



HAL
open science

Vertical adjustments between liner shipping and container handling industry on the global scale: divide et impera ?

Antoine Fremont, F Parola, Martin Soppe

► To cite this version:

Antoine Fremont, F Parola, Martin Soppe. Vertical adjustments between liner shipping and container handling industry on the global scale: divide et impera ?. IAME, International Association of Maritime Economics Conference, Jul 2007, Athènes, France. 19p. hal-02123048

HAL Id: hal-02123048

<https://hal.science/hal-02123048>

Submitted on 7 May 2019

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

VERTICAL ADJUSTMENTS BETWEEN LINER SHIPPING AND CONTAINER HANDLING INDUSTRY ON THE GLOBAL SCALE: DIVIDE ET IMPERA?

Antoine FREMONT¹ PhD, INRETS-SPLOT research institute, Arcueil (Paris), France
antoine.fremont@inrets.fr

Francesco PAROLA² PhD, University of Genoa, Department of Business Studies & Italian Centre of Excellence for Integrated Logistics, Italy
parola@economia.unige.it

Martin SOPPE¹ PhD, INRETS-SPLOT research institute, Arcueil (Paris), France
martin.soppe@inrets.fr

¹ INRETS-SPLOT,
2 avenue du Général Malleret-Joinville
F-94114 ARCUEIL Cedex (France)
Tel. +33 1 47 40 72 20
Fax +33 1 45 47 56 06

² University of Genova,
Via Vivaldi 5
16126 Genova (Italy)
Tel. +39 010 209 5071
Fax +39 010 209 5088

Topic area: container shipping and handling

Abstract

Stevedoring operations in seaports assumed a dramatic importance for shipping lines, that secured dedicated berths in many regions. More recently, the institutional turn in ports drove the overseas expansion of aggressive pure stevedoring companies rapidly taking the control of the market. For quite long time carriers and pure stevedores fiercely battled each other both for defining the contractual terms of handling services and for securing new concessions. Currently this scenario is slowly changing. Therefore, this paper aims at revealing the contractual and equity forms of co-operation that are emerging in ports between shipping lines and terminal operators.

Keywords: market consolidation, liner shipping, port handling, global network, vertical coordination, corporate strategy

VERTICAL ADJUSTMENTS BETWEEN LINER SHIPPING AND CONTAINER HANDLING INDUSTRY ON THE GLOBAL SCALE: DIVIDE ET IMPERA?

1. THE LINER SHIPPING INDUSTRY AND THE SUPPLY OF PORT SERVICES

The advent of the containerisation has deeply affected the organisation of maritime shipping industry as well as the relationships among the players within the transportation chain. The demand for containerised transport has been continuously increasing, leading shippers to progressively enlarge their focus towards a ‘global’ perspective. The whole liner shipping industry had to adapt to these changes of demand. Besides the expansion in marine operations, top shipping lines (SLs) have also aimed at reducing other production costs, diversifying their investments and achieving paths of vertical integration along the transportation chain. Therefore major carriers have deeply invested on the land-side, setting up a network of port facilities all over the world and becoming integrated shipping lines (ISLs).

In reaction to the carriers’ evolving and aggressive strategies, but also to exploit the growing investment opportunities offered by the recent “institutional turn” in ports (De Monie, 1994; Juhel, 2001; World Bank, 2001), some pure terminal operators (PTOs) have been expanding their operations internationally, setting up wide networks of terminal facilities across various regions. Therefore the port handling sector is experiencing a similar consolidation trend: a handful of players ‘is taking the power’.

The emergence of powerful pure terminal operators, willing to diversify their portfolio and to increase their financial margins overseas, gave momentum to carriers’ involvement in terminals as majors shipping lines were growingly constraint to defend their enormous investment in maritime assets (i.e. vessels). Therefore last years were characterised by a strong battle between carriers and PTOs to get the control of the “port phase”.

Nevertheless, this scenario, characterised by a clear-cut separation and a fierce competition between shipping lines and PTOs, is slowly changing (i.e. “corporate realignment”: Slack, 2004). The progressive scarcity of available port spaces for greenfield projects, the end of the “privatisation window” (early-1990s/early 2000s), as well as the enormous cash-flows needed for the realization of modern terminal facilities, are leading PTOs and carriers to stay “closer” each other and to experiment some forms of co-operation. In other words, the above changes are driving to a partial convergence of their respective interests, as well as to the establishment of contractual and equity cooperative agreements.

Within the academic literature the topic of container port services has been considered by many studies. The involvement of shipping lines in stevedoring activities and the emergence of dedicated terminals have been early discussed by Slack (1993) and Haralambides *et al.* (2002). Notteboom (2002) analysed vertical integration strategies of carriers, highlighting the potential role of network economies in such a process.

Contrary to carriers’ entry in ports, the emergence of pure terminal operators has been caught up by the mainstream literature relatively late. Early studies came from Ferrari and Benacchio (2000) and Peters (2001), showing leading players expanding in various markets. More recently, Notteboom (2004) discussed about major PTOs in relation to the growing concentration in liner shipping and to the rise of global alliances. Midoro *et al.* (2005), addressing the Peters’ typology on terminal operators’ waves of internationalisation, focused on major drivers of carriers’ vertical strategies in ports. Slack and Frémont (2005) analysed the stevedoring industry clearly outlining the two dominant business models, PTO and ISL.

Finally, Olivier (2005) approaching the role of emerging (local) forms of partnerships between PTO and ISL, guesses the future establishment of wider inter-industry relationships even at a global scale.

While much attention remains focused on global carriers and PTO as a customer/supplier duo or as competing port investors, no efforts have been done in matching the demand and the supply of handling services in really quantitative terms. Moreover, the current trends reshaping the port industry (Olivier and Slack, 2006) are also calling for a new understanding of it, mostly based on terminals (instead of ports as a whole) as new emerging “elementary unit” of analysis (i.e. “terminalisation of ports”: Slack, 2005). Right in this respect, a “terminal by terminal” approach seems to be much more appropriate to depict the existing correlations between the top players of two industries.

Such methodology would allow to reveal the dependency of shipping lines from third-party handling providers as well as the real fitting between carriers’ maritime services and managed port network. Therefore the major aim of the current paper is to address this gap.

In fact, one of the major points on the research agenda is to investigate the real nature of the relationships between carriers and terminal operators in ports that potentially might differ from one region to another, in the light of local investment opportunities and various market conditions (Airriess, 2001). This relies on previous researches (Parola, Veenstra, 2006) that have shown a significant statistical correlation between the maritime network of major SLs and the port network managed by leading PTOs. Such inter-industry partnership might also be an effect of the growing concentration in liner shipping and port operations (Frémont, Soppé, 2004).

This paper, predominantly written from a carriers’ standpoint, wills at investigating the current relationships between SLs and international terminal operators (PTOs and ISLs), both contractually and in terms of joint terminal investments.

In such respect, the “analytical lens” is focused on shipping lines as customers and investors (through JVs, POS and WOS) in ports. Finally the study aims at identifying “unrevealed” and geographically extended forms of inter-industry co-operation between SL and international terminal operators.

2. THE CARRIERS’ ENTRY IN PORT OPERATIONS AND THE RISE OF PTOs

Terminal operations have been caught up in a maelstrom of change over the last decade. The world’s leading shipping lines have played a key role in these transformations since the middle of the 1980s. They have extended their interests in terminal operations by securing long-term leases over dedicated berths. The academic literature has already explored the reasons pushing the shipping lines to integrate terminal handling operations in their portfolio, and to run terminals (often dedicated).

First of all, terminal handling operations account for a major share of the total door-to-door transportation costs (cost-driven). This share has been estimated as 21% (Stopford, 2002) and up to more than 50% on port-to-port basis (Fossey, 2002). Internalizing these costs through direct management of terminals is seen as giving the carriers greater control over operations and hence the opportunity to reduce costs.

Second, the growing traffic flows and the dramatic increase of the “call size” imposed a tremendous pressure on port handling operations, requiring faster and more affordable services (productivity-driven). The increases in ship size (Sys, 2005; Cullinane and alii, 1999) drove to larger economies of scale through the reduction of unit transport costs but, at the same time, also implied a significant growth of the daily cost in terms of

amortisation, interest charges, running costs¹, etc. In such respect, a systematic delay in port operations can easily have a strong impact on carriers' profitability. Therefore dedicated berths and terminals proved to be a very useful tool for shipping lines to deal with the growing traffic concentration in a few hubs.

Third, the shipping lines have developed global networks based on the hub and spoke system to deal with the global demands of their clients (network-driven), i.e. shippers (Baird, 2006). The concentration and the co-operation among leading shipping lines favour the extension of carriers' networks (Guy, 2003; Heaver and alii, 2000). Both the leading independent carriers and the alliance members use a limited number of hubs mainly located on the main east-west intercontinental axis spanning the world (Rimmer, 2004). The hubs became the nerve centres of carriers' networks because of their importance and vulnerability require a sophisticated and affordable management. This is why major shipping lines try to manage their key hubs by themselves.

Fourth, efficient container terminals also facilitate the optimization of inland transportation (intermodality-driven). The shipping lines develop an efficient carrier haulage to speed up the container rotation and to reduce their inland transportation costs (Notteboom, 2004). If the traffic is large enough, hinterland transportation can be appropriately organized from marine container terminals with block trains or barges (Panayides, 2002). Massification arises in the container terminal.

Fifth, the growing scarcity of available port spaces and the dramatic rise of international pure terminal operators (PTOs) across major market areas quickly raised the bargaining power of the supply side (strategic-driven). Powerful and aggressive stevedoring groups emerged over the last ten years as a result of the institutional turn in ports. Thanks to their enormous financial capabilities, their know-how and expertise, as well as their speed in getting new concessions and entering new ports, such players rapidly became a threat for shipping lines.

For all the above reasons, since the mid-1980s, shipping lines have become more and more involved in the stevedoring business. Currently around 3/4rs of the 20 world leading carriers have international terminal handling activities. They play a major role in this business. According to Drewry (2005), they managed a quarter of the world throughput in 2004. It may be noted, however, that the PTOs account for almost 47% of the market. Despite their process of integration in terminal activities, even experiencing a strong acceleration over the last ten years, major shipping lines still have to resort to third-party terminal operators (international or local) in many ports.

In addressing the issue of potential port suppliers for SLs a distinction should be made between PTOs, independent players having the stevedoring market as core business, and ISLs belonging to competing maritime groups. In many cases, however, ISLs throughput is mostly generated by the maritime traffic of the SL of the same group. Moreover, many carriers are still quite reluctant to be served by terminal operators belonging to a competing maritime group. More specifically, in relation to the share of the third-party traffic, ISLs can be classified as follows:

- *hybrid ISLs* (4): APMT, Cosco Pacific/Coscon, NYK, OOCL². They are internal divisions of the carrier group but they are growingly trying to appear and to act as independent companies;

¹ For instance running costs are estimated to be 100 000 US \$ for a Post-Panamax ship with a capacity of around 9 000 TEUs.

² In November 2006, OOIL (parent company of OOCL) sold out its North American terminal division (4 facilities) to a Canadian pension fund. These terminals generated the greatest part of OOCL throughput.

- *other ISLs* (11): CMA-CGM, MSC, Hapag-Lloyd, APL, China Shipping Terminal Development, Evergreen, Yang Ming, MOL, K-Line, Hanjin, Hyundai; they are integrated shipping lines essentially aiming at covering their own maritime services.

PTOs classification depends on their network extension. In fact, as shown by Parola and Veenstra (2006), despite their overseas investments, only an handful of them can be labelled as really global. Therefore, we propose the following classification:

- *global PTOs* (3): HPH, PSA and DPW (including P&O Ports). They have a wide coverage in many port ranges;

- *regional PTOs* (9): Eurogate, Dragados, TCB, SSA, HHLA, ICTSI, Modern Terminals Ltd., New World Holdings, China Merchant Holdings. They have a strong presence predominantly in the market around their home port base;

- *local players*: they have only a domestic focus and in the current study are not sampled. Nevertheless within their captive area they can play a quite important role: i.e. Marine Terminal Corp. (MTC) on the US West coast or Associated British Ports (ABP) in the UK.

3. METHODOLOGICAL NOTES

A quantitative analysis on carriers' traffic flows distribution over terminals is an interesting method of addressing the issue of relationships between terminal operators and shipping lines. The analysis of such figures can give an interesting insight into the way shipping lines satisfy their growing need of port services, such as the share of self-handling (through WOS and POS), the diversification of the suppliers portfolio, the degree of dependence on major third-party terminal operators (especially PTO) or the relevance and the geographical spread of emerging cooperative ventures (JVs) between shipping lines and PTO in ports.

For the purpose of this research, carrier's statistical data on traffic flows handled in each container terminal would be probably the most relevant ones. Unfortunately, the latter are unavailable, being considered as highly strategic and kept confidential by shipping lines.

Nevertheless, the extrapolation of data on transport capacities (i.e. vessel slots) makes possible to overcome the unavailability of carrier's throughput per terminal. The analysis of the capacity deployed by each shipping line also allows a better appreciation of the various strategies carriers adopt in order to defend their maritime assets from the growing bargaining power of pure terminal operators (PTOs).

We have collected information on maritime containerised services from an annual statistical publication, the Containerisation International Yearbook. We completed the work investigating the brand name of the different container terminal companies called by each maritime service. This latter information is a result of an intense and deep research in all available sources (shipping lines' and terminal operators' websites, corporate interviews, Containerisation International on-line database, Drewry reports, professional press releases and scientific papers). Such data on various terminal handling suppliers, do not have a high confidential value at the level of a single port, but acquire a considerable worth when [exhaustively] collected and aggregated both on a regional and worldwide scale. In such respect, accurate information on relevant shareholders has also been collected in order to weight their different financial involvement in each project.

Our quantitative analysis focuses on the distribution of transport capacity for the selected shipping lines (Table 1). The sample covers exhaustively the 100 major ports (in terms of container throughput), the 10 largest shipping lines (ranked by fleet capacity),

including their main subsidiaries, and the 27 current international terminal operators (Table 2), both PTO and ISL (ranked by throughput). The stevedoring companies outside our sample have been labelled as “local players”. Our sample represents 72% of weekly capacities for considered shipping lines. MSC and Maersk Line, the most diversified carriers calling at many smaller ports, show obviously the lowest percentages, respectively 64% and 68%, which is still good enough in terms of representativeness.

Table 1. Sampled leading shipping lines groups

Shipping Lines (SL)	Country of origin	Fleet capacity (TEU)	Vessels
Maersk Line ¹	Denmark	1 608 431	518
MSC	Switzerland	942 205	306
CMA-CGM ²	France	569 708	220
Evergreen ³	Taiwan	539 801	166
Hapag-Lloyd	Germany	448 840	138
Coscon	China	385 368	125
China Shipping	China	349 105	98
APL	Singapore	329 896	102
Hanjin Shipping	South Korea	322 482	77
NYK Line	Japan	273 779	84

Notes:

¹ Maersk includes Safmarine

² CMA-CGM includes Delmas

³ Evergreen includes Italia Marittima and Hatsu.

Source: our elaborations from CI-on line database (as October 1st, 2006).

Table 2. Sampled international terminal operators (2004 throughput)

Terminal Operator	Type	Country of origin	Million TEU (2004)	% share	No. of ports (mid-2006)
Hutchison Port H.	PTO	Hong Kong	47.8	13.3	44
PSA Corporation	PTO	Singapore	33.1	9.2	20
APM Terminals ¹	ISL	Denmark	31.9	8.9	42
<i>P&O NedLloyd¹</i>	<i>ISL</i>	<i>UK/Netherlands</i>	<i>2.1</i>	<i>0.6</i>	
Dubai Ports World ²	PTO	Dubai	11.4	3.1	36
<i>P&O Ports²</i>	<i>PTO</i>	<i>UK</i>	<i>21.9</i>	<i>6.1</i>	
Cosco Pac./Coscon	ISL	China	13.3	3.7	19
China Merchant H.	PTO	Hong Kong	12.8	3.6	5
Eurogate	PTO	Germany	11.5	3.2	10
Evergreen	ISL	Taiwan	8.1	2.2	12
SSA Marine	PTO	USA	6.7	1.9	9
MSC	ISL	Switzerland	5.7	1.6	14
HHLA	PTO	Germany	5.6	1.6	9
New World Holdings	PTO	Hong Kong	5.5	1.5	3
APL	ISL	Singapore	5.3	1.5	10
Modern Terminals Ltd.	PTO	Hong Kong	4.4	1.2	3
Hanjin	ISL	South Korea	4.4	1.2	10
NYK	ISL	Japan	4.4	1.2	13
OOCL	ISL	Hong Kong	3.6	1.0	4
MOL	ISL	Japan	3.6	1.0	8
Dragados	PTO	Spain	3.1	0.9	8

K-Line	ISL	Japan	2.6	0.7	7
TCB	PTO	Spain	2.4	0.7	8
ICTSI	PTO	Philippines	1.9	0.5	5
Yang Ming	ISL	Taiwan	1.7	0.5	3
China Shipping TD.	ISL	China	1.2	0.3	5
Hyundai	ISL	South Korea	1.2	0.3	5
CMA-CGM	ISL	France	1.2	0.3	5
Hapag-Lloyd	ISL	Germany	0.8	0.2	2
International operators total			259.2	72.0	
World throughput			360.2	100.0	
Total PTO			168.1	46.7	
Total ISL			91.1	25.3	

Notes: Hong Kong, Taiwan and China are considered separate political entities.

¹The Maersk Group (APMT and Maersk Line) took over P&O NedLloyd in 2005.

²DPW took over P&O Ports in early 2006.

Source: our elaborations from Drewry (2005) and company annual reports.

For all the services we examine the “call capacity” (i.e. vessel size in TEUs) in the sampled container terminals. The data from Containerisation International provide for each service the port rotation, the number and the capacity of ships deployed by each carrier and the frequency. The above parameters have been organized within the “WCTC database” (Weekly Containerised Transport Capacity database) having the port calls ports (per each carrier’s service) as its elementary record: In case of services jointly run by an alliance or a consortium the real contribution (i.e. shared vessels) of each shipping company has also been specified. For reasons of uniformity and consistency all capacities have been converted to weekly equivalent terms called “weekly capacity”. More specifically, the relation between the carrier (demand) and the terminal operator (supply) has been managed weighting the WCTC by the financial involvement of different terminal shareholders. Thus, the WCTC generated by a vessel call of any maritime service has been split among and associated to various shareholders as explained in the following example (Weighted WCTC = WWCTC):

Let’s consider a terminal “delta” with the following shareholders: A (50%), B (40%), C (10%).

Let’s consider a maritime service X calling at “delta”

$WCTC_{\text{delta}}^X$ is the weekly capacity of the service X calling at “delta”

$WWCTC_A^X$ is the weighted capacity of the service X calling at “delta Assigned to the shareholder A

The WCTC is split among the three shareholders A, B, C:

$WCTC_{\text{delta}}^X = WWCTC_A^X + WWCTC_B^X + WWCTC_C^X$

$WCTC_{\text{delta}}^X = (WCTC_{\text{delta}}^X * 0,5) + (WCTC_{\text{delta}}^X * 0,4) + (WCTC_{\text{delta}}^X * 0,1)$

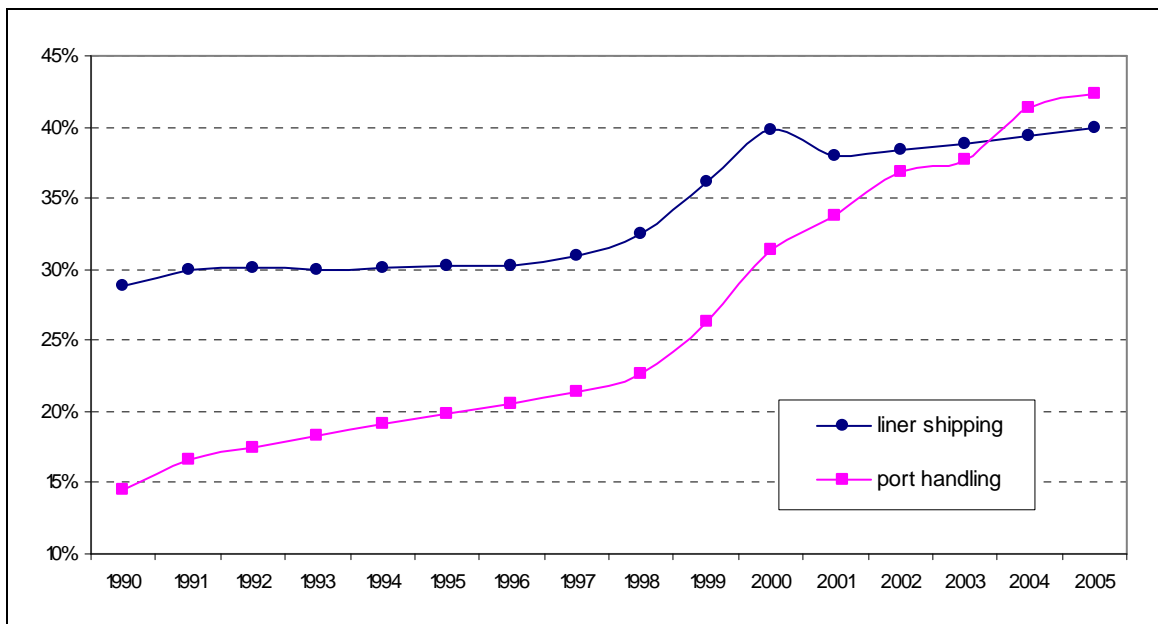
4. A GEOGRAPHICAL FRAME FOR VERTICAL COORDINATION: DEMAND VERSUS SUPPLY OFFSET

The shipping lines’ strategies towards the supply of terminal operations depend undoubtedly on the confrontation with the structure of the opposite side. Size, market shares bargaining power, prices, terminals portfolio and geographical reference determine the very context in which vertical coordination, i.e. relations between shipping lines and terminal operators, take shape. As transport activity is strongly location-dependent, we will examine the geographical aspect of demand and supply meet, focusing in particular on the global scale.

Globalisation mechanisms affect container handling industry in a different way compared to any firm or shipping line. This can explain the relative delay of handling industry on the path to globalisation in respect to other economic sectors, in particular to container shipping. Production sectors have been at the very origin of globalisation process, combining the advantage of geographical differences, the economies of scale and the possibility to escape to national constraints. Shipping lines have been the vector for this new economic organisation and the match with a new global demand has really been a competitive challenge for them. On the other hand, the interest for and the possibilities of global extension have been more constraint for the handling sector. Geographical differences or configuration are not a real and direct source of benefits or competitiveness. Their international growth was driven by the carriers' aggressive strategies and by investment opportunities in ports opening the doors to foreign private investors.

The shipping and handling sectors have been experiencing a similar consolidation trend (see figure 1). The respective market concentration ratios both converged to the similar level. In fact TOP 5 in each industry control around 40% of the market. This means that stevedoring operators have progressively filled the gap with their customers (i.e. shipping lines) in terms of concentration, rising in turn their bargaining power in negotiating handling contracts.

Figure 1. Evolution of market shares controlled by top 5 players in liner shipping and container handling



Note:

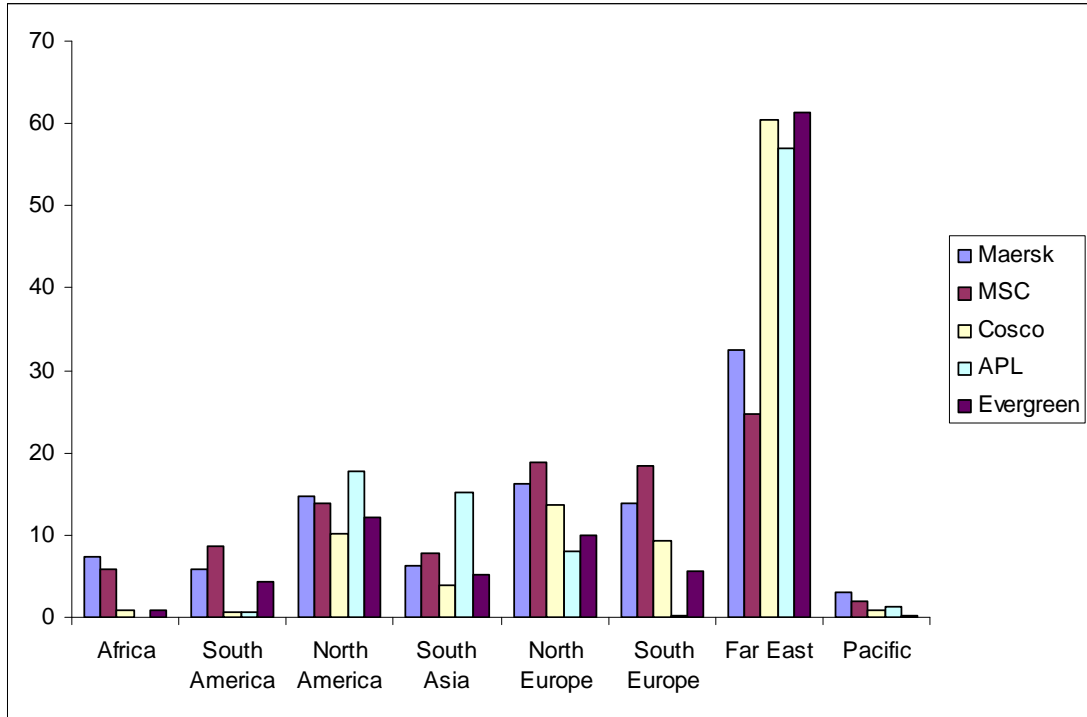
Data on liner shipping are referred to the cellular fleet capacity of major carriers while port handling figures are referred to the total throughput of leading container terminal operators (both PTOs and ISLs).

Source: our elaborations from Containerisation International (various years), Drewry (various years) and companies' websites.

The following figures (figures 2 and 3) aim to appreciate the geographical match between shipping line's network and that of container terminals. In spite of the general evolution towards global networks, a temporal and geographical offset remains between the demand and the supply sides. Although the gap in concentration levels has been filled

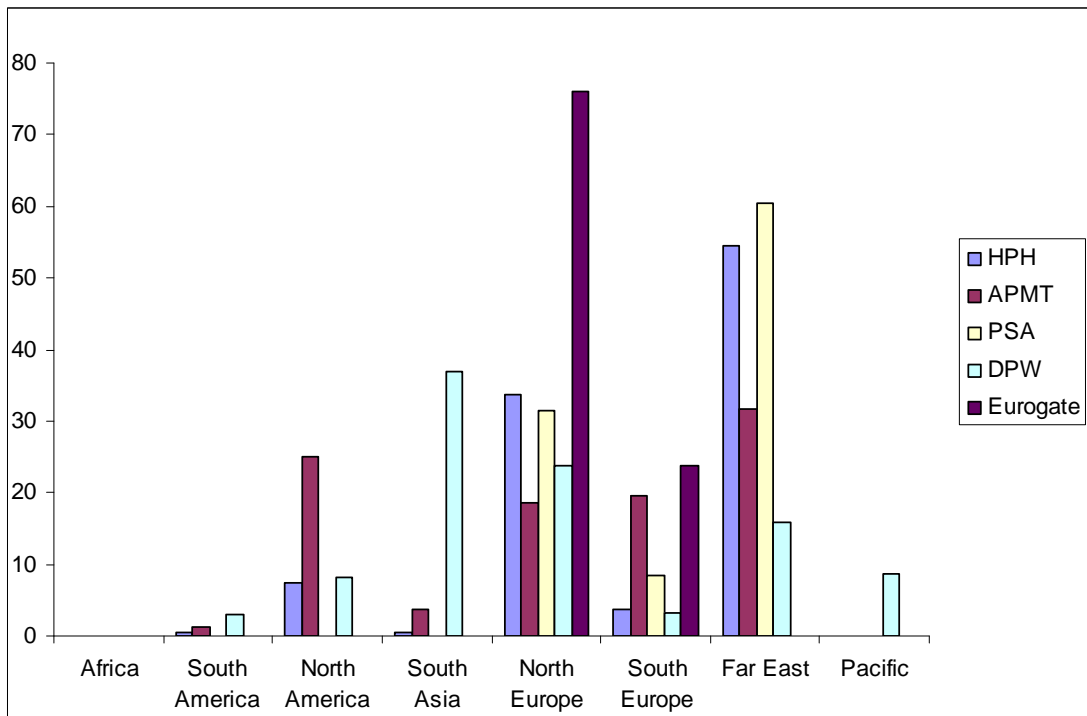
by PTOs, the temporal offset impacts on the maturity of market structure. The delayed start of international expansion might not be the only reason for that. It would be worth verifying the hypothesis of the difference of growth and adaptation rhythms between liner shipping and container handling due to nature and size of necessary investment.

Figure 2. Shipping lines' capacity distribution over world's regions (in % of WCTC)



Source: our elaborations from WCTC database.

Figure 3. Terminal operators' WWCTC distribution over world's regions



Source: our elaborations from WCTC database.

For the time being scarcely any terminal network has reached the critical size to be able to supply a global offer. Although only few shipping lines can really pretend to the status of *global carrier*, (Frémont *et al.*, 2003) the shipping lines' networks have generally a wider geographical spread tending to a worldwide scale, achieved by the means of external growth or horizontal integration. This geographic offset is clearly demonstrated by the figures 2 and 3 which allow comparison between the top 5 players for each sector. It reveals a strong contrast between more widely globalised maritime networks and the networks of terminals which are more fragmented – either the operators have a (multi-) regional base like PSA or Eurogate, or they are selective, investing massively in specific places (HPH).

This maturity and geographical offset sets a frame in which vertical coordination take place. Terminal networks did not achieve sufficient spread for co-operation at a global level. Maersk is the only one who has been able to develop a global network of terminals, adapted to its own needs. The vertical adjustment between demand and supply is more likely at regional or local levels. However, consolidation trend in handling industry reveals seek of terminal operators for further network expansion and this evolution might progressively create different conditions for vertical coordination on a global scale.

5. SHIPPING LINES IN PORTS: AN OVERVIEW OF MAJOR HANDLING PROVIDERS

To go further in our analysis we will now consider the relation between shipping lines and terminal operators in a closer insight. The following cross-check table (Table 3) contains the weekly capacity, for each shipping line, as distributed among terminal operators.

The category “Local players” represents a relatively constant share in shipping lines' capacity distribution (approximately one third). The relatively small variations are caused by the choice of ports where local players are strongly involved in terminal operations or the sole operator. A deeper analysis would be necessary to know to what extent the presence and choice of handling companies (international or local) in the port can be determinant for a carrier. In this respect, much more significant variations affect the distribution of capacities among remaining operators, in particular between PTO and ISL categories. We will focus our analyses on the top five terminal operators for every shipping line as these account in average for 80% of remaining WCTC (i.e. excepted “Local players” category).

The two major PTOs always rank within the top three positions with the exception of one shipping line, the NYK. Indeed, HPH and PSA have succeeded to become two leading global partners for all container shipping lines. They have achieved this position more by selective investment than through a large spread of their networks. Investments at strategic ports like Hong Kong, Singapore, Rotterdam or Antwerp where they have a strong, if not dominant, position makes them a partner that can't be ignored by shipping lines. The NYK's excessively low value for HPH below 5% suggests possible shunting attitude towards HPH.

The dispersion of WCTC over the top 5 terminal operators tells about the shipping line's attitude towards terminal operators, at the global level, in terms of diversification and concentration. We refer to the top 5 terminal operators' share, where self-made operations have been deducted for reasons of signification - we are referring to the column ‘Top five minus self-handled’ in Table 3. Low values indicate the strategy of portfolio diversification turned to smaller terminal operators. High values reflect

concentration and preference for major operators. In this respect Maersk, NYK and Hanjin appear as most diversified and independent shipping lines. On the contrary Hapag Lloyd, Cosco and APL show much less diversification and concentration on major terminal operators.

Table 3. Five major terminal operators of shipping lines' portfolios
(by shipping line, in % of WWCTC of each shipping line's portfolio)

	Top 5 port suppliers per carrier (WWCTC share)					Top 5 share	Top 5 share minus self- handling	Local players share
Maersk¹	APMT	PSA	HPH	Eurogate	DPW	59.3	22.3	32.5
	37.0	6.6	6.5	4.6	4.6			
MSC	MSC	HPH	PSA	DPW	Eurogate	51.1	37.4	39.5
	13.7	12.5	9.8	8.4	6.7			
Cosco	HPH	PSA	COSCO	SSA	Eurogate	51.7	39.0	35.7
	16.7	13.4	12.7	5.1	3.8			
APL	APL	PSA	HPH	DPW	Eurogate	58.8	38.6	30.0
	20.2	16.9	9.9	8.8	3.0			
Evergreen²	Evergreen	HPH	PSA	APMT	DPW	55.2	27.6	36.4
	27.6	12.7	9.7	2.6	2.6			
Hanjin	Hanjin	HPH	PSA	Eurogate	DPW	59.7	32.5	33.7
	27.2	14.0	9.7	4.9	3.9			
CMA-CGM³	HPH	PSA	DPW	CMA-CGM	APMT	51.0	42.5	37.3
	15.6	12.2	11.3	8.5	3.4			
NYK	NYK	DPW	PSA	OOCL	HPH	47.8	31.1	30.7
	16.7	10.8	10	5.4	4.9			
CSCL	HPH	PSA	SSA	TCB	DPW	38.9	38.9	39.9
	14.2	11.1	5.4	4.2	4			
Hapag-Lloyd	PSA	HPH	DPW	NYK	SSA	43.2	43.2	33.1
	12.3	10.4	9.8	5.8	4.9			

Source: our elaborations from WCTC database.

Notes:

¹ Maersk includes Safmarine

² CMA-CGM includes Delmas

³ Evergreen includes Italia Marittima and Hatsu.

Another striking fact is the use of proper terminals. Maersk, Evergreen and Hanjin are the most integrated shipping lines with a share of self-made terminal operations as high as 37%, 27.6% and 27.2 % respectively. The position of handling subsidiaries is yet another feature that differentiates integrated shipping lines from the others. It holds first place for the companies mentioned above as it does also in the case APL, NYK and MSC.

The opposition between the shipping lines that integrate terminal operations and extend their terminal networks and those who focus on their core maritime activity has already been pointed out. A closer look at the integrated shipping lines' terminal network reveals the terminal based strategies of the carriers. Maersk as a pioneer in handling activity keeps a significant quantitative advantage. Maersk's network is not only the most important among all the ISLs but it is by far the widest one, including those of PTOs. Its maritime network is entirely based on hub ports which control is of strategic importance. While Evergreen follows the Maersk's path towards a global network of almost exclusive terminals the other integrating shipping are at the stage of concentrating their efforts to the ports in their home area (Hanjin in Asia, Cosco in China, MSC in Europe) both at hub and gateway ports.

As far as the relation between shipping lines and ISL operators belonging to the other companies is concerned, we can the following observations. Except the own handling subsidiary, there is generally not an ISL operator within the carrier's major suppliers. However two specific cases should be remarked. In spite of its ISL origin APMT is an exception as it figures among main suppliers for Evergreen and CMA-CGM. A complementary or defensive strategy based on cooperation within the shipping sector can be observed for some shipping lines which have large use of their alliance partners' terminals (NYK, Hapag-Lloyd).

6. THE CARRIERS' DILEMMA: HOW TO SATISFY THE GROWING DEMAND?

As mentioned earlier, port operations play a growing role in determining carrier productivity and profitability. Therefore, shipping lines aim at choosing carefully their suppliers in ports and at increasing their own stevedoring activities.

In order to evaluate various carriers' behaviour in getting handling services, we split their WCTC in accordance to the different pathways adopted to "defend" their maritime investments:

- *Contract*: simply signing a contract with an independent third-party terminal operator (either international or local);
- *Joint-Venture (JV)*: entering in a joint-venture with local and/or international partners (equity share $\leq 50\%$);
- *Partially Owned Subsidiary (POS)*: establishing or acquiring a company acting as terminal operator (equity share $> 50\%$);
- *Wholly Owned Subsidiary (WOS)*: establishing or acquiring a company acting as terminal operator (equity share = 100%).

Except the first option, all the remaining ones drive the carrier to get dedicated handling services for its calling vessels. Such approach allows to point out how carriers aim at differentiating their "sources" of port services, either adopting a self-handling strategy (in its various forms) or resorting to third-party suppliers (Table 4).

Among the sampled shipping lines Maersk shows the highest ratio of self-handling (44.1%), and half of it is through WOS. This clearly means that the world leader intends to preserve its fleet from PTOs' aggressive price policies. In such respect this carrier has stronger contractual relationships with PSA, HPH and DPW. Some equity partnerships (JV) is mainly established with Eurogate.

The behaviour of MSC is radically different. As much as 73% of the WCTC is covered contractually (HPH, DPW and PSA) and the residual 27% is managed through some JVs (often 50/50) with PSA and two regional PTOs, i.e. Eurogate and Dragados. CMA-CGM seems to follow a similar pathway. Only 13.7% of the WCTC is satisfied through JVs (9.1%) and WOS (4.6%) while all the rest is managed contractually mainly with HPH, DPW and PSA. Among its preferred partners in equity ventures we find DPW (former P&O Port facilities) and PSA.

The Evergreen case is fairly different. Since the 1980s this carrier started its vertical strategy in ports mainly looking for POS and JV (and management contracts). The remaining share of WCTC (70.5%) is covered through contracts with HPH and PSA (and local operators). Contrary to the previous shipping lines, Evergreen does not stipulate any equity venture with PTO or ISL: it prefers to join local and less powerful operators.

Table 4. Carriers' WCTC split in port operations: from third-party suppliers to WOS

Carrier	Contract (third-party)	JV*	POS	WOS
Maersk	45.9%	22.8%	4.4%	27.0%
MSC	73.0%	27.0%	-	-
CMA-CGM	86.3%	9.1%	-	4.6%
Evergreen	70.5%	16.2%	2.1%	11.2%
Hapag-Lloyd	95.8%	2.4%	-	1.8%
Coscon	60.8%	38.9%	-	0.3%
CSCL	98.3%	1.7%	-	-
APL	77.8%	1.7%	-	20.5%
Hanjin	66.6%	15.3%	-	18.1%
NYK	83.1%	0.3%	-	16.6%

Notes:

* These figures also include management contracts and subleases: Evergreen (Tokyo, 2 in Osaka, Tacoma), APL (Kobe, Osaka), Hanjin (Osaka, Tokyo).

** Figures for China Shipping are estimates due to the lack of information for some services calling the ports of Shanghai, Ningbo, Tianjin, Xiamen and Qingdao.

Source: our elaborations from WCTC database.

Hapag-Lloyd entered the stevedoring business very recently and at the moment it satisfy its needs of port service contractually. Its favourite suppliers are PSA, HPH and DPW.

The Chinese carrier Coscon has a fairly wide terminal network, essentially managed through JVs and consortia (38.9%) with HPH, PSA, DPW and even APMT. Only in a few cases its equity share is around 50%. In such a way it can have a partial strategic control on the facility without being involved in the day-to-day operations. The WCTC covered via contractual arrangements (HPH and PSA) is still quite high (over 60%).

The other Chinese top carrier, China Shipping is also a particular case. Although it has established an *ad-hoc* business unit for port operations (China Shipping terminal Development), the self-handling share is still extremely low. Major suppliers (through contracts) are HPH and PSA. China Shipping usually diversifies a lot its providers, mainly selecting local stevedores (over 50%).

The last three shipping lines of the sample, APL, Hanjin and NYK, present quite homogenous characteristics if analysed from this viewpoint. All such carriers aim at controlling through WOS (from 16.6% to 20.5%) a good share of their WCTC. Among them only Hanjin presents a good attitude (15.3%) to enter JV projects but only with some local players (i.e. MTC on the US West Coast). From a contractual standpoint all they have wide relations with the three global PTOs. Moreover, Hanjin and NYK also reveal to be good customers of Eurogate (7.4%) and OOCL (6.5%) respectively.

7. SHIPPING LINES AND TERMINAL OPERATORS IN PORTS: FROM OPPONENTS TO GLOBAL PARTNERS?

Previous sections addressed the relevance of port handling services for major carriers. The main results disclosed through the elaborations of the WCTC database revealed various strategic approaches to secure such services. The main research objective was to investigate the existence of “unrevealed” and transnational forms of

inter-industry partnerships in ports. Table 5 clearly faces this point. As far as the relevance of the actual relationships between the major players of the two industries is concerned, it matches their geographical extension with the WCTC share that such contractual and equity arrangements represent for each shipping line. In other words, a really global partnership should present a very wide geographical coverage, reasonably spreading across 5 regions and even more, coupled with a strong relevance in terms of WCTC share (15% and over) for the involved carrier.

Table 5. Carriers and terminal operators: from local to transnational partnerships

		Geographical coverage		
		regional (below 3 regions)	multi-regional (3-4 regions)	transnational (5 regions and over)
WCTC relevance	5%-10%	MSC (Eurogate)	Maersk, <u>MSC</u> , Evergreen, CSCL (PSA)	MSC, Hapag-Lloyd, APL (DPW)
		Hapag-Lloyd (NYK)		
		<u>Coscon</u> , Hapag-Lloyd (SSA)		
	10%-15%	Hanjin (PSA)	Maersk, APL (HPH)	MSC (HPH)
		NYK (OOCL)	CMA-CGM, <u>Coscon</u> , NYK (PSA)	
		Hanjin (HPH)	Evergreen, CSCL (HPH)	<u>CMA-CGM</u> , NYK (DPW)
over 15%	APL (PSA)	CMA-CGM, <u>Coscon</u> (HPH)	...global??	

Notes:

* Data on China Shipping are estimates due to the lack of information for some services calling the ports of Shanghai, Ningbo, Tianjin, Xiamen and Qingdao.

** In brackets is mentioned the terminal operator (PTO or ISL) in partnership with the carriers listed in the cell.

*** Underlined carriers' names are related to partnerships where the share (in terms of WCTC) of equity ventures (JVs and POS) is over 25%. The residual part is, of course, managed contractually.

Source: our elaborations from WCTC database.

The current empirical evidences do not disclose any real global partnership between carriers and terminal operators. We have discussed a series of reasons for this fact, among which the maturity and geographical offset between the demand and the supply sides and the strategies of the largest carriers that prefer taking advantage of diversification of their suppliers portfolio at the global level rather than a close cooperation with a limited number of major pure terminal operators.

Notwithstanding some interesting cooperative relationships, even at an transnational scale, come up. The three global PTOs reveal fairly wide relationships with shipping lines: HPH and PSA mostly in Asia while DPW, having a more diversified network, even in 5 or 6 (of the 8) regions. Looking regionally, PTOs like Eurogate and SSA seem to be the most relevant partners for carriers.

Still at a local level, particular partnerships between carriers appear: NYK (as carrier) with OOCL (as stevedore) and Hapag-Lloyd (as carrier) with NYK (as stevedores). This clearly shows the extension of their co-operation within the Grand Alliance in liner shipping beyond their core liner activity

And finally, one very promising form of vertical coordination between the two industries that comes up is a close cooperation between major players at the level of single ports. This type of partnerships might in the future potentially be developed and achieve a “global status”. The observed cases are CMA-CGM/HPH, NYK/DPW, Coscon/HPH, and CMA-CGM/DPW. While the first two couples are fully based on a contractual relationship, the second two couples include a quite relevant share of joint equity investments (JVs).

REFERENCES

Airriess, C.A. (2001): “The regionalization of Hutchison Port Holdings in Mainland China”, *Journal of Transport Geography*, 9: 267-278.

Baird, A. J. (2006): “Optimising the container transshipment hub location in Northern Europe”, *Journal of Transport Geography*, 14(3): 195-214.

Ferrari, C., Benacchio, M. (2000): “Market structure in container terminal operators and port services”, *proceedings of the IAME Conference*, Naples, September 13-15.

Cullinane, K., Khanna, M. (2000): “Economies of scale in large containerships: optimal size and geographical implications”, *Journal of Transport Geography*, 8: 181-195.

De Monie, G. (1994): “Mission and role of port authorities”, *proceedings of the World Port Privatisation Conference*, London, September 27-28.

Drewry Shipping Consultants (2003, 2004, 2005, 2006): Annual Review of Global Container Terminal Operators, London.

Frémont, A., Soppé, M. (2004): “The evolution of North-European shipping networks: from inter-continental links to a global system, 1994-2002”, *paper presented at the World Conference on Transport Research*, Istanbul, July 4-8.

Guy, E., (2003): Shipping line networks and the integration of South America trades, *Maritime Policy & Management*, 30(3): 231-242.

Haralambides, H, Cariou, P, Benacchio, M. (2002): “Costs, benefits and pricing of dedicated terminals”, *International Journal of Maritime Economics*, 4: 21-34.

Heaver, T. D., Meersman, H., Moglia F., Van De Voorde, E. (2000), “Do mergers and alliances influence European shipping and port competition”, *Maritime Policy & Management*, 27(4): 363-373.

Juhel, M.H. (2001): “Globalisation, privatisation and restructuring of ports”, *International Journal of Maritime Economics*, 3: 139-174.

- Midoro, R., Musso, E., Parola, F. (2005): "Maritime liner shipping and the stevedoring industry: market structure and competition strategies", *Maritime Policy & Management*, 32(2): 89-106.
- Notteboom, T. (2004): "A carrier's perspective on container network configuration at sea and on land", *Journal of International Logistics and Trade*, 1(2): 65-87.
- Notteboom, T. (2004): "Container Shipping And Ports: An Overview", *Review of Network Economics*, 3: 86-106.
- Olivier, D. (2005): "Private Entry and Emerging Partnerships in Container Terminal Operations: evidence from Asia", *Maritime Economics & Logistics*, 7: 87-115.
- Olivier, D., Slack, B. (2006): Rethinking the port, *Environment & Planning A*, 38: 1409-1427.
- Panayides, P. M. (2002): "Economic organization of intermodal transport", *Transport Reviews*, 22(4): 401-414.
- Panayides, P. M., Cullinane K. (2002): "Competitive Advantage in Liner Shipping : A review and Research Agenda", *International Journal of Maritime Economics*, 4: 189-209.
- Parola, F., Veenstra, A. (2006): "The spatial coverage of shipping lines and container terminal operators: is this a global industry?", *paper presented at the IAME Conference*, Melbourne, July 12-14.
- Peters, HJF. (2001): "Developments in global sea trade and container shipping markets: Their effects on the port industry and private sector involvement", *International Journal of Maritime Economics*, 3: 3-26.
- Rimmer, P., (2004): "Global Flows, Local Hubs, Platforms and Corridors; Regional and Economic Integration in Northeast Asia", *Journal of International Logistics and Trade*, 1(2): 1-24.
- Ryoo, D-K., Thanopoulou, H. A. (1999): "Liner alliances in the globalization era: a strategic tool for Asian container carriers", *Maritime Policy and Management*, 26(4): 349-367.
- Slack B., Comtois C., McCalla R. (2002): "Strategic alliances in the container shipping industry: a global perspective", *Maritime Policy and Management*, 29(1): 65-76.
- Slack, B. (1993): "Pawns in the game: ports in a global transportation system", *Growth and Change*, 24: 579-588.
- Slack, B. (2004): "The global imperatives of container shipping". In: Pinder, D and Slack, B (eds). *Shipping and Ports in the 21st Century*. Routledge: London.
- Slack, B. (2005): "The Terminalisation of ports: an academic question?", proceedings of the international workshop on *New generation port-cities & their role in global supply chains*, December 12-14, Hong Kong: 20-30.

Slack, B., Frémont, A. (2005): “Transformation of port terminal operations: from the local to the global”, *Transport Reviews*, 25: 117-130.

Sys, Ch. (2005): “The link between optimal ship size and optimal operations”, proceedings of the BIVÉC-GIBET Transport Research Day 2005 – Part I. Hasselt. Hasselt University. 81-108.

World Bank (2001): *Port Reform Toolkit*, October, World Bank, Washington D.C.

Appendix 1. Major suppliers/partners of shipping lines in port operations: a geographical viewpoint

Carrier	Major suppliers & partners	WCTC share (%)	no. regions ¹	no. ports ¹	no. weekly calls ¹	Forms of co-operation ² (WCTC %)
Maersk	PSA	6.6%	3	5	26	89.2 contract (93.0) 10.8 JV (7.0)
	HPH	6.5%	4	7	45	77.5 contract 22.5 JV
	Eurogate	4.6%	2	5	37	22.7 contract 77.3 JV
	DPW	4.6%	5	10	33	87.4 contract 12.6 JV
MSC	HPH	12.4%	5	11	55	100.0 contract
	PSA	9.3%	3	5	41	46.3 contract (19.5) 53.7 JV (80.5)
	DPW	7.9%	5	8	32	100.0 contract
	Eurogate	6.4%	2	4	27	47.4 contract 52.6 JV
CMA-CGM	HPH	15.4%	3	12	71	100.0 contract
	PSA	12.1%	3	6	37	85.8 contract (79.1) 14.2 JV (20.9)
	DPW	11.2%	6	14	66	71.7 contract 28.3 JV
Evergreen	HPH	14.2%	4	11	84	100.0 contract
	PSA	9.6%	3	6	55	100.0 contract
Hapag-Lloyd	PSA	12.2%	3	5	33	100.0 contract
	HPH	10.4%	3	10	42	100.0 contract
	DPW	9.8%	6	14	60	100.0 contract
	NYK	5.7%	2	6	12	100.0 contract
	SSA	5.1%	1	4	12	100.0 contract
Coscon	HPH	17.3%	4	11	76	64.8 contract 35.2 JV
	PSA	13.4%	3	5	42	54.5 contract (49.6) 45.5 JV (50.4)
	SSA	5.0%	1	3	5	68.5 contract 31.5 JV
	Eurogate	3.8%	1	2	4	100.0 contract
	APMT	3.2%	2	5	27	15.2 contract 84.8 JV
	DPW	3.1%	2	3	18	21.8 contract 78.2 JV
CSCL	HPH	11.3%	3	8	35	100.0 contract
	PSA	8.9%	3	5	22	100.0 contract
	SSA	4.3%	2	4	6	100.0 contract
	DPW	3.2%	4	7	11	100.0 contract
APL	PSA	16.7%	2	5	31	100.0 contract
	HPH	9.8%	4	10	32	100.0 contract
	DPW	8.7%	5	11	21	95.0 contract 5.0 JV
	CMH	2.6%	1	3	13	100.0 contract
	APMT	2.3%	3	5	11	88.1 contract 11.9 JV
Hanjin	HPH	14.0%	2	10	40	100.0 contract
	PSA	9.7%	2	3	21	100.0 contract

	Eurogate	4.9%	2	3	9	100.0 contract
	DPW	3.9%	5	12	20	100.0 contract
	DPW	10.8%	5	12	24	100.0 contract
	PSA	10.0%	3	5	18	100.0 contract
NYK	OOCL	5.4%	2	3	7	100.0 contract
	HPH	4.9%	3	8	20	100.0 contract
	CMH	3.8%	1	3	14	100.0 contract

Notes:

* Figures for China Shipping are estimates due to the lack of information for some services calling the ports of Shanghai, Ningbo, Tianjin, Xiamen and Qingdao.

¹ Figures concerning regions, ports and weekly calls do not take into account the 20% share of PSA in HPH.

² Figures in *italics* show results without including the PSA share in HPH.

Source: our elaborations from WCTC database.