project. For about ten years or so a lively debate has been in progress, not discussed in depth in this paper, regarding whose duty it is to finance this work, other than the federal budget, and in what proportion.

Table 12 *Funds required for new dredging projects (millions of $US)*

Container ports	**Needed**	**Requested**
New York/New Jersey Harbour	115	115
Oakland Harbour	50	7
Columbia Riva Channel	50	0
Houston - Gavelstone Channels	48	18
Los Angeles	40	0
Wilmington Harbour	23	9
Corpus Christi	21	0
Miami Harbour Channel	20	3
Dredged material disposal facilities	13	7
Total	**380**	**159**

Source: Author's data from *American Association of Port Authorities* – CI, 2003

[11] For example, a recently completed project for deeper dredging of the Port of Oakland estimated costs for engineering work, licenses and for modifications to protect the environment that exceeded already considerably high current expenditure.

Up until 1986, the share of costs charged to the federal budget was equal to 65% of the costs relating to bed maintenance work and to increasing the depth of channels. The remaining 35% was charged to state or local governments. In 1986 Congress approved the Harbor Maintenance Tax – HTM (an *ad valorem* excise on the value of transported freight initially equaling 0.4% and later modified) and the constitution of HTM Funds, as granted to the USACE for maintenance costs of commercial shipping[12]. The US MHT, which was declared unconstitutional for exports in 1998, is still applied to maritime imports and makes up about 71% of the contributions for maritime services in the United States. In 1999 Clinton proposed reviewing the HTM with a different form of taxation that took into greater consideration the actual use of ports, especially by large shipping companies, which are the main cause of the increase in dredging work. The proposal was that the excise should depend on the number of ports called at in the United States and on the size of the ship. The law did not pass the tests of constitutionality provided for by the Supreme Constitutional Court and was rejected.

4.1.3. Financing problems

Federal financing is however being reduced and the funds for dredging are in competition with those for port security[13]. Against this growing demand, the predicted budget for the tax year 2004 is 40 million dollars less than that for the previous tax year for maintenance dredging, and more than 90 million less for capital expenditure, and barely any more (+ 2 million) for other work. This against an estimated total requirement of more than 5 and a half million carried out by the American Association of Port Authorities – AAPA.

[12] The debate regarding the HTM began immediately and has never been interrupted, both as regards presumed unconstitutional aspects of the law, which over time were recognized, and because this tax was interpreted, especially by the EU, as a protectionist barrier to incomers (as it is now levied only on imports).

[13]The challenges that ports have to face are not just those of productive capacity: they are now interpreted as a sort of "front line" in the war against terrorism. The irony is that the ports are increasingly protected against trespass, theft and sabotage, but now it is expected that they should be the gatekeepers for the entire supply – chain, preventing the illegal entry of terrorists and arms of mass destruction. Moreover it is expected that ports should carry out this work without any interruption of service. Security work is competing with dredging for federal funding.

Table 13. *Federal Financing (USACE) for dredging. 2003 – 2004 (in millions of $US)*

Type of measure	Fiscal Year2003		Fiscal Year 2004	
	Requested	Enacted	Requested	Enacted
Operations & maintenance	1979	1940	1939	
Construction	1440	1756	1350	
General investigations	108	135	100	
Total	**3527**	**3831**	**3389**	

Source: Author's data from *American Association of Port Authorities* – CI, 2003

4.2. Weaknesses on the land front.

Facilitating the docking of large vessels, making terminals more efficient with the upgrading of docks, cranes, machines for handling on the yards, etc. is of little use if it does not create a convenient connection from the port to the railroad and the road network, and if it does not develop this type of infrastructure. The ports are just one of the sub-systems of the intermodal transport system and the entire system, which includes the railroads, roads and motorways and intermodal hubs, is just as vulnerable when faced with an impending capacity crisis as it is to sabotage and destruction.

Although an increasing number of freight passes through the container ports of North America, very little capacity has been added to the entire intermodal distribution system of freight. Motorways, railways and port appear increasingly congested, the motorway transport system has conducted experiments on the doubling of vehicle miles traveled over the last twenty years, while the total number of kilometers on the motorways has increased by only 1%. The same can be said for the railway network, a private industry that transports around 40% of national intercity freight, increased the total volume of freight transported by over 50% since 1980. At the same time, the number of available track kilometers has been reduced by 35%.

A number of studies have been carried out in recent years, among the most important being the study conducted in October 1990 by the Maritime Administration – MARAD of the USDOT (in collaboration with the Transportation Research Board – National Research Council) and the most recent in August 2002 again by the MARAD – USDOT – OID (Office of Intermodal Development). In addition, several important private studies have been performed, the most up-to-date and outstanding being that conducted in August 2003, on "*Trade and Transportation – A study of North American Port and Intermodal Systems*", by the National Chamber Foundation. However, all

these studies have led to the same conclusion: the network is no longer adequate.

In the last government report carried out with the collaboration of the AAPA, 59 small, medium sized and large bulk and container ports were interviewed. The answers to the questionnaire, which was slightly different according to the type of port, were selected according to the size of the ports and their specialization. Obviously the sensitivity of the large ports to road or railway network accessibility is very much higher than that felt by the other ports (Tables 16 & 17).

In the concluding analysis to the report it is stated that, "*the current state of the intermodal access system for US ports is generally acceptable to handle the existing volume of freight flows. However acceptable is a different condition from optimal. Acceptable means that ports, freight transportation providers and shippers can work around problems and can tolerate a certain amount of delay and costs. Acceptable conditions can become unacceptable as freight volumes increase in the future or if a segment of the system becomes unusable. The fact that the Top 15 deepwater container ports reported less acceptable conditions than the overall response pool is an indicator of the need to address access issues*".

Table 14 *Percentage of ports that consider conditions of the listed elements unacceptable*

Questions	**Sections**			
	A	**B**	**C**	**D**
Roadways within the Port	7	20	10	3
Local roads	25	20	25	24
State/interstate roads	20	27	30	10
Rail line - haul moves	20	21	22	18
Rail moves on rights-of-way shared with passenger operations	23	36	37	10
Sufficient depth in federal channels	26	14	29	24
Sufficient depth in private channels and at berths	22	15	28	14

Legenda	
A	59 Overall port agency sample
B	TOP 15 deepwater container ports
C	29 out 59 container ports
D	30 out 59 non container - ports

Source: Author's data from USDOT, MARAD, August 2002

The NCF report is even more severe and concludes by pointing out that the system of United States ports is working at its minimum capacity in many areas. "*Should any component of the system break down, over a fourth of the national economy will be crippled. ……..The paradox is that the United States has significant reserve capacity in its freight transportation system; it simply is located in the wrong place to relieve the most critical choke points.*

The U.S. lacks a national program for freight transportation planning and development to focus critical scarce resources on the checkpoints at key gateways and corridors".

In both reports the importance of guaranteeing efficient corridors between ports and railway networks and between ports and motorway networks is emphasized. For the railway in particular, intermodal movements by rail are strongly dependent on the existence of port – railway connections; these involve high capital investments that may either be in the port or in the areas near the port. In addition, the possibility of railways reserved only for freight was highlighted (Table 18). In the United States many of these have already been set up; mention will be made here of just one example, namely the famous Alameda Corridors that serve the ports of Los Angeles and Long Beach.

Table 15 Percentage of ports that consider the conditions of the elements in the chart unacceptable.

Questions	**Sections**			
	A	**B**	**C**	**D**
Number of turning lanes on local roads	25	20	25	21
Location of turning lanes on local roads	26	20	22	26
Number of turning lanes on state/interstate roads		21	25	31
Location of turning lanes on state/interstate roads		21	20	
Traffic flows at at-grade rail crossing within the port	28	31	52	23
Traffic flows at at-grade rail crossingon state/interstate roads			24	
Traffic flows at at-grade rail crossing on local roads	37	45	43	
Height/width restrictions for rail tunnels		25	23	
Weight , height and other restrictions on local roads				22
Weight limitations on state/interstate roadway bridges			20	20
Number of spurs/tracks within the terminals and on port property		21		
Cost and travel time associated with draying cargo between the port and rail heads	27	21	32	20
Environmental issue in federal channels				21

Legenda	
A	59 Overall port agency sample
B	TOP 15 deepwater container ports
C	29 out 59 container ports
D	30 out 59 non container - ports

Source: Author's processing of USDOT – MARAD data, August 2002

One of the worst problems for the road transportation network is that relating to the so-called last – mile stretch, even though the problem relating to congestion of motorways is also acute, suggesting the need to construct roads reserved specifically for lorries (Table 18).

The greatest cost in road transport is actually in the terminal stretches allowing entry into and departure from the terminals, especially the larger and more efficient terminals. The construction of efficient intermodal connectors

is therefore equally essential for road transport. The ISTEA - The Intermodal Surface Transportation Act was issued in the United States as early as 1991 and has been in effect since that date. It recognized the importance of the intermodal network and pointed out the need for intervention.

However, in June 2000 the NHS – The National Highway System once again found itself having to report that 1222 connectors were in a dreadful condition, and that they were receiving fewer funds than other roads belonging to the NHS.

Table 16 Requirements as perceived by interviewed ports

Questions	**Sections**			
	A	**B**	**C**	**D**
Availability of trucks-only routes within ports	36	71	38	33
Availability of trucks- only routes on local roads	72	86	77	67
Availability of trucks- only routes on state and interstate roadways	52	75	75	27
Radio transmission of roadways within the ports	35	50		
Radio transmission of conditions on local roadways	34	40	45	27
Radio transmission of conditions on state and interstate roadways	48		41	
Availability *paperless gates*		50	50	
Port specific signage on local roads				29

Legenda	
A	59 Overall port agency sample
B	TOP 15 deepwater container ports
C	29 out 59 container ports
D	30 out 59 non container - ports

Source: Author's data from USDOT – MARAD, August 2002

Besides the obvious need to find funding, the real bottleneck regarding the solution to this problem is that intermodal connectors are under the authority of the Metropolitan Planning Organization – MPO, and these organizations are not co-ordinated. *No coordinated approach exists to a single intermodal system*. More than being an intermodal transport system it is an mass of public and private multiple modes, each of which is hinged on its own individual work areas. Each of them has both a vertically integrated IT system, and vertically integrated programs of planning, management and development, without intersections of dialogue between the modes.

5. A strong port system, at the limits of productive capacity, on the threshold of an unstoppable trade growth that it could help or hinder.

5.1. Strong points and weaknesses: a summary

The United States is the most complete, important, modern port system in existence today. However some weak point exist, a few of which have been described in detail in the text. They may be summarized as follows:

- port dependence on liner shipping companies strategies
- increase of dredging work
- higher taxation
- national security in conflict with commercial use of ports and in competition with federal funds
- inefficient use of work force
- lack of efficient direct ship – train railway connections in the port
- congested roads, especially near metropolitan centers
- inexistence of an overall intermodal system coordination plan, despite the need for such a plan being firmly supported even with the creation of agencies and forms of specialized financing.

5.2. A proposal for intervention

It is obvious that such a complex problem requires several alternative solutions for each of its points. It is for this reason that the National Chamber Foundation (NCF), by means of a TSC study, proposes the adoption of a National Freight Policy. This proposal is aimed at establishing and coordinating within the Department of Transport – USDOT, a program for the transport of freight that should be *separate from the general one* and should plan and promote a national intermodal system based on accurate data of trade flows and efficient information technologies. Likewise, the TSC suggests the creation of a Federal Freight Advisor Committee, which should produce specific results in those areas of infrastructures, such as those mentioned above where the greatest weaknesses were found, and should implement measures to resolve such weaknesses by:

- a clear, definite program coordinated by USDOT
- a national intermodal planning and development initiative
- a coherent, sustainable process of environmental regulation
- information technologies and transport data bases
- a labor system integrated in the national policy of freight transportation

Also important is the proposal to investigate new sources for the financing of the re-launch of intermodal infrastructures of freight transportation systems, including the constitution of a National Freight Transportation Bank, and the issuing of a new series of Transportation Bonds.

5.3. Port strength arises from intermodal integration

The success of this program of interventions could become the real strong point of the port system of the United States. Excellent ports exist in the USA, but also in other countries such as in the Far East (Hong Kong, Singapore, Kaohsiung, Busan, Port Klang, Yokohama, etc) and in the European Northern Range (Antwerp, Rotterdam, Hamburg, Brema, etc). In contrast, it is difficult to find national intermodal systems as well developed as the American system. Europe is not yet a single nation and, although rich in potential, still has much to do and these are ten-year investment sectors; the Far East is split into many nations in strong competition with each other; furthermore, in the largest Asian nations, such as China - which could become a dangerous competitor to the United States - the land infrastructures are practically inexistent, so much so that Asia has greatly strengthened the hub and spokes maritime systems of transportation precisely to remedy this shortcoming.

But even if Europe is soon to become a single nation, it would still be far from having a standardized intermodal system: the stated weaknesses of the American model are trivial if compared with the very poor connections in the railway services and road networks of many European countries. Many studies have been and are being carried out on the possibility, for example, of increasing the use of Mediterranean ports to reach relatively nearby hinterlands such as those of southern Germany, Austria, Hungary, Slovakia, etc, i.e. in order to reduce by almost ten days or so the number of days freight spends at sea, to decongest the ports of the Northern Range, and to strengthen the economy of the Mediterranean. The weak point in this solution remains the inland transportation system, in the case in point the Italian inland transportation system: inadequate roads that are unsuitable to take on even greater loads with large lorries carrying heavy freight, rail lines that are inadequate even for the simple transportation of passengers, natural obstructions such as the mountain chain that prevents the adoption of double-stack trains. The development of short sea shipping might ease this situation but obviously would not be enough to solve it.

5.4. Conclusions and proposal for setting up a comparative USA-EU study.

The United States is the nation with the largest, best-organized port and intermodal system in the world. Some weaknesses exist and can be specifically identified in some aspects of intermodal connections to ports, both for maritime access and for land access.

As regards its ability to cope with strong development in international trade and therefore of the economy in general expected, as in the forecasts up to 2020, it is observed that the system has almost reached the full capacity.

Much infra-structural work is being carried out and much is foreseen for the next decade. Yet should the situation remain at the present level, or should the work prove to be insufficient compared with sectorial operators' estimated requirements, a serious problem might ensue, possibly even a crisis situation.

But a more moderate development of ports and of the economy might simply occur by means of international trade, which could be advantageous to some Asiatic countries that are not exclusively suppliers of the United States but also competitors.

5.4.1. Further development: a comparative USA – EU study.

A comparative study between the US and EU coast port industrial systems could represent the natural evolution of this work. The European economy might also take advantage of this, assuming that the EU decides to behave as a "nation" and succeeds in benefiting from its current developmental lag compared with the United States. That is to say, Europe might profit from the present debate by drawing on experiences that are already known from elsewhere, thereby avoiding mistakes previously committed on the other side of the Atlantic.

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