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RECENT TRENDS IN THE MARKET STRUCTURE OF CONTAINER TERMINAL SERVICES: WHICH WAY TO INTEGRATION?

Summary

In recent years three main trends have occurred in maritime and ports industries, mainly in those involved in containerised traffic: i) the lowering of ports tariffs; ii) the development of vertical and horizontal concentrations of port terminal operators; iii) the adoption of different forms of co-operation in order to face the increased competition of the market.
Those trends are leading to a clear-cut division among great and small port operators, on market side, and to a greater differentiation of port services - not only on a spatial basis - in order to re-gain some profits. The increasing differentiation of port services arouses interests as it is involving the logistic supply chain.
The paper aims at investigate those trends both on the theoretic and the practical point of view, mainly referring to European and Italian experience.

Key Words: port industry, market structure, co-operation, competition

1. Recent trends in maritime and port industries

In the last decades many changes have occurred in the liner shipping industry as well as in the market structure (and in the organization) of port terminal operators. Due to the necessary linkage existing between liners and port operators - it is not by chance that efficient ports are those in which goods pass through from ships to inland means of transport as smoothly as possible - the changes in the port industry can be often seen as answers to changes occurring in liner shipping.

The present paper does not aim at investigating all the changes mentioned above; it is focused on the analysis of the evolution of port terminal operators' market, with a particular attention to European and Italian situation. To reach the goal the reality of liners cannot be set aside in order to fully realize the real causes that have determined a "revolution" in ports.

The growth of containerized cargo since the sixties and the increased port productivity for the adoption of technical equipment dedicated to container movements has allowed ships to become bigger achieving economies of scale. The increased ship dimensions (nowadays biggest ships operating have a capacity of nearly 7,000 TEUs) mean increased fixed costs, mainly capital costs, so economies of scale are achievable subject to two conditions: i) that ships maintain an occupancy rate of nearly 80% (Lim, 1998) and ii) that ships sail as much as they can, avoiding to stay in port. The latter condition means that shipowners tend to limit only to a few the set of port of call for each service.

The combined result of the conditions just mentioned together with the increased average distance covered by each ton of cargo during the sea leg of transport have determined a new structure of liner services based on transhipment. It needs only a few ports (called hub ports), possibly located very close to the ideal shipping route, in which containers - collected from several origins - are brought by small ships (feeders), then they are loaded on bigger ships and unloaded in another hub port from which they are newly loaded on feeder ships to reach their final destinations. On the port side, it is important to stress that hub ports non necessarily coincide with historical ports, but often the optimal lay-out of these ports (berth length and structure, wideness of the storage area, access depth) make more convenient the building of completely new harbours, as happened for example in the case of the Mediterranean hub ports of Algeciras, Malta and Gioia Tauro, and, recently, Taranto and Cagliari.

The transhipment revolution stressed, among other things, the inconsistency of the trends towards a fewer number of ships in service, due to the increased capacity of vessels and the different schedule of services (induced by the hub&spoke scheme), and the constraints to increase the transit time of ships in order to maintain a high quality level of the service.

The development of strategic alliances among liners seems a possible solution to these problems and an efficient tool in order to cope with increasing competition within the sector and in order to enter into new markets. Ryoo and Tanopoulou (1999) indicate three goals achievable by firms through strategic alliances: (*i*) to widen operative borders of a single firm, (*ii*) to achieve the scale useful to compete in global markets, (*iii*) to quickly enter new markets maximizing the return (output) of each partner's resources (input).

If strategic alliances allow even medium sized liners to face global competition - representing a valid alternative to an internal growth of the firm - at the same time they reduce the contractual power of ports and, most of all, of terminals in ports. In

fact, the choice of terminals that are to be called by the ship depends on the strategic behavior of the alliance and not on each single liner's choice. Then a significant number of terminals struggle to gain cargo from different liners contracting as if they were only one. Port terminals struggle with the solely "weapon" of lowering tariffs and this process is also due to the lack of sunk costs in the operation of re-scheduling of liner voyages, for which ships can rapidly change ports (Meersman et al, 1999).

Liners, in fact, try to maintain a certain degree of competition between terminals belonging to the same range (or sometimes to the same port), by calling to different terminals for different services. Data in annex 1 confirm, with reference to the ten of biggest players in alliances and four "independent" carriers, that usually the choice of calling at a terminal is shared by members of alliances, but also show that there is a clear strategy in differentiating service providers (especially for alliances) and not concentrating business with a few stevedores. This implies the possibility of a constant monitoring of contractual conditions of different suppliers (including tariffs but also priorities in berthing, stevedore's commitments in service standards such as berth productivity, dwell time for containers etc.), which allows to threaten fast shifts from a terminal to another, due to lower costs in relocation since contractual agreements are already going on (although for a number of services). A recent example of liners "volatility" can be highlighted with reference to Rotterdam and Antwerp. From December 1999 two of the four weekly services (China-North Europe, approximately 125.000 teus/year) of Grand Alliance based in Rotterdam Ect Delta terminal, were rescheduled on Antwerp Noord Natie Terminal, due to increasing delays in handling and dispatching containers (caused by terminal congestion but also by some temporary problems to the information system). In February 2000 the situation has been reconsidered, and from March, after less than three months, "loop D" ships have been gone back again to Rotterdam.

The adoption of the hub and spoke scheme in the scheduling of liner services leads each large company to operate in order to be equipped with its "own" hub port where they may organize terminal activities with a better fine tuning with their (own) ships' arrivals (Musso *et al.*, 1999) reaching all the scale economies of ships (that, being them of major entity compared to terminal scale economies, lead to an optimum level of production for the integrated operator that is bigger than those of the distinct port and ship operator).

Moreover, operational benefits justify terminal ownership and management: it ensures, by priority use of the facility, a level of service tailored to the line and it allows exercising a greater control over costs (even if a cost reduction is not always guaranteed, being terminal operations usually not the core business of carriers). From a strategic point of view it allows control to be exercised in a part of the supply chain beyond the seaborne frontier (Haralambides *et al.*, 2002).

Liner companies have three main ways to equip themselves with a hub terminal: *i)* to built (although public funds usually represent a significant share of the in-

vestment) and operate their own container terminal acting as a "pure" terminal operator (e.g. with their own means and personnel), eventually handling also third-party traffic; *ii)* to become a port terminal operator through a shareholding into a new, or already existing, consortium, joint venture or company with a stevedore, giving rise to a dedicated container terminal and *iii)* to become the sole calling at a part of the terminal through an agreement with the terminal operator company to which remain the ownership and the management of the terminal.

Dedicated terminals are a quite common in US and Asian ports: carriers like (the former) Sea-Land (who can be considered a pioneer of carrier involvement in terminal facilities), Maersk, Evergreen, Cosco, OOCL, Hanjin, Nepune Orient Line/ American president Lines and Hyundai, usually operate several terminals all over the world (with terminals ownership and management being sensitive to changes in alliances, takeovers and mergers). In Europe the emergence of dedicated terminals started in the last few years: in table 1 some recent examples and imminent projects of the outlined different strategies are shown, even though categories are always quite rigid.

Table 1.: Main dedicated and semi-dedicated container terminals in Europe

Pure Terminal operator	Dedicated terminal	Dedicated sections of terminal
Evergreen in Taranto (100%)	Maersk in: Rotterdam new dedicated terminal in ECT Delta Terminal (Maersk 75%, ECT 25%); Bremen BLG Terminal III (Maersk 50%, Eurogate 50%), Gioia Tauro MCT (minority interest with Eurogate);	MSC in Antwerp (in the dedicated part of the first Hessenatie terminal)
Maersk and Sealand in Algesiras		Global Alliance semi dedicated terminals in a module of Rotterdam ECT Delta Terminal
	MSC in: Antwerp (joint venture 50-50 with Hessenatie); Bilbao (minority interest in a consortium)	Maersk-Sealand in a dedicated section of the first semi-dedicated terminal Rotterdam ECT Delta Terminal, and in Gioia Tauro
	Evergreen in Sines (with PSA)	CP Ships in Antwerp (Hessenatie)
	P&O Nedlloyd in Antwerp (with P&O Ports and Duisburg P.A. and Allied Stevedores)	Cosco in Naples (Molo Bausan)

Sources: Containerization International (various issues), Web sites: informare, cargoweb.

Data in table 1 can be seen as an empirical evidence of a recent trend in which the shift towards a higher commitment (and control) by liner companies is gaining significance (indirectly also proving the strategical value of the port business for major carriers[1]). Interesting is the case of Maersk-Sea land in Rotterdam who already was the exclusive user of a section of ECT's Delta Terminal on the Maasvlakte (fully operated by ECT). In fact, the new Maersk Delta Terminal (starting operations in late summer 2000) will be run by Maersk own people according to their own methodology, schemes and with own material.[2]

2. Market structure of port terminal operators

All changes recently occurring in liner shipping and port industries tend to modify - or to interact with - the market structure of port services by changing one, or more than one, of the different conditions with which the market as the meeting point of demand and supply determines prices and exchanged quantities.

A recent survey of Drewry Shipping Consultants Ltd. (1998) shows that tariffs diversification is greater among different ranges than inside each range (even if it does not mean that inside each range the level of tariff is everywhere the same). Figures shown in Tab. 2 indicate that in a world dominated by global competition some reasons still remain to enhance the hypothesis of a variety of markets - on a continental or sub-continental basis - each reflecting the particular port organization structure, superstructures endowment, connections with inland transport infrastructures, flows of cargoes and so on. But tariffs diversification also means a low degree of elasticity of port services demand to tariff variations, as stated by the economic literature (Arnold, 1985; Suykens-Van de Voorde, 1998).

[1] Recent industry rumors have linked also P&O Nedlloyd with Gibraltar for a new hub.

[2] The choice for a non fully automated terminal (as ECT Delta ones) is based on the strategy to consider the terminal as a node in a wider logistic process, aiming therefore at improving the overall efficiency of the transport chain by increasing flexibility (ECT fully automated terminal is well-known for being highly productive and performant, but, at the same time, quite rigid).

Table 2.: Average tariff paid to terminal operators per full box (US$)

Region	Gateway (ship's hold to stack to track or *vice versa*)	Transshipment (tariff per cycle)
North America	312	130
North Europe	120	152
South Europe	113	76
Far East	164	163
South East Asia	92	104
Middle East	106	85
Latin America	174	201
Australasia/Oceania	130	196
South Asia	106	85
Africa	256	99
East Europe	144	183

Source: Drewry, 2002

Table 2 clearly shows how competition keeps tariffs at the same level of Middle East and South Asia, despite the higher labour costs.

The existence of tariffs diversification on a range basis is not only the result of the different degree of competition existing in the different markets but also of the different monopolistic power of ports in respect of their hinterlands (i.e. traffic is less footloose).

OSC (1999) gives some other figures for the cost per teu handling, affecting liner shipping companies, that confirm the decreasing tendency: Antwerp from $80,5 to $105; Zeebrugge $84,5; Rotterdam Delta terminal $132; Bremen-Hamburg (average) $134. Those trends has slowly eroded profit margin of port container terminal operators (not even comparable, for example, with those of oil terminal companies) but not necessarily it wholly meant a reducing of final prices of goods, due to the oligopolistic market forms that prevail in the transport sector.

As an example, in Table 3, data from Drewry (2002) concerning the profitability for four major stevedoring companies in 2001 are shown.

Table 3.: Comparative profitability of a sample of terminal operators

Terminal operator	Turnover ($m)	Earnings ($)	Margin (%)	Revenue/teu ($)	Earnings/teu ($)
Hutchison	1987.7	742.4	37.3	73.62	27.50
PSA Corp.	1238.5	586.3	47.3	64.74	30.65
P&O Ports	911.8	166.4	18.2	93.04	16.98
Eurogate	312.2	21.4	6.9	36.30	2.49
OOCL	221.5	49.9	22.5	218.78	49.29
ICTSI	85.3	13.6	15.9	85.28	13.60

Source: Drewry (2002)

Data of Table 3 confirm that profit margins are somehow related to the competition level within the port (the higher is competition, the lower tariffs and therefore profits). In particular, in Europe, competition erodes profit margins, Eurogate shows a margin that is only a third of P&O Ports margin which is less than a half of PSA margin.

If tariffs levels represent a competition tool in the short term, as they may acquire cargoes previously passing through competitors, the other element determined by the market, the quantity of port services, represents an important mean of dynamic competition, i.e. the opportunity for firms to survive in the market in the long run. In fact, the whole amount of service sold in the market is strictly connected with the concept of port capacity which - deriving to a great extent from the infrastructural endowment - is characterized by great lumpiness in ports' production function.

Following this perspective, then the market structure can be seen as a sort of oligopoly a la Stackelberg, i.e. where the equilibrium is based on the quantity of goods and not on prices. In this case, production of ports services, the quantity of product may be usefully substituted with the amount of capital invested in infrastructures. Figures 1 (Stackelberg equilibrium in the case of a duopoly between a Leader - L - and a Follower - F) shows the reaction curves of the duopolists and how market reach the equilibrium (labeled a). The figure shows how Stackelberg equilibrium differs from that of Cournot (labeled e).

It is well known that in the Stackelberg model, in the case of the duopoly, one of the (two) duopolists (the "follower") assumes that his choices do not affect the other behaviour while the other firm (the "leader") assumes just the opposite. On these assumptions the leader increases its level of production (in respect of the production level characterizing Cournot's equilibrium) till the follower's reaction curve - RF -

becomes tangent to the lower curve of leader's maximum profit π^*1 (for this family of curves profit increases the closer they are to the horizontal axes). The equilibrium is unstable for the passive seller can take up a struggle, but it will not happen if the leader is manifestly stronger than the follower.

Concerning the port sector, if the quantity of production may be reasonably substituted with capital investments in infrastructures (where they depend on stevedores) and superstructures (always depending on stevedores) - i.e. those elements determining the terminal capacity of production -, incumbents may limit the entry of other competitors increasing their level. Moreover incumbents may obtain the same goal by tuning the major (and solely) production factor whose cost in most cases is borne by the public subject (for instance, the Port Authority) and not by the (private) terminal operators, or that private enterprises use by a long lease, usually at a favorable condition: we intend referring to port and terminal infrastructures.

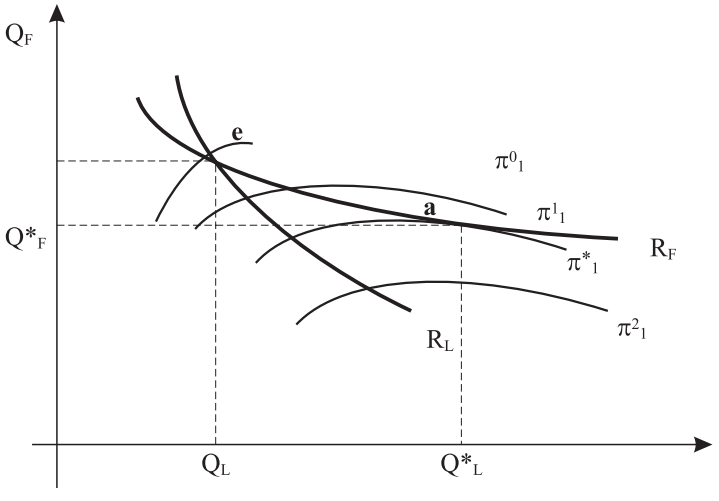

Figure 1.: The equilibrium of Stackelberg in the case of duopoly

Stackelberg model divides incumbents into two groups: leaders and followers. Why should a port terminal operator decide to act as a follower and not as a leader? We suppose the answer may be found in the different dimension and financial capacity of firms actually operating in this sector.

Dimension of players is not related just to the physical extension of one-terminal firms, but to the complex structure of multi-terminal operators which run sev-

eral terminals all over the world, with a relevant market power and financial capacity, compared to the follower firms actually operating in this sector.

Clearly there are only few firms belonging to great multinational holdings, covering different geographical ranges, controlling one or more hub ports and giving raise to real structured terminals networks. No more than three years ago Drewry (1998) referred to the so-called "big five" - i.e. Hutchison Port Holding (HPH), P&O Ports, International Container Terminal Services Inc. (ICTSI), Stevedoring Services of America (SSA) and Port of Singapore Authority (PSA) - as the only global operators located nearly in all geo-economical ranges. They all started from American, Australian and Asian markets, but it is important to stress the extent to which, since 1997-1998, the main international port operators turned their attentions to Europe. Furthermore, nowadays, it is quite evident that a few multi-plant firms, originally focused on the European market, such as Hamburger Hafen und Lagerhaus Aktiengesellschaft (HHLA), Eurokai, Hessenatie and Europe Combined Terminals (ECT), are expanding their control on major container ports in a wide regional basis.

Moreover, outside Europe there are Modern Terminals and CSX World Terminals too. The latter emerged as a new market force from late 1999, running several of the former Sea-Land terminals (approximately 3 mil. teu), after Sea-Land's international liner shipping company was acquired by Maersk. To complete the scenario of the "global players", if is important to add terminals operated directly by carriers (Maersk/Sea-land *in primis*): rough estimates are about 6-7 mil. Teu in 1999. Table 2 provides a comparison of the current port portfolio of each terminal operator (1999 throughput data in million of TEU are reported), with indication of main investment projects. Needless to say, all other container terminal operators located only in a port or in very few (small) ports have necessarily to act as followers.

Table 4.: Major terminal operators in the world and in Europe (beginning 2000)

Operator	TEUS (Approx)[3]	Asia/Australia/America	Europe
PSA	19 mil (9-9.2%)	Singapore; Dalian, Nantong, Fuzhou (China); Taicang, Aden (Yemen); Cigadin, Tuticortin (India), Incheon (South Korea), Muara (Brunei)	Genoa-Voltri, Venice, Civitavecchia (with Evergreen) (ITA) Projects 2000-2005[4]: Sines (PT)

[3] The worldwide throughput in 2000 is assumed to about 200M Teu. Figures between brackets give the rough market share in the world.

[4] Projects refer only to new ports to be added to the current portfolio of terminal operators and don't take into account expansion plans in presently run terminals.

Operator	TEUS (Approx)	Asia/Australia/America	Europe
Hutchison Ports[5]	17 mil (8-8.2%)	Hong Kong, Shanghai, Yantian, Jiuzhou, Nanhai, Shantou, Jiangmen, Zhuhai, Gaolan, Xiamen (China); Freeport (Bahamas); Balboa, Cristobal (Panama); Yangon (Myanmar); Busan (Korea) Projects 2000-2005: Laem Chabang (Thailand); Karachi (Pakistan); Veracruz, Ensenada (Mexico); Buenos Aires (Argentina); Tanzania; Saudi Arabia	Felixtowe, Thamesport, Harwich (UK) Projects 2000-2005: Rotterdam (NL) in 2001
P&O Ports	8.3 mil (4-4.1%)	Freemantle, Melbourne, Sydney, Brisbane + minor ports (Australia); Tauranga (New Zealand); Vostochny (Russia - *joint venture* with CSX World Terminals); Shekou, Tanggu, Qingdao (China); Bangkok, Laem Chabang (Thailand); Manila (Philippines); Irian Jaya, Java (Indonesia); Colombo (Sri Lanka); Port Qasim (Pakistan); Nava Sheva + several licences (India); Buenos Aires (Argentina); Maputo (Mozambique): Newark (USA)	Larne, Southampton, Tilbury (UK); Naples (ITA) Projects 2000-2005: Zeebrugge, Antwerp (BE); Derince (Turkey); Cagliari (ITA)
Stevedoring Services of America	4.4 mil (2-2.1%)	Seattle, Portland, Tacoma, Oakland, Vancouver, San Francisco, Long Beach, Los Angeles, Mobile, Charleston, Savannah, Jacksonville (USA); Colon (Panama); Manzanillo (Mexico); San Antonio, San Vincente (Chile); Durban (S.Africa); Ho Chi Min (Vietnam) Projects 2000-2005: Singapore, Bangladesh, India, Egypt	–
Marine Terminals Corp	3.7 (1.7-1.9%)	Seattle, Vancouver, Tacoma, Oakland, San Francisco, Long Beach San Pedro, Los Angeles (USA)[6]	–
Modern Terminals Ltd.	2.9 mil (1.3-1.5%)	Kwai Chung, Hong Kong, Shenzhen (China)[7]	–

[5] After Hutchison's acquisition of "control" in Ect, it has become the biggest stevedoring company (around 23 million Teu in 2000). Worth to note the joint venture in Hong-Kong with Cosco Lines.

[6] Many of the terminal run by MTCorp. are dedicated or partially dedicated ("MTC customer facilities") terminals (e.g. Hanjin, Evergreen, Yang Ming, etc.).

[7] Modern Terminal Ltd and Hutchison Ports are jointly building a six-berth container terminal in Hong-Kong that is expected to have a 2.6M. Teu annual capacity in 2004.

Operator	TEUS (Approx)	Asia/Australia/America	Europe
Int. Container Terminal Services Inc.	1.8 mil (0.8-1%)	Manila, Cebu (Philippines); Buenos Aires, Rosario (Argentina); Vera Cruz, Ensenada (Mexico), Kanachi (Pakistan), Damman (South Arabia) Projects 2000-2005: Dar es Salaam (TAN)	–
Eurogate	7.7 mil (3.6-3.8%)	–	Bremen, Hamburg (DE), Klaipeda (EST), Lisbon (PT); La Spezia, Gioia Tauro, (ITA – from late 1999) Projects 2000-2005 Bremen (DE), Salerno, Livorno, Ravenna (ITA) Inland terminals: Dortmund (DE), Modena, Milan (ITA), Vienna (AU)
European Combined Terminals	3.8 mil (1.7-1.9%)	–	Rotterdam (NL) Projects 2000-2005: Klaipeida (EST), Port Said (EGY – with Maersk) Inland terminals: Venlo, Moerdijk (NL); Duisbourg (DE); Willebroek (BE)
Hessenatie[8]	2.6 mil (1.2-1.4%)	–	Antwerp, Zeebrugge (BE), Rotterdam (NL – inland and waterways barges) Projects 2000-2005 Flessingue (NL), Antwerp-left bank (BE), Tangier (MAR)
HHLA	2.4 mil (1.1-1.3%)	Projects 2000-2005: TPS Valparaiso (Chile), Santos-S.Paolo (BRA)	Hamburg (DE) Projects 2000-2005: Lubeck (DE), Odessa (Ukr) Inland terminals: Czech (CZ)

Source: Musso et al. (2000) with updates (sources Containerization international, web sites)

The two outlined different kind of players (i.e. leaders and followers) derive from a clear distinction among great port terminals (hub terminals and/or great destination terminals) and other destination terminals which present different scale of production. Therefore leaders have no interest in a cutthroat competition with followers till their market exclusion but leaders aims at limiting followers expansion increasing their capital levels (more than Cournot ones). In fact, leaders tend to control main origin/destination nodes of the whole maritime transport chain considering not stra-

[8] In 2001 Hessenatie merged with the Antwerp stevedore Noord Natie creating "HesseNoord Natie".

tegic, as well as quite impossible, their presence in all regional ports, also because in minor ports the knowledge of local environment becomes a relevant and critical factor for success (see, for instance, the problems incurred by ECT during its unsuccessful experience in Trieste). As an example, a niche operator like Noord Natie in Antwerp (0.7 mil. teus in 1998), sometimes co-operates with Hessenatie in sharing berth cranes in peaks period, and is finalizing its participation in operating the container terminal in the port of Vestpils (Latvia).

To sum up, the Stackelberg model shows that each terminal operator at each instant keeps more productive capacity than it would if it could not influence its competitor's accumulation, so the latter is forced to reduce its capacity.

Moreover, the competitor who invests first or with an advantage in investment speed (perhaps due to its financial dimension) have a positive impact on the structure of the industry (Tirole, 1988). And the tendency to "over-invests" represents a sort of medium-term commitment. In fact, the commitment value is inversely related to the rate of depreciation of capital investment and in this case, investments in terminal productive capacity cannot surely be considered irreversible, but have a slow depreciation process.

Anyway, even among leaders and among followers there is a high level of competition that leads terminal operators to differentiate port services from the sole port manipulation of cargoes to the (port) logistical services, developing the third strategy beyond "classic" price and quantity.

3. Improving profits through product differentiation: a survey of recent trends in European port terminal operators

Three can be considered the main elements of the outlined scenario regarding the current status of port industry in the terminal sector:

- Market structure of container terminal business and operators' strategies can be considered as a reaction to the changes characterizing the development in the maritime and multimodal transport sector and its vertical relations;
- Profit margins of stevedores companies are threatened by the increasing market power of liner companies;
- The profile of stevedoring companies is not unique since the size of terminal operators (including, with an increasing importance, the size of the terminals network - see the case, for instance of Eurogate in Europe) plays a role in distinguish leaders and followers, but, at the same time, a trend towards a future market failure for small operators is not likely (both for the existence of niche segments and for the leaders' will).

Concerning operational profits, it is widely accepted (e.g. Drewry 1998, 1999) that terminal costs structure is quite hard to squeeze (even increasing size of single terminals) because of the relevant fixed costs that are rather related to the throughput value. On the other side revenues are influenced by (decreasing) tariffs and by the risk of suddenly loosing a significant share of traffic of a number of allied carriers. The lumpiness of port production function could affect also turnover so that results eventually cannot pay back the huge investments needed.

Therefore market leaders, supported by their financial capacity, are mainly focusing on expansion plans in terms of world-wide or macro-regional networks. This can be considered a sort of differentiation on a geographical basis, whose benefits' range goes from exploiting different kinds of economies scale-based (purchasing means in stocks, developing common projects, improving standard procedures) to minimizing market risks, also through temporary cross subsidization among terminals (Musso *et al.*, 2000). Concerning managerial aspects, the emergence of international networks doesn't mean consequently that standard, uniform operational models can be successfully applied by leaders in all new controlled terminals (e.g. Ect in Trieste). Terminal business is, in fact, quite related to local environment (from labor markets to institutional frameworks, from cultural features to the role played by ports on local economies). These considerations in part explain why, recently, big players usually penetrate new European small ports holding majority stakes in partnerships with companies (=followers) previously running terminals or local institutions aiming at exploiting and enhancing local skills (e.g. PSA in Leghorn and Civitavecchia, Hessenatie in Flushing and Tangier,[9] Malta Freeport in Brindisi).

However the international development of terminal business is not just a matter of competition among terminal operators (even big). It remains still affected by the main role played by major marine carriers and multimodal transport operators, whose financial capacity - an important *proxi* of contractual power - is not comparable to those of port industry (as highlighted by Figure 1, where the average revenues of top 10 shipping companies are around three times more than top 10 terminal operators and ten times more than greatest European port authorities).

[9] The case of Hessenatie in Tangiers is quite interesting, where a consortium with French construction firm Bouges has been awarded the contract to build the greenfield terminal, being the tender for a BOT contract.

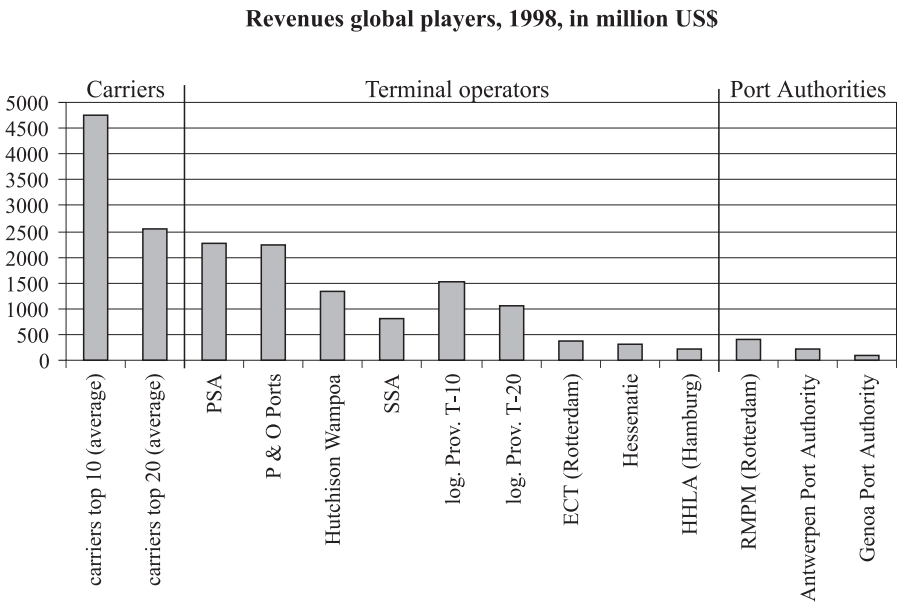

Figure 2.: Maritime and port players and relative revenues (source: Blomme, 2000)

This unbalance partly interprets two main trends in product differentiation in the stevedoring sector:

1. the emergence of dedicated terminals as already mentioned in §1 (an - obliged? - answer to carriers needs for a tailor-made stevedoring service);
2. the expanding range of services offered to clients (aiming at differentiating supply for increasing market shares but also an attempt to compete with other operators in the logistic/transport chain).

In both aspects the concept of differentiation implies the importance of a further element in evaluating terminal function (besides quantity and price), that is the "quality" of the service (actual or perceived).

In the first case *quality* is expressed by the more effective service provided to ships, by dedicating a terminal facility, in terms of the possibility *i)* to process vessels immediately upon arrival, eliminating time losses, *ii)* to re-schedule service timetables according to a free disposability of the terminal and *iii)* to pursue standardization of (faster) procedures due to eventual common features of the liner's fleet (Haralambides *et al.*, 2002). It can be considered a quality improvement within the traditional pattern of port services, by which stevedores compete each other (horizontally) in order to acquire and maintain clients. The difference between the strat-

egy of dedicating terminals and other innovations for better performances (e.g. an investment in a new type of cranes able to handle boxes faster) is mainly in the fact that clients take part actively to the service production. Despite different considerations concerning the opportunity cost of dedicating a terminal to an exclusive user (quite often, in fact, liners pressure is so strong that dedicated terminals can be seen as a forced outcome consequent to a "take it or leave it" behavior), such agreements feature a sort of "mutual commitment" between liner companies and ports. Each part takes advantage from co-operation between ship and terminal, from information sharing to complete vertical equity integration. Ships gain in a more rational use of the fleet and in time and reliability of the port services; terminal operators receive, through liners huge investments, clear signals that major clients have "faith" in the port and want to stay for a long time.

Effects of dedicated terminals on stevedores profits are not so obvious, in the sense that the overall level of traffic in the terminal could also decrease, due to the worsening in the service potentially perceived by clients of multi-user facilities. Only if stevedores are able to use the secured capacity of exclusive users as an element for price discrimination, dedicated terminal can be a concrete strategy for sustainable development of terminal industry in the medium run also from a financial point of view.

Different is the case of differentiation through adding new function to the port service. The business of logistic is considered as the way for terminal operators (as well as for other players in the transport chain) for expanding their core business in more profitable activities by which the terminal is not just a container transit point.[10] Added-value logistics in ports is giving rise (when the required space is available) to development of distriparks, in which storage, consolidation, distribution and sometimes manipulation of goods take place.

Besides distriparks, further elements can be outlined in the recent trend of product differentiation with reference to the European context:

- projects in inland terminals (adding internal *nodes* to the network);
- cooperation, joint ventures, equity interest in (intermodal) transport operators (adding *spokes* to the network).

Concerning the first aspect data in table 3 have already shown the interest of terminal operators in operating inland terminals. Main benefits of such an extension of the natural borders of the port to final destinations, can be considered:

[10] Even just considering the average Mediterranean container terminal revenue profile, exclusively based on stevedoring activity, Drewry points out that berth cargo handling (mainly Lift on/lift off charges) count for 55% of the global turnover, while yard operations count for more than 30%. (Drewry 1998).

- the possibility of storing and operating containers, that have to reach final inland destinations, not in the stacking yard of terminals, reducing congestion and achieving a more rational use of the space;
- the better services provided to shippers in terms of door-to-door transport;
- the extended market area of the port (which can compete with a higher number of other ports): inland terminals, in fact, when close to important hinterlands of even far regions (also foreign), give shippers the possibility to choose between more ports to reach final destination. ECT's strategic acquisitions of inland terminals is, for example, an explicit purpose of increasing competition, with Belgian an German ports, for East and West markets, compensating geographical location of mainport Rotterdam;
- the better information flow management between marine and inland terminals, by the way of EDI (Electronic Data Interchange) and GPS (Global Positioning Systems), which can allow, if equally developed in the different nodes of the network, to speed up documentation processing (e.g. Bills of Lading), and tracing container flows;
- the possibility to control logistic platforms located where the price of land is surely lower than close to coastal areas, and transport infrastructure are usually less congested.

Interest in the transport side is, on the other side, the logical further step for connecting and strengthening the expanding networks of marine and inland terminals. The aim is *i)* to control part of the transport chain to increase service flexibility for shippers and final clients and *ii)* to compete more effectively in new tenders for concessions (for the recognized capacity of carrying out investments in port-related transport infrastructures). It is not still clear, however, if it has to be considered functional to the core business of port service or a new segment of business.

Some concrete examples follow, in addition to those of table 3, regarding the outlined differentiation strategies (information are updated to the November 2001):

- the Antwerp based stevedores Hessenatie and Noord Natie operate respectively the terminal OCHZ of Zeebrugge and the Norodzee Terminal of Antwerp together with the Belgian railway company NMBS (which has shares of 50% and 33%); moreover a three-partner consortium participated to the tender for a concession along the left bank of the Schelda.
- Ect, a part its multimodal inland teminals of Venlo, Duisbourg and Willebroeck, has a majority stake in CSKD-Intrans, a Czech logistic operator running more than 15 rail terminals in Czech and Slovakia.
- Eurogate acquisition of Contship Group include, besides MCT and LSCT Italian terminals, Sogemar (intermodal transport and logistic) and Medexpress, (feedering).

– HHLA recently acquired Combispeed Fachspedition für Containerverkere Gmbh in Poland and Expologistica S.A. in Buenos Aires (Argentina); Moreover HHLA has a 81.5% share in Metrans (the Czech's largest intermodal operator) and a partnership in HHCE (Hansa-Hungaria-Container-Express) block train service linking Hamburg and Bremerhaven with 14 rail terminals in Hungary.

A further aspect has to be carefully considered: with the strategic differentiation in the logistic and transport sector terminal operators indirectly enter in different businesses acting as carriers (even if for short legs) and logistic providers. This cause a new strong element of vertical competition with the big multimodal transport operators (including main marine carriers) for the control of high-profit links. Conflicts that, on the contrary, were mediated by cooperation in dedicated terminals development.

Inland terminals acquisition policy by Ect, for instance, was looked with disfavor by carriers such as Maesk (an Ect client) and P&O Nedlloyd (which is involved in developing a "concurrent" rail connection Antwerp-Duisbourg through a consortium, which includes also the local municipality, for the concession of a new container terminal in Antwerp).

4. Some conclusions

Port container terminal industry is actually living a stage of great development also due to the positive expectations regarding the growth of international maritime trade and namely of containerized traffic for the next years. Between 1980 and 1998, in fact, while non-containerized general cargo volumes rose by only 0,6% annually, containerized cargo volumes, registered an average growth of 8,3%. Current container share of general cargo, around 55%, is expected to reach 65-68% in 2005 (around 800 million tons). Moreover, continuing increase in the incidence of transshipment will promote further "induced" growth in the level of containerized traffic.

The increasing throughputs, the development of hub and spoke networks and the alliances-based organization of the liner shipping sector, cause the container terminal sector to be recognized as quite interesting also by carriers, who are moving, through several organizational approaches, in the search of profitability. In fact, much of the global port development aimed at transshipping cargo is being undertaken directly by main carriers; it means that liners' strategies aim at: a tight control of container routing and the development of *ad hoc* service standards for their own ships and scheduled services.

At the same time the sole stevedoring activity is less profitable than it was in the recent past for the increasing overlapping of market areas and for the huge con-

tractual power of (few) liners. But the reduced profit margins are also a consequence of the strong competition among terminal operators. It does not imply the existence of a perfect competition market, but it means that captive hinterlands are no longer the unique markets of each port. Moreover the distinction among leaders and followers is sometimes still not clear and accepted by all incumbents, giving rise to tariffs competition (Ferrari, 2000).

In order to regain some profits, container terminal operators tend to differentiate their product in different ways: horizontal concentrations, vertical integrations (either becoming dedicated terminal or becoming a logistic platform), widening of the services offered (transformation from maritime terminal operators to logistical operators).

To a certain extent the port terminal sector is experiencing the same trends, previously experienced by the liner sector, even with a certain time lag: i.e. the progressive reduction of the number of the market players and a clear distinction among few (great) operators and a number of "local" niche players acting as followers.

Within the outlined scenario two main questions arise, concerning:

- the development of the stevedoring sector (in terms of number of players, their role and activities);
- the future effects of the current "trial of strength" between carriers and stevedores.

Being aware of the complexity of those matters, here it is just possible to draw some guideline of analysis.

Concerning the first point, in the next future, it is quite likely that leaders will continue to struggle again to win competition, also through extra acquisitions. This will lead to winners and losers in terms of market share and profit margin, but a further reduction of their already small number is quite improbable, since the current high level of consolidation. It could be possible only if containerized cargo flows will stop to grow, but neither the tragic events of September 11th resulted in a prolonged slowdown of the growth.

Strategic alliances seem to be, therefore, the natural trend also in container terminal operation. First of all between stevedores: for all "local" container terminal operators (i.e. followers) there will be the opportunity to gain traffic and profit from their partnerships with the market leaders, if they are able to exploit at the maximum level the heritage of knowledge of the local market, and of the complex network of relations existing among all the economic and institutional agents somehow related to the port. On the contrary, a competitive strategy would start a never-ending struggle, that probably could exclude some of the followers from the market, but will result in lower profit margins than the actual ones also for leaders.

To some extent this is what is actually happening in Italy where a lot of container terminals has experienced in the last decade a strong increase in container

throughput only for the presence of the hub container terminal of Gioia Tauro. Quite all medium-small container terminals (both on the Tirrenian and the Adriatic coast) were able to exploit the situation through equity exchanges or partnerships with several market leaders assuring in such a way their existence for the future.

But alliances would be more and more common also between stevedores and different kind of companies (promoting logistic-orientated product differentiation), between stevedores and Port Authorities (promoting synergies in infrastructure policies and sharing information on port future plans) and, finally, between stevedores and liners (promoting mutual benefits from vertical integration, like the Antwerp consortium between P&O Nedlloyd and Hessenatie/Noord Natie and the "alliance" between PSA and Evergreen in Civitavecchia).

Co-operation between different players in the transport chain are to be positively considered because it allows the concentration of each player in its own business implementing the efficiency of the logistical service and a more rational infrastructure policy exploiting economies of scale and reducing sunk costs.

Co-operation, consortia and joint ventures between different levels of the logistical chain, however, don't necessary imply any equality between partners. Market players' power will result in different leaderships in, even temporary, partnerships. Currently the discrimination criterion for identifying "logistic-alliances" leaders should be found in the financial capacity and firm's size; and within such a scenario, it is not rash thinking of a general predominant role of big carriers, especially in maritime alliances, where involved.

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References:

1. Arnold, J.H. (1985) Port Tariffs: Current Practices and Trends, World Bank, Technical Paper
2. Benacchio, M. - Cariou, P. - Haralambides, H. (2000) Dedicated Container terminals: costs and benefits from a port perspective, paper presented at the Special Interest Group on Maritime Transport and Ports (SIG-2) International Workshop (WCTR Society), Genoa 8-10 June, mimeo.
3. Blomme, J. (2000) Northern Range Port Strategy, Proceedings of IAME Conference "Maritime Industry into the Millennium: the Interaction of Theory and Practice", Naples
4. Drewry Shipping Consultants (1998) World Container Terminals. Global Growth and Private Profit, London

5. Drewry Shipping Consultants (1999) North European Container Ports, London
6. Drewry Shipping Consultants (2002) Global Container Terminals, London
7. Ferrari, C. (2000) Imprese terminaliste nel trasporto containerizzato: funzione di produzione e forme di mercato, Genova, ECIG
8. Haralambides, H - Cariou, P. - Benacchio, M. (2002), Costs, Benefits and Pricing of Dedicated Container Terminals, International Journal of Maritime Economics, vol 4, n°1, 2002, 21-34
9. Lim, S.M. (1998) Economies of scale in container shipping, Maritime Policy & Management, vol. 25, n. 4
10. Meersman, H. - Moglia, F. - Van de Voorde, E. (1999) Mergers and alliances in liner shipping, What does European Port Authorities have to fear? in Liner Shipping: What's Next?, proceedings of the 1999 meeting of IAME conference, Halifax
11. Musso, E. - Ferrari, C. - Benacchio, M. (1999) On the global optimum size of port terminals, International Journal of Transport Economics, vol. XXVI, n. 3
12. Musso, E. - Ferrari, C. - Benacchio, M. (2000) Co-operation in maritime and port industry and its effect on market structure, paper to be presented at Ports 2000, Barcelona, 27-29 September
13. Musso, E. - Ferrari, C. - Benacchio, M. (2003) Co-operation in maritime and port industry and its effects on markets structure, in Selected Papers of the World Conference of Transport Research Society held in Seoul, 2001 (to be printed)
14. Ryoo, D.K. - Thanopoulou, H.A. (1999) Liner alliances in the globalization era: a strategic tool for Asia container carriers. Maritime Policy & Management, 26(4), 349-367
15. Song, Dong-Wook (2002) Regional container port competition and co-operation: the case of Hong Kong and South China. Journal of Transport Geography, 10, 99-110
16. Suykens, F. - Van de Voorde, E. (1998) A quarter of a century of a port management in Europe: objectives and tools, Maritime Policy & Management, vol. 25, n. 3
17. Tirole, J. (1988) The theory of industrial organization, Cambridge (Mass.), MIT Press

Press and news sources:

Containerization international (various issues)
Informare web site (http://www.informare.it/)
Cargo System web site (http://www.cargosystems.net/)
Companies' web sites.

Annex 1.: Major lines/services calling at European container terminals (Data 2001 from Containerization International Yearbook 2002)

Port	Terminal	Maersk/ S-L		Grand Alliance		New World Alliance		United Alliance		Cosco/K Line/Yangming		Independent			
		Maersk	S-L	PONl	H-L	APL-NOL	MOL	Hanjin - DSR	UASC	Cosco	K Line	Evergreen	MSC	ZIM	CMA - CGM
Northern Range															
Rotterdam	Ect – Delta/Home	X	X	X	X	X	X	X	X						X
	Holland Terminal			X						X	X			X	X
Antwerp	Noord Natie	X	X	X		X									X
	Noordzee Terminal			X	X					X					X
Zeebrugge	Hessenatie ESV			X								X			X
	Flanders Container Term.			X	X										X
Hamburg	Burchardkai Terminal			X	X					X		X			X
	Tollerort			X						X	X		X	X	
	Unikay			X	X										X
Bremer haven	BLG-Eurogate	X	X	X	X	X	X	X	X	X	X	X	X		X
Felixtowe	Trinity Container Term.	X	X	X		X	X	X	X	X	X		X		
Southampton	Southampton Cont. Term.			X	X	X	X				X				X
Thamesport	HPH			X	X							X			X
Liverpool	RSCT				X								X	X	
Le Havre	GMP + SETN + CNPM	X	X	X	X	X	X	X		X	X	X	X		X

Port	Terminal	Maersk/ P-S		Grand Alliance		New World Alliance		United Alliance		Cosco/K Line/Yangming		Independent				
		Maersk	S-L	PONI	H-L	APL-NOL	MOL	Hanjin - DSR	UASC	Cosco	K Line	Evergreen	MSC	ZIM	CMA - CGM	
Southern Range																
Algesiras	Maersk Espana	X	X													
Malta	Marsaxlokk	X	X	X	X										X	
Valencia	Maritima Valenciana	X	X	X	X	X		X	X	X		X	X	X	X	
Barcellona	TBC			X	X	X	X		X	X	X	X		X	X	
	Terminal Port-Nou										X				X	
Marseilles	FOS	X	X	X	X		X					X		X	X	
	Mourepiane CT			X									X	X	X	
Genova	PSA	X	X	X	X	X				X	X	X	X	X	X	
	SECH (P&O-GIP)					X	X	X	X					X		
La Spezia	BLG-Eurogate	X	X	X	X		X	X	X			X				
Venezia	Vecon	X	X	X					X	X		X	X	X	X	
Trieste	Ect								X					X		
Ravenna	Sapir											X	X	X		
Salerno	SCT			X	X	X	X	X	X			X				
Gioia Tauro	BLG-Eurogate	X	X									X				
Thessaloniki	CT (pier 6)			X								X		X	X	
Piraeus	Main Port + SGCT + VCT			X			X					X	X	X		

Port	Terminal		Maersk/ S-L		Grand Alliance		New World Alliance		United Alliance		Cosco/K Line/Yangming		Independent			
			Maersk	S-L	PONl	H-L	APL-NOL	MOL	Hanjin - DSR	UASC	Cosco	K Line	Evergreen	MSC	ZIM	CMA - CGM
Atlantic Range																
Bilbao	TMB – Cara Norte				X	X						X		X		X
	Atlantic Euroterminal		X	X								X				
Lisbon	Alcantara		X	X	X	X									X	
	S. Apollonia CT											X				X
Nantes SN	Montoir													X		X

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NAJNOVIJA KRETANJA NA TRŽIŠTU USLUGA KONTEJNERSKIH TERMINALA: KOJIM PUTEM DO INTEGRACIJE?

Sažetak

Posljednjih godina su uočena tri glavna smjera kretanja u pomorskim i lučkim djelatnostima i to uglavnom na području kontejnerskoga prometa, tj. 1) snižavanje lučkih tarifa; 2) razvoj okomite i vodoravne koncentracije lučkih terminala; 3) prihvaćanje raznih oblika suradnje radi lakšeg suprotstavljanja sve većoj konkurenciji na tržištu.
Takva kretanja vode do jasne podjele na velike i male lučke operatere na strani tržišta te do sve veće diferencijacije lučkih usluga – ne samo u prostornome smislu – radi ponovnog ostvarivanja neke dobiti. Sve veća diferenciranost lučkih usluga budi zanimanje jer je povezana s logističkim distribucijskim lancem.
Cilj je ovoga rada istražiti ta kretanja sa stajališta teorije i prakse, uglavnom na temelju europskih i talijanskih iskustava.

Ključne riječi: lučka djelatnost, tržišna struktura, suradnja, konkurencija

RECENTI EVOLUZIONI NELLA STRUTTURA DI MERCATO DEI SERVIZII PORTUALI NEL SETTORE CONTAINER: QUALI FORME DI INTEGRAZIONE?

Sommario

Le principali tendenze in atto nell'industria dei servizi marittimo-portuali, con particolare riferimento alla movimentazione container, riguardano: i) la riduzione delle tariffe portuali; ii) lo sviluppo da parte dei principali operatori terminalisti di processi di concentrazione orizzontale e verticale; iii) l'adozione di un'ampia gamma di forme di cooperazione tese a fronteggiare la crescente competizione presente sul mercato.
Tali tendenze portano sempre più ad una netta suddivisione tra grandi e piccoli operatori portuali e ad una crescente differenziazione dei servizi portuali (non soltanto su una base spaziale) nel tentativo di riguadagnare profitti. Tale differenziazione dei servizi porta ad un crescente interesse degli operatori portuali verso il settore della logistica integrata.
Il lavoro si pone l'obiettivo di analizzare le tendenze descritte sotto il profilo teorico prendendo lo spunto da casi ed esperienze Italiani ed europei.