JOINT TRANSPORT RESEARCH CENTRE

Discussion Paper No. 2009-1
January 2009

Empirical Evidence for Integration and Disintegration of Maritime Shipping, Port and Logistics Activities

Antoine FRÉMONT
Director of Research at INRETS
Noisy-Le-Grand
FRANCE

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

International Transport Forum

JOINT TRANSPORT RESEARCH CENTRE

Discussion Paper No. 2009-1

Prepared for the Round Table of 5-6 February 2009 on

Vertical Relations between Transport

and Logistics Businesses

EMPIRICAL EVIDENCE FOR INTEGRATION AND DISINTEGRATION OF MARITIME SHIPPING, PORT AND LOGISTICS ACTIVITIES

Antoine FRÉMONT
Agrégé de Géographie
Director of Research at INRETS
Noisy-le-Grand
FRANCE

December 2008

TABLE OF CONTENTS

1. INTRODUCTION 5

2. CONTAINERISATION AND HORIZONTAL AND/OR VERTICAL INTEGRATION PROCESSES 6

2.1. Historical segementation of the business involved 6
2.2. The logistics opportunities that containerisation offers 8
2.3. Vertical and/or horizontal integration scenarios 10
2.4. Limits of integration 12

3. A STRONG HORIZONTAL INTEGRATION DYNAMIC, LIMITED VERTICAL INTEGRATION 13

3.1. Horizontal integration in practice 13
3.2. Limited vertical integration 16

4. THREE TYPES OF LOGISTICS 20

4.1. The findings of a survey 20
4.2. "Container logistics" and "vessel logistics" 22
4.3. Are shipping lines interested in freight logistics? 24
4.4. Striking a balance between the three types of logistics 26

5. CONCLUSION 29

NOTES 30

BIBLIOGRAPHY 31

1. INTRODUCTION

In 50 years, containerisation has become the backbone of globalisation. That it has done so can be attributed to the beneficial interaction of three broad types of factor: technical, economic and organisational. In the beginning, containerisation was nothing more than a simple technical innovation. However, as an intermodal tool, the container paved the way for new and long-term organisational models in the transport sector. These organisational factors challenged transport actors, who had to redefine the demarcation lines between their respective businesses in order to bring reliable door-to-door transport chains with a global reach into operation. The opportunities that containerisation offered would have remained a dead letter had they not coincided with the deep upheavals in economic factors since the 1970s. The very strong growth in international trade in manufactured products, systematically higher than growth in international trade overall -- itself higher than GDP growth -- marks a deeper division in international labour, which was made possible only through the support of a strong transport system.

Since its advent in the mid-1960s, containerisation has been bringing about the integration of the transport chain (Brooks, 2000). At the same time, shippers' logistics needs have been increasing steadily as they take advantage of the opportunities offered by globalisation to develop their production and/or distribution activities on an international scale and this necessitates synchronisation of their activities in space and time through the introduction of logistics chains. The management of these chains is a source of control as well as providing a source of profit for all -- forwarders, maritime or inland transport operators, forwarding agents or logistics specialists -- who are involved in the these chains (Heaver *et al*., 2001).

All international transport companies now claim to be logistics operators capable of providing a customised response to the needs of their shipping clients. Meanwhile, logistics theorists, particularly academics, demonstrate the organisational and economic advantages of putting in place logistics chains integrated as closely possible with the creation of the value chain, from the pre-production of goods through to the final distribution stage. What counts is no longer transport so much as the organisation of logistics services for shippers. If they are to meet this demand, carriers would therefore have to integrate a whole series of logistics functions, which would mean extending the scope of their activities far beyond their original core business. However, one does need to question the term « logistics » and whether there actually is integration as is assumed to be the case today. Is an ordinary port-to-port maritime transport service still essential? Does the shift to door-to-door transport services mean real vertical integration of the different modes of transport by a single operator? Does this integration lead to marginalisation of a firm's original core business? Apart from actual transport, is the management of logistics chains for a shipper right from pre-production through to end distribution really as common as all that?

In order to answer these questions, we will concentrate on the biggest shipping lines. Today, they are key actors in transport chains by virtue of the global networks they have deployed (Slack *et al*., 2002), the transport capacity they control - in 2007, over 80 per cent of containerised traffic was concentrated in the world's top 20 shipping lines – and the opportunities that containerisation is giving them to establish themselves as logistics providers (Evangelista, 2005), chiefly because they control

the containers, which can be regarded as part of a vessel's cargo hold. Containerisation has reportedly transformed maritime operators into fully-fledged logistics firms capable of providing a basic door-to-door service but also of more extensive involvement in the management of entire logistics chains, including tracking and direct operations on the cargo itself. Our question is: is the apparent integration of logistics and port functions by shipping lines actually a reality? How does their core business as maritime lines fare with the introduction of integration, which would tend to relegate maritime transport services to second place and appears to be determined by the very nature of containerisation?

On an essentially qualitative basis, in the absence of complete quantitative data, our aim is to demonstrate that the involvement of scheduled shipping lines as logistics providers in a logistics chain is still very debatable. We will demonstrate that containerisation effectively paves the way for the processes of horizontal and vertical integration. However, the less doubt there is about horizontal integration, the more we should be questioning vertical integration. An analysis of the activity of maritime groups is convincing in this respect. With this in mind, we propose to make a clear distinction between « container logistics » and « freight logistics ». The first of these is an integral part of the maritime business and is totally the responsibility of the shipping line. The second involves the direct handling of goods over and above straightforward transport provision. This distinction prompts some very strong reservations as to the actual vertical integration in the transport chain.

2. CONTAINERISATION AND HORIZONTAL AND/OR VERTICAL INTEGRATION PROCESSES

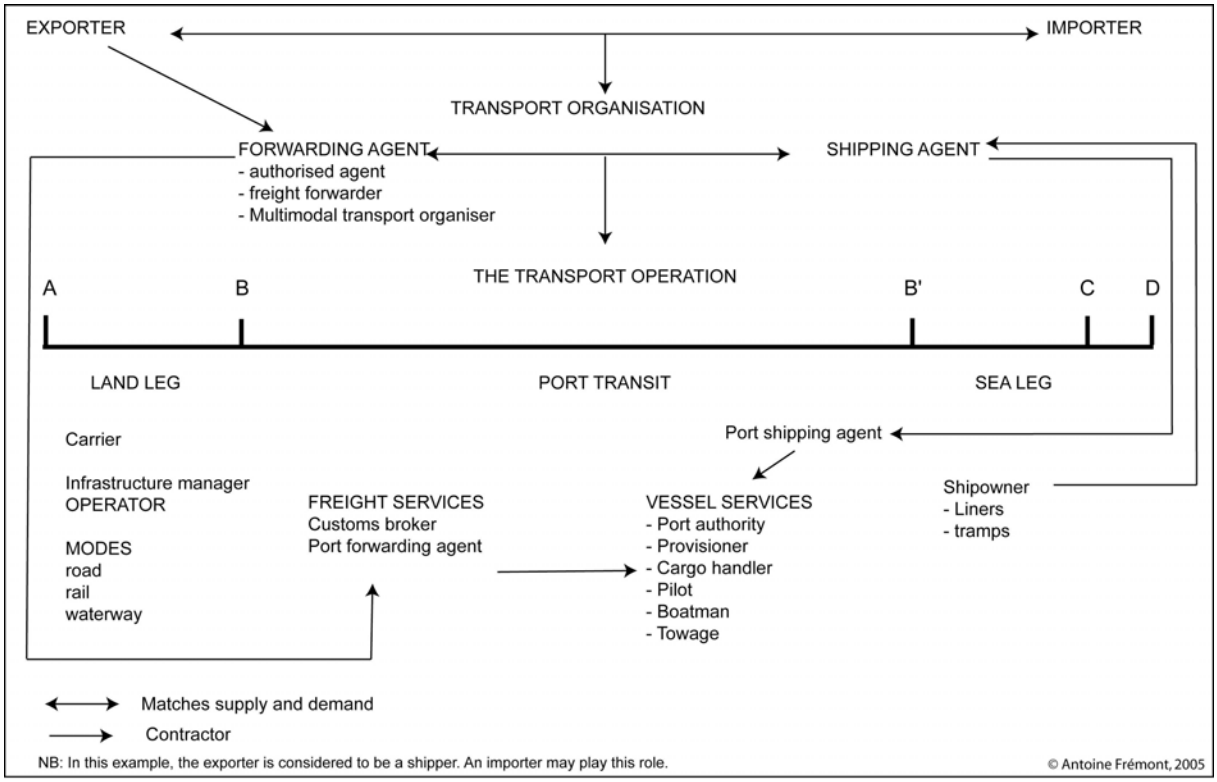
2.1. Historical segmentation of the businesses involved

Historically, international freight transport by sea required the involvement of many actors specialised in a specific task who would work to provide a service on behalf of the shipper.

The first, and fundamental, difference between the transport modes is that sea transport is confined to a port-to-port leg only. This is the business of the shipping line, be it the owner or simply the operator of the vessel. On land, road, rail and inland waterway modes compete with one another based on their respective advantages and disadvantages. Other differences between them are their principles of organisation, innovation and intramodal competition. Historically, there has been no co-ordination among the various inland modes of transport either.

From this modal perspective, organising the transport of freight by sea is a highly complex task given the number of intermediaries involved. The agent, if acting as freight forwarder, arranges transport for his shipper client, matching demand with available sea transport supply provided by a shipping agent who works in port B on behalf of the shipping line if the latter does not have a presence there itself. The shipping agent effectively gives the shipping line a presence in the port.

Figure 1. **Parties involved in the sea transport chain in shipping freight from point A to point D via ports B and C.**



If negotiations are successful, a transport contract is drawn up to allow the actual shipping operation to proceed. The latter involves actors in the port who see that the contract is followed, particularly when cargo is being loaded and offloaded from the vessel, the very moment when the freight change hands and responsibility for them passes from the freight forwarder to the shipping line or vice-versa, with the port forwarding agent designated by the freight forwarder acting as representatives for the shipper and the freight while the ship's agent, designated by the shipping agent, acts on behalf of the shipping line. In addition, for the shipping line, numerous vessel services are indispensable for a successful port call. These are dependent on trades that each have their own history and organisation, which vary a great deal from one port to another.

Transporting freight by sea involves greater risk than using only inland transport precisely because it requires the consecutive use of several modes of transport, each with a different operating perspective. Martin and Thomas (2001) describe the port community involved in handling various goods before the advent of containerisation as a system split up among different actors. This system reflects the rigid division of the different functions and tasks designed to limit the responsibility of each for the goods in the event of damage. Despite that, responsibility can still be a grey area, chiefly when the goods are being moved from ship to shore or vice-versa with different usages and customs in different ports.

In this system, which could be called "Fordist", the international transport service is segmented into different well-structured markets: maritime transport, pre- and post-shipment carriage and the organisation of transport. In these markets people with demand meet suppliers and enter into transactions with them. These are transactional markets.

2.2. The logistics opportunities that containerisation offers

While the intent, here, is not to give a detailed account of the numerous advantages of containerisation, there are four major advantages that have opened up new opportunities for redesigning transport chains through horizontal and/or vertical integration by the various players in the transport chain.

The first two such advantages concern mainly the sea leg of transport: port handling efficiency and reduced transport costs per unit carried, made possible by the steady increase in size of container ships. Higher volume maritime transport has facilitated consistent economies of scale over time, culminating in the reduction in the cost of port-to-port transport by scheduled shipping lines.

The third advantage is that containers are intermodal tools that facilitate door-to-door services. In the intermodal transport chain, while no individual mode loses its identity or its importance, the role of each is henceforward determined by the objectives of the system overall (Hayuth 1992). Intermodal transport allows scheduled shipping lines to develop *hub and spoke* networks that span the globe and high-volume inland transport networks that interface with maritime networks. The reduction in transport costs no longer applies solely to the port-to-port leg; it is extending to door-to-door services as well.

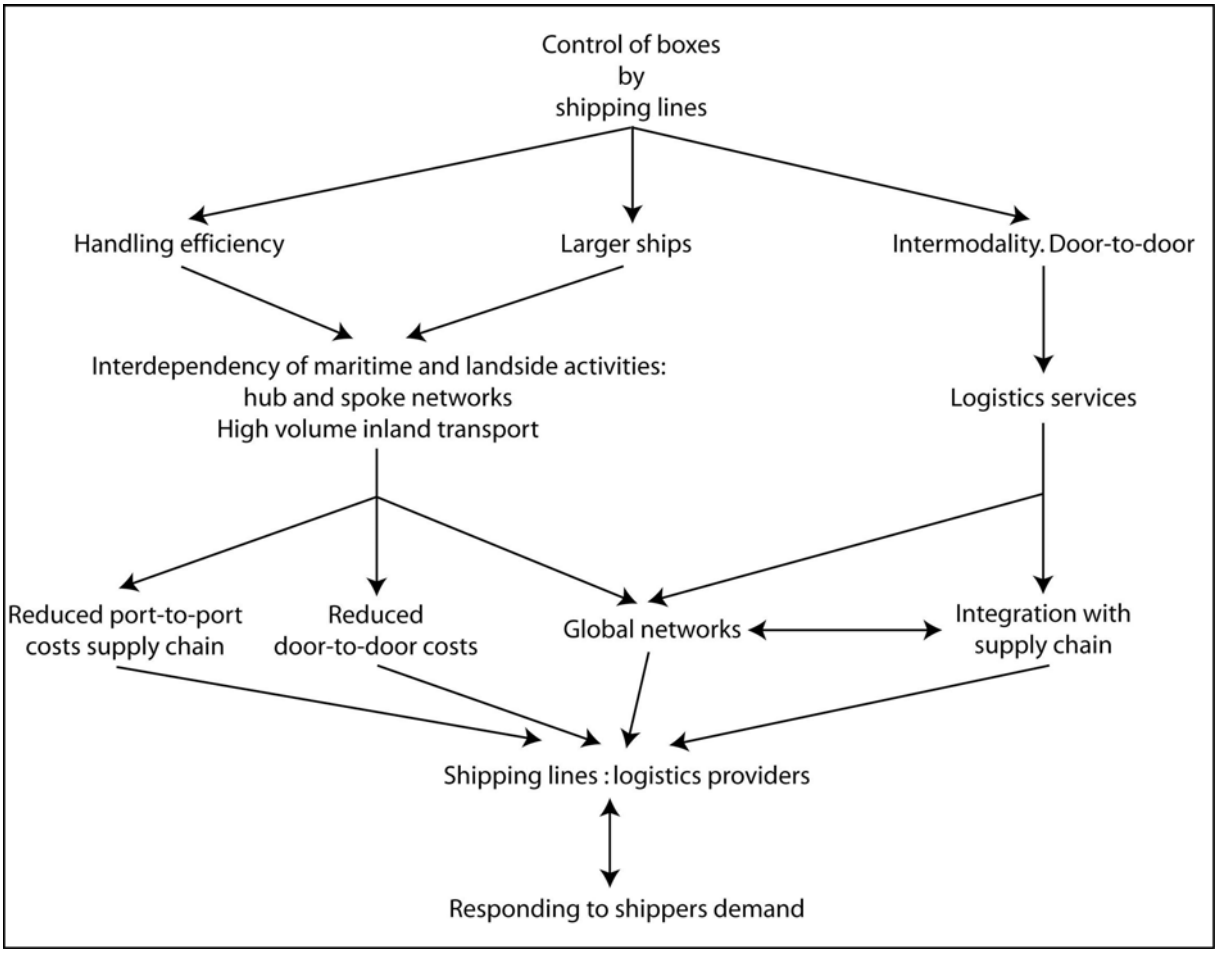
The fourth advantage is the development of logistics services. Yet, how can we define these? Among the many definitions of logistics proposed is the following: all of the methods and resources deployed to manage the physical flows necessary for the seamless operation of an activity, a firm etc. Conventionally it applies to physical flows (transport and inventory management) but its methods can also apply to financial and information flows. At the level of a firm, it is a function that organises the transport and storage of goods from pre-production (raw materials procurement) to end point (product marketing) » (Dufetelle, 1995). Associated with logistics is Supply Chain Management. The definition of the latter may encompass logistics itself. The entire logistics chain extends from the supplier to the end client. Production is therefore order led. It must enable the overall management of resources in order to provide the best service for actual and forecast customer demand (ASLOG, 2002). Overall management is complex since it involves the management not only of physical transport flows but also of associated information flows as well as management of the interfaces between the different actors in the chain from the producer to the end consumer, including the wholesaler and distributor and, of course, the transporter(s). In order to achieve its primary objective, which is to reduce inventory as much as possible with the aim of just-in-time provision in order to have « the right product in the right place at the right time », to quote the well-known slogan. Supply chain management relies on information on everything from demand right up to the data necessary for distribution including actual design and production (Damien, 2001). It needs to rely on an information system.

A container operator that provides a door-to-door service or even just a quay-to-quay maritime service is in the logistics business. His service as « just » a carrier aims to optimise physical flows of goods using an intermodal transport unit. Better handling, large ships, intermodal transport, higher volume transport and the hub technique are complementary tools that serve optimisation. Yet they concern only the actual transport segment.

Apart from transport service provision, however good its performance, a container operator can expand its logistics services for its client, the shipper. From operation and management of transport supply, which requires container tracking via information systems, the operator can, in theory, graduate to goods tracking, or to performing direct operations (labelling, repackaging, bringing to standard, etc.) on goods when they pass through the warehouse stage, becoming even more extensively involved in the logistics chain. The container operator then becomes a logistics provider in the fullest sense of the term: it can turn its hand to all stages of production and consumption and tends to bring them all together into one integrated process: procurement, manufacturing, distribution, consumption, waste recovery and recycling. Its aim, in this case is not so much to minimise transport costs alone as to minimise total logistics costs while at the same time optimising logistics to meet the performance requirements stipulated by its client (Savy, 1995).

In fact, containers are particularly suited to just-in-time management, which needs to meet set schedules and maintain reliable delivery. Depending on the quantities to be transported, which may change in time and space, all that is needed is to adapt the number of containers. Containerisation also allows the regular transport of small deliveries by consolidating goods from different origins in the same container (LCL-Less than Container Load as opposed to FCL-Full Container Load).

Figure 2. **Scheduled shipping lines: from control of boxes to logistics services**



T. D. Heaver (2002a) lists the potential advantages of this type of integration of logistics operations for a container operator, in this case a shipping line. Demand from any given client for one activity may support another. Just as airlines build hotels in order to fill their plains, a container operator may supply a logistics service in order to fill up its containers and secure the loyalty of its customers. Economists mainly point out the opportunities to reduce transaction costs between the different components of the logistics chain by internalising them and controlling the entire chain, which makes for greater transparency. Another important source of synergies comes from shared use of an information system, which can again be expanded from the management of container flows to goods management. Lastly, integration of the logistics function enables greater business diversification thus providing better protection against business and price fluctuations in one segment of the chain or another.

2.3. Vertical and/or horizontal integration scenarios

In theory, containerisation prepares the ground for full vertical and horizontal integration of the transport chain.

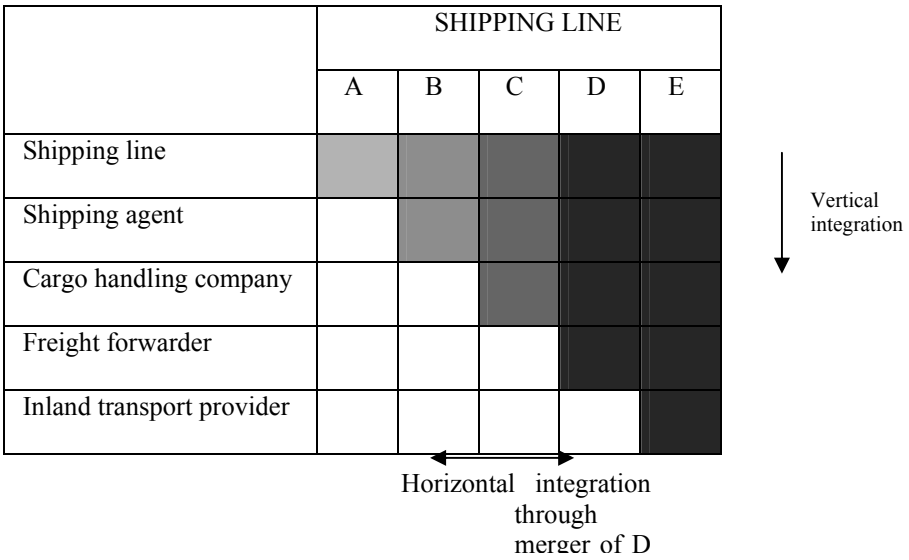
Integration may be horizontal. Containerisation encourages the emergence of very large shipping lines. This is because the economies of scale to be gained from the use of large ships and hubs are only possible for lines that control sufficiently large volumes. For a maritime carrier there are three alternatives: alliances with other shipping lines, formerly competitors but now inescapable partners; acquisition of a competitor; or, lastly, internal growth of the company. The objective of these three forms of horizontal integration, other than a general desire to increase the volumes carried, may be to increase market share on a given maritime route or, conversely, to extend the geographical coverage offered by the line's maritime networks. This latter solution does not provide any major economies of scale at the beginning since becoming established in a new market is risky and means small market shares at first unless a major operator with a presence in the same geographical sector can be bought out wholesale. The hub technique is a less risky way of doing the same thing and of reaping all of the benefits if volumes increase over time.

The choices available to shipping lines are more or less the same for cargo handlers and freight forwarders, through, for instance, the establishment of networks of terminal or agencies. That said, there is one major difference between forwarders and shipping lines or cargo handlers. The business of the former requires primarily human resources to strengthen a network of agencies that facilitate contact with client shippers while the latter must first make heavy capital investments to be able to ensure maritime and landside links or large-scale handling operations.

Containerisation also facilitates vertical integration with a view to reaping all of the benefits of intermodal transport, this time, rather than economies of scale. A multimodal transport operator (MTO) replaces a piecemeal system in which the shipper used to sign separate contracts with each single-mode carrier by a single contract with a single multimodal operator, which will then be responsible for all transport over the entire journey (P&O Nedlloyd, 2003). Theoretically, it could replace all of the actors who ensure part of the transport operation, each from their own individual business-specific perspective, and organise the most streamlined door-to-door transport possible from a single business perspective, even if that would not prevent it sub-contracting one part of the transport operation or another to a specialist. Being able to respond to the needs of its clients with the widest possible range of logistics services is not the only benefit for such an MTO, it should also benefit in terms of its own internal organisation, which can be a source of savings.

Figure 3 presents different theoretical scenarios for transport chain integration in which the shipping line is the key player in the integration process.

Figure 3. **Transport chain integration based on shipping line examples**



When a shipping line integrates the functions of a shipping agent into its business, it can have its own representation in ports and is no longer dependent on an external agent, who -- although he of course works for the shipping line --can also offer his services to a competitor. Primarily this is a commercial investment to reinforce direct contact with the customers of freight forwarding agents or shippers. Besides offices in ports, it requires human capital to be in touch with the local situation in a given market.

When a shipping line integrates the functions of a cargo handler into its business, it can secure its port operations, particularly in hubs, which implies perfect co-ordination of calls by its various mother and feeder ships. By taking over handling operations the shipping line is no longer dependent on a handling company that it does not control and can schedule its ships through a terminal that is wholly dedicated to its own operations. This requires substantial investment, which could only be justified by a high enough volume of port calls; otherwise, the dedicated terminal would be underutilised and lose money (Musso *et al*, 1999; Haralambides *et al*., 2002; Cariou, 2003).

As well as the functions of shipping agent and cargo handler, a shipping line may further integrate the transport chain by becoming an inland carrier, freight forwarder and/or logistics provider. It then leaves the purely maritime and port segment to engage in the inland transport segment. The shipping line moves away from its core business to encounter new sets of problems. It may become a rail or road operator, which would probably give it better control over its container fleet traffic, but it might lose the potential advantages it gains from competition between the various inland modes. Likewise, in becoming a forwarding agent or logistics provider, it broadens its commercial range by directly addressing shippers. It captures some goods that will ensure that its ships are filled but at the same time enters into potential competition with its own traditional clients, freight forwarders, and runs the risk of losing the goods.

Containerisation facilitates the transition from transactional markets to relational markets where transport supply is no longer segmented but offers a door-to-door solution to shippers, which may itself be integrated into a wider solution for the management of the shipper's supply chain. Containerisation paves the way for relational markets since it has standardised the conditions of door-to-door transport through intermodality.

2.4. Limits of integration

Integration of the transport chain is anything but straightforward. It calls into question long-established relationships between clients and suppliers who go from being partners bound by commercial contracts to potential competitors. In any given port, a cargo handler which yesterday worked for shipping line A loses that line's traffic as soon as it begins to handle its own cargo. To offset the loss, the cargo handler must turn to other shipping lines and becomes a *de facto* competitor of the handling company set up by shipping line A. Likewise, will a forwarding agent who has traditionally handled traffic for the line continue to do so if shipping line A develops its own freight forwarding or customs brokerage service and is immediately faced with the temptation of poaching customers from its former forwarding agent?

For the shipper client, a horizontally and vertically integrated transport chain raises the problem of competition in a situation that could turn into a monopoly. True, integration allows the shipper to benefit from a door-to-door service and to outsource logistics so that it can concentrate on its core business. This is the « one-stop shop » idea: a single container operator, carrier and/or logistics provider offers its shipper clients a whole range of services to meet their logistics needs through its worldwide agency network (Panayides, 2002). However, total outsourcing can also make shippers heavily reliant on the service provider. Faced with a potential monopoly situation as a result of significant vertical integration or with logistics services that could make them dependent compared with conducting their own activity, it is in shippers' best interest to promote competition between the various actors in the transport chain.

Lastly, integration of the transport chain comes up against the financial, technical and human-resource capacity of the different actors involved. By definition, these capacities are limited and uneven across firms and this inevitably entails trade-offs between strategies which would promote the extension of geographical coverage or increase the volume of operations (horizontal integration) and strategies which would lean towards broadening the company's range of business and services (vertical integration). It all depends on market share, income and expected return on investment (Heaver, 2002a). In other words, it is impossible for one group – one forwarding agent, cargo handler, or shipping line – however powerful it may be – to do everything, everywhere, all at the same time. It has to choose.

Hence, differentiated transport chains, integrated or otherwise, are being established and are starting to compete with each other. While economists stress the greater potential efficiency of integrated chains compared with chains involving several contractors (Frankel, 2002 ; Robinson, 2002), which remains to be demonstrated in practice, let us simply bear in mind the variety of possible situations.

3. A STRONG HORIZONTAL INTEGRATION DYNAMIC, LIMITED VERTICAL INTEGRATION

3.1. Horizontal integration in practice

Horizontal integration is not in doubt, whether in the case of shipping lines, cargo handlers or forwarding agents/logistics providers. In 1980, the top 20 shipping lines accounted for 45 per cent of world container traffic capacity. In 2000, their share had risen to 52 per cent and to 82 per cent in 2007. In the same years, the share of the top five operators rose from 17 per cent to 24 per cent and then to 43 per cent. Since the year 2000, this concentration dynamic has been accelerating sharply. The system of global alliances that are bringing together essentially Asian shipping lines also warrants mention. Through mergers/acquisitions or alliances, the goal of shipping lines has been to set up global maritime networks capable of providing high-frequency, high-capacity services to the world's three main economic centres, East Asia, North America and Europe.

Table 1. **Share of the world's top 20 shipping lines. 1979-2007: in % of world fleet, in million TEU**

	1979	1989	2000	2004	2007
20 LEADING SHIPPING LINES	**44.1**	**32.8**	**52**	**62.3**	**82.3**
of which European lines	**21.5**	**8.6**	**21.2**	**28.2**	**45.5**
of which North American lines	**12.7**	**4.5**	**0**	**2.1**	**0**
of which Asian lines	**9.9**	**15.7**	**27.6**	**30.2**	**34.7**
World fleet (million TEU)	**0 951**	**2 995**	**6 490**	**9 088**	**11 629**

Source: Containerisation international, various issues.

Table 2. **The top twenty shipping lines in November 2008**
In % of world fleet capacityin TEU*

Rank	Operator	Nationality	%
1	Maersk	Denmark	15.7
2	Mediterranean Shg Co	Italian/Swiss	11.1
3	CMA-CGM	France	7.6
4	Evergreen Line	Taiwan	4.8
5	Hapag-Lloyd	Germany	3.8
6	COSCO Container L.	China	3.8
7	APL	Singapore	3.8
8	CSCL	China	3.4
9	NYK	Japan	3.2
10	Hanjin / Senator	South Korea	2.9
Share of top 10			**60.2**
11	MOL	Japan	2.9
12	OOCL	Hong Kong	2.8
13	K Line	Japan	2.5
14	Yang Ming Line	Taiwan	2.4
15	Hamburg Süd Group	Germany	2.3
16	CSAV Group	Chile	2.2
17	Zim	Israel	2.2
18	Hyundai M.M.	South Korea	1.9
19	PIL (Pacific Int. Line)	Singapore	1.4
20	UASC	United Arab Emirates	1.2
Share of top 20			**82.0**
World total			**100.0**
of which			
European shipping lines			40.6
Asian shipping lines			35.8

* The capacity of the world fleet is estimated at 12.9 million TEU.
Source: Alphaliner.

Table 3. **The three major alliances in April 2008, capacity in million TEU**

	TEU million	Members
CKYH	1.4	Coscon
		K Line
		Yang Ming
Grand Alliance	1.3	Hapag-Lloyd
		NYK Line
		MISC
		OOCL
The New World Alliance	1.0	APL
		Hyundai
		Mitsui OSK Lines

Source: K Line Annual report 2008.

Similarly, since the end of the 1990s, a few terminal operators have dominated the market. They have developed worldwide terminal networks always targeting the three main centres of the world's economy. They may be exclusively terminal operators, subsidiaries of shipping lines or may even still be an integral part of a shipping line's business without actually being a separate subsidiary. The share of world cargo handlers in port handling operations was only 18 per cent in 1996. Ten years later, it had increased to 70 per cent and investment programmes now in progress should further reinforce the trend.

Table 4. **World's top 10 cargo handlers in 2006. In % of TEU throughput of world ports***

Rank	**Operator**	**Nationality**	**Core business TO/S****	**%**
1	HPH	Hong Kong	TO	13.8
2	APM Terminals***	Denmark	TO	11.8
3	PSA	Singapore	TO	10.7
4	DPW	Dubai	TO	9.4
5	Cosco	China	S	5
6	Eurogate	Germany	TO	2.7
7	Evergreen	Taiwan	S	2,1
8	MSC	Italian/Swiss	S	2
9	SSA Marine	United States	TO	1.7
10	HHLA	Germany	TO	1.5
Share of top 10				60.7
Share of world operators				70.7

* 443 million TEU handled worldwide in 2006.

** TO = Terminal Operator
S = Shipping line

*** APM Terminals is the stevedoring subsidiary of the AP Möller group, which also owns Maersk, the world's top shipping line. APM Terminals has a close working relationship with Maersk, but does not work exclusively for it.

Source : Drewry, 2007

Lastly, a few major freight forwarders/logistics providers are making their presence felt on a worldwide scale (see Table 8). They offer their clients worldwide logistics services using their vast network of agencies. These have more often than not been set up through buyouts of local firms, triggering a vast concentration dynamic in the sector. Their activities can range from express courier delivery to total management of a shipper's supply chain. Originally, their business centred on freight forwarding. Unlike shipping lines and cargo handlers, their activities are not capital intensive.

3.2. Limited vertical integration

3.2.1. Advantages long recognised

As evident as it is that horizontal integration is now a reality, it remains to be demonstrated that this is the case for vertical integration. Having said that, theoretically, the advantages of moving towards vertical integration are obvious. Let us take the example of shipping lines. Vertical integration today would offer them a way of gaining comparative advantages over their competitors, particularly through the development of logistics services, for two fundamental reasons. It is becoming more difficult, if not impossible in the long term, for shipping lines to generate sustainably competitive margins by reducing maritime costs, with the cost reductions obtained from using larger vessels being so systematically wiped out by dropping freight rates when new capacity is brought into operation… except when there are unusual conditions such as very strong growth in world exports, powered mainly by China. (Panayides and Cullinane 2002; Lim 1998). The current economic and financial crisis has brought an abrupt end to a very long cycle of growth. Secondly, for door-to-door services, the maritime cost is secondary; an estimated 23 per cent of total transport costs (Stopford 2002). Furthermore, the increase in vessel size automatically tends to accentuate the transfer of costs from maritime to landside transport (Notteboom 2002, 2004a). Shipping lines stand to gain doubly from vertical integration: it would enable them to control non-maritime costs, but also to consolidate their position as logistics operators in their own right so that they could gain a comparative advantage, hence sustainably competitive margins, on land when it seems impossible for them to do so at sea. Rather than merely an advantage, vertical integration appears to be a necessity.

Transport chain integration by shipping lines is not a new idea. As far back as 1966, the then president of the Swedish Shipowners Association said that the time had come when the business of shipowners could no longer stop short at maritime transport, but should also encompass inland transport. If shipowners wished to confine themselves to maritime transport, they would slowly realise that they had become mere cogs in a giant transport machine. They should begin to see themselves as transport companies, not as purely maritime carriers and should forge close relationships with the other links in the transport chain.[1]

However, outside of this long-term vision, vertical integration processes only really began to establish themselves from the 1980s when transport chain integration could be considered, even then, to be the great idea of the decade. This period saw mergers and acquisitions between groups involved in different stages of the transport chain. The American Sea-Land line was bought out in 1986 by the US rail company CSX after the collapse of McLean's Reynolds group. CSX along with APC, then owner of the APL shipping line, were among the biggest rail operators in the United States. The P&O group had a land arm, POETS, which provided pre- and post-shipment container haulage and routes over the English Channel as well as warehousing and distribution. The Dutch shipping line, Nedlloyd, developed the « Nedlloyd Flowmasters » concept at this time in order to show that it handled freight and information flows equally well[2]. Conversely, forwarding agents and road hauliers became shipowners. The most well known of these at the time was the Swedish company, Bilspedition, which acquired control of Cool Carriers, the world's largest reefer shipping line, in 1988; it acquired the leading Swedish line company, Transatlantic, the same year and, in 1989, went on to buy out Gorthon Lines, the main exporter of Swedish forestry products by sea; finally, it took over Atlantic Container Line, one of the main consortia in the North Atlantic, by acquiring the stakes of CGM, Wallenius and Cunard.

Did these mergers finally deliver cohesive groups? At the end of the 1980s, it would be more accurate to say that there was diversification of the major maritime groups, with the underlying objective of potential integration of the transport chain (Gugenheim 1990). What was the position 15

years on? Some of the examples misfired. Bilspedition's venture into maritime transport ended in 1994, only five years after its acquisition of ACL. The US rail group, CSX, parted with Sea-Land in 1999, when it tired of the very poor financial results of its maritime subsidiary. In 2004, Hapag-Lloyd totally withdrew from all logistics activities to focus solely on maritime containerised transport. It seems that integration does not always bring success.

3.2.2. In 2007, vertical integration still just as limited

In 2007, shipping lines, or the maritime groups they are part of, that have developed real logistics subsidiaries -- i.e. subsidiaries that claim to be capable of providing freight forwarding, land haulage, or logistics services -- are few. Of the top 12 shipping lines in 2007, all, with the exception of Hapag-Lloyd proclaim loudly and clearly that they are logistics providers. However, an analysis of their annual reports shows that only three of them have a logistics subsidiary of any size, taking turnover as a measure of size: AP Mőller, NYK Line and APL/NOL. The turnover of Maersk Logistics has increased substantially following the acquisition of the maritime activities of P&ONedlloyd in the summer of 2005. Based on the information available from their annual reports, compared with the overall turnover of the groups to which they belong or even with the turnover generated by shipping line activities, the turnover of these logistics subsidiaries clearly accounts for a really significant share in only two companies: the Japanese group, NYK and to a lesser extent the AP Möller group. Otherwise, logistics is a secondary activity.

In contrast, in 2007 just as in the 1980s, the vertical integration strategies followed by shipping lines have been confined mainly to handling operations (Slack *et al.*, 2005) and, in North America, to the operation of rail bridges made possible by the US Shipping Act of 1984.

Table 5. **Subsidiaries involved in port handling, intermodal transport and logistics activities of shipping lines in 2007**

Group	Shipping line	Port handling	Intermodal	Logistics
AP Möller Group	Maersk	APM Terminals	ERS	Maersk Logistics
CMA-CGM Group	CMA-CGM		RSC Progeco LTI France CMA Rail	CMA-CGM Logistics TCX Multimodal Logistics
China Shipping Container Lines	CSCL	China Shipping Terminal		China Shipping Logistics
Neptune Orient Lines	APL	APL Terminals		APL Logistics
NYK Group	NYK	Terminal & Harbour services		NYK Logistics
Mitsui OSK Lines	MOL			Logistics
Hanjin	Hanjin shipping			Hanjin Logistics
Orient Overseas International	OOCL	Terminal operations		OOCL Logistics

Source: Annual Reports of shipping lines.

Table 6. **Logistics activities of the top 12 shipping lines in 2007**

Shipping line	Parent company	Logistics subsidiary	Share of maritime line and logistics in total activity % *	Share of logistics in total activity % *	Share of logistics in container activity % *
Maersk-Sealand	AP Moller	Yes	52,0	5,8	11,2
MSC		No	100	?	?
CMA-CGM		Yes	100	2,7	2,7
Evergreen		No	98,5	0?	0?
Hapag Lloyd		No	100	0	0
Cosco		Yes	?	?	?
APL	NOL	Yes	100	15,1	15,1
China Shipping		Yes	?	?	?
NYK Line		Yes	48,2	21,0	40,8
Hanjin		Yes	81,5	?	?
MOL		Yes	39,6	3,2	8,0
OOCL		Yes	98,2	?	?

*: in % of turnover.
? no data.

Source: Annual Reports 2007.

3.2.3. Comparison of the logistics business of shipping lines and freight forwarders/logistics providers

Two main types of organisation can be identified. In the first of these, the shipping line is a subsidiary of a larger consortium-type group which, in addition to its shipping line subsidiary, may or may not have a logistics subsidiary, but also has a handling subsidiary. In this case, the link between the maritime subsidiary, the handling subsidiary and the logistics subsidiary is not necessarily direct. The three subsidiaries may conduct their business independently of each other and work for different clients. They operate as profit centres. The AP Möller and NOL groups are typical examples of this type of organisation and, to a lesser extent, so is CMA-CGM with its intermodal and logistics subsidiaries. The turnover of these subsidiaries can be identified clearly from company annual reports. Conversely, in the second type of organisation, it is impossible to identify the activities of logistics subsidiaries from the annual reports, which suggests a low level of activity and/or close or virtually exclusive relationship(s) with the maritime parent company. Handling is not set up as a subsidiary: it is therefore considered not as a profit centre but as a cost item in the integrated management of maritime lines.

A comparison of the turnover for the logistics activities of maritime groups and the world's largest freight forwarders/logistics operators also shows the limits of vertical integration. The logistics subsidiaries of maritime groups are dwarfed by the world's largest logistics operators (Tables 7 and 8). Their overall turnover is very substantially lower than the overall turnover of logistics operators. If we

take into account only the maritime business of the latter, where that information is provided, they remain substantially dominant. Only NYK Logistics and probably Maersk Logistics attain a level of business comparable to that of groups like Shenker or Panalpina. The predominance of freight forwarders /logistics operators can be seen, too, in terms of agency presence worldwide: the networks of freight forwarding/logistics companies are much thicker on the ground than networks of the logistics subsidiaries of shipping lines.

Lastly, the scope of activity covered by the logistics subsidiaries of maritime groups is not clear. The annual reports of freight forwarding/logistics companies draw a distinction between straightforward transport operations, differentiating between maritime and air, and inland transport (intermodal) and logistics, i.e. supply chain management on behalf of a shipper. This is a distinction that is not made by the maritime groups. One therefore has to ask what the term "logistics" means to maritime groups.

Table 7. **Turnover by main segment of activity (in USD billion), number of agencies and number of TEU carried (in millions) by shipping lines in 2007**

Group	Total	Maritime shipping lines	Terminals	Logistics	Agencies	TEU Million
AP Möller	51.2	21.1	2.5	3	200	13.6
NYK	20.7	5.2	1.1	4.3	291	?
CMA-CGM	11.8	11.5	?	0.3	650	7.7
NOL/APL	8.6	6.7	0.6	1.3	95	4.7
MOL	8.5	?	?	?	120	?
Hanjine	6.5	?	?	?	200	3.6
OOCL	5.6	?	?	?	100	4.6

Source: Annual Reports 2007.

Table 8. **Turnover by main segment of activity (in USD billion), number of agencies and number of TEU controlled by the largest freight forwarders in 2007**

	Total	Freight forwarding		Intermodal	Logistics	Agencies	TEU Million
		Air	Maritime				
DHL Logistics*	38.3	8.4	5.4	5.3	19.2	> 2000	2.8
Kuehne&Nagel	19.1	4.5	7.6	2.8	4.1	> 750	2.6
Shenker**	20.5	9.8		8.4	2.3	> 1500	1.4
Panalpina	7.6	3.7	2.8	0.0	1.2	> 500	1.2

*: DHL Logistics is a subsidiary of the Deutsche Post group.
**: Schenker is a subsidiary of the Deutsche Bahn group.

Source: Annual Reports 2007

4. THREE TYPES OF LOGISTICS

4.1. The findings of a survey

Between 2001 and 2004, we conducted a series of interviews in Europe and East Asia with shipping lines asking them systematically to provide a definition of their activity and a description of the changes in their relations with forwarding agents. These surveys are not exhaustive, but they do provide some clear indications. The table below shows systematically the content of the answers for each shipping line with which we met. It shows the extent to which, despite the widespread but unsupported idea that containerisation is driving an ongoing revolution that is giving birth to a single, all-encompassing entity known as "logistics", each actor's respective activities remain very clearly identified and separate and their content is only changing slowly.

Table 9. **Inland carriage, relations with clients and definition of logistics: some viewpoints of shipping lines**

	Your management of pre- and post-shipment carriage	Your relations with shipper and/or forwarder clients	What is logistics?
MSC Antwerp 2004	Take advantage of competition between road carriers. Dedicated block trains in a contract with BCargo.	Forwarding agents are the main clients. Direct contact with large shippers.	Provision of door-to-door service on the basis of client demand.
Hanjin Le Havre 2001	Development of inland transport by the shipping line. Limitation of inland transport by forwarding agents. Special relations with ten local road carriers.	Partnership with forwarding agents. No transit unit and no customs operations except at the explicit request of clients.	Optimum management of container fleet.
MOL Le Havre 2001	60% of land transport controlled by shipping line, compared with an average of 40% for the port of Le Havre. Try to develop transport under the control of the shipping line, including when the client is a forwarding agent.	60% of clients are forwarding agents and 40% are direct clients, most often large shippers (Danone, Carrefour). Need to have some clients who are large forwarding agents (Shenker), who provide regular volumes. Do not encroach on the territory of forwarding agents.	Optimised management of container fleet through the European Logistic Center of Rotterdam. Which implies, if possible, control of inland transport through carrier haulage.

P&O Nedlloyd Le Havre 2001	Subcontracting with large road haulage companies that have a network of agencies throughout France.	90% of containers handled are FCLs, mainly with forwarding agents. LCL activity is marginal. This is handled by P&ONedlloyd GLD (Global Logistic Distribution)	Optimum management of container fleet. Manage imbalances in shipping flows.
Maersk Le Havre and Marseilles 2001	Has subsidiary Macadam for road transport but outsourcing predominates.	Maersk Logistic is a separate entity from Maersk Sealand. Consolidation (LCL) is carried out by forwarding agents, who are very large clients of Maersk.	Optimum management of container fleet.
CMA-CGM Marseilles 2001	Outsourcing for road haulage. "It is not the same business".	Shippers do not want to have to deal with shipping lines that have a monopoly position because they would also be freight forwarders.	Before integrating logistics, a need to control port terminals. To integrate logistics, the simplest method is to purchase a freight forwarder.
Hanjin and Hyundai Seoul 2002	Weakness of door-to-door service in South Korea. 10% at most.	In South Korea, the need to use a customs declarant for customs operations.	The maritime line's key activity is port-to-port service.
P&O Nedlloyd Singapore 2001	Outsourcing of feedering since competition is strong. Maximise relations between feeders and mother vessels. Importance of PSA for the success of this process.	Strong position of forwarding agents on the European market.	On transpacific, need to develop logistics to meet shippers' demand. P&O's investment in logistics is recent and still generates little income.
Evergreen Singapore 2001	Same as for P&O.	Direct relations with both forwarding agents and shippers.	Evergreen confines itself to the role of maritime carrier. Logistics is not our business.
NOL Singapore 2001	Same as for P&O. When NOL took over APL, this did not include the US rail subsidiary Stacktrain.	Forwarding agents are more efficient for LCL than shipping lines.	APL Logistics is based in Oakland and organises logistics for large shippers.

MOL Singapore 2001	Same as for P&O.	As a maritime line, MOL cannot compete with the biggest forwarding agents. Ability of forwarding agents to provide volumes to fill vessels.	MOL has invested in logistics for 17 years but this activity remains limited and adapts to client demand. In Singapore, logistics provided for two clients in the field of chemicals. "The key is to remain focused on the core business, which is that of carrier".
CMA-CGM Hong Kong 2001	Dedicated barge service on the Yangtze.	Chinese market: capture freight more rapidly than competitors by opening commercial agencies in continental China.	Chinese market: priority is to capture freight, and then to optimise flows for clients and inside the company.

Source: surveys.

4.2. "Container logistics" and "vessel logistics"

For shipping lines, the logistics that count are "container logistics". This consists of optimising the management of the container fleet. This fleet represents, along with vessels, a substantial amount of fixed capital. For a container vessel to operate effectively requires two to three times more containers than the vessel's capacity, with one set of containers on the vessel at any given time and two others on shore. The cost of this large investment can be kept proportionately lower through better management of turnaround times and the time that containers are immobilised on land.

To optimise the repositioning of containers on trade routes that are by nature unbalanced, shipping lines must not lose control of container flows, including on inland segments, which explains the development of the practice of inland haulage of containers by shipping lines (carrier haulage). This allows shipping lines to triangulate[3] and consolidate pre- and post-shipment carriage using more advantageous transport modes while adapting commercial objectives to logistic constraints (Gouvernal 2002). We observe in our survey that when the pre- and post-shipment carriage is carried out mainly by sea via feeder vessels as in Singapore, the approach of shipping lines remains identical, i.e. to optimise co-ordination between mother and feeder vessels to ensure the turnaround of containers and more fully loaded vessels. These techniques of triangulation and co-ordination are easier to implement when they are based on major maritime networks and large volumes that multiply the possibilities of repositioning (Gouvernal 1998).

On the other hand, inland haulage of containers by freight forwarders (merchant haulage) does not allow the shipping line to have full control of information on its containers, which considerably hampers the turnaround of containers. At the same time, however, it is not willing to impose financial penalties on a client that keeps its containers too long out of fear of losing its business.

The development of intermodality and door-to-door transport under the responsibility of shipping lines is taking place to the detriment of the activity of forwarding agents, who are in fact losing some their organisational power over the entire transport process. However, what interests shipping lines is not so much to challenge forwarding agents as to optimise their container flows before and after sea carriage on their vessels. What is more, the situations differ from one market to another, most often for historical reasons. Carrier haulage, for which it is very difficult to obtain figures, predominates in

North America because of the importance of dedicated rail freight services, and in the United Kingdom, where the shift in port activity from the west to the east coast has led to the disappearance of the network of UK forwarding agents. Elsewhere, in Europe and in Asia, where forwarding agents and shippers continue to play the dominant role in organising surface transport (Heaver 2002), the share of inland transport directly controlled by shipping lines can reasonably be estimated at approximately 30% (Notteboom 2004b). But this average conceals deep-seated differences between shipping lines. In Le Havre, the representative of MOL stated that his company has a rate of 60% and wondered how some competitors, such as CMA-CGM, manage to survive with low rates. This depends on the differing extent of involvement of companies in a given market and, with regard to CMA-CGM, on some very recent successes, which are still limited mainly to the strictly maritime component.

The involvement of shipping lines in the inland component of transport in no way means that they are buying up inland transport companies. It is limited more simply to more or less long-term outsourcing contracts with companies specialised in road, rail or waterway modes or feedering companies, for shipping lines take full advantage of the competition existing between many operators. When shipping lines announce that a dedicated rail or waterway service has been opened, it is most often for commercial reasons, but their actual involvement in terms of capital in these services is marginal. E. Gouvernal (2003) shows that this is true with CMA-CGM's rail subsidiary Rail Link: "Like many other rail services, RL's service provision stems from co-operation between the various existing actors. There is no new competitor in these services, nor any specific investment by a leader, but a strategy for integrating the service" by strengthening co-operation between the actors involved in different activities and who continue to focus on their core business. The Metrans and Polzug rail services (Dubreuil 2002) from Hamburg and the services of the European Rail Shuttle (ERS) established jointly since 1994 by Maersk-Sealand and P&ONedlloyd mainly from Rotterdam have this same organisational rationale even though in the case of ERS, Maersk has now entered into a phase of investment in traction.

Similarly, the extensive integration of the activities of shipping agents by shipping lines and the less widespread integration of stevedoring activities can also be interpreted as the desire of these shipping lines to gain better control of container logistics. By controlling the activities of shipping agents, shipping lines have more information on the origin and destination of containers, which enables them to have better control of seamless transport services and to set up an information system covering their entire network and thereby, once again, to optimise container flows. In the case of a dedicated terminal, the rationale is identical. No aspect of freight logistics take precedence over the terminal, except at the margin, for dockside space is too limited and scarce to develop consolidation/deconsolidation operations there. On the other hand, the objective of a terminal, whether it is multi-client and run by a stevedoring specialist or is dedicated and run directly by a shipping line, is to minimise the negative effects of breaking bulk, which is to be "streamlined" as much as possible so that container flows to or from the vessel and the various inland transport modes will take place virtually seamlessly. The key priority is to ensure that nothing disrupts the turnaround of container vessels, which have very high operating costs, or that of large-volume inland carriers (trains and barges), although this is less important (Heaver 2005). The process again involves this same optimising of container turnaround that we call "container logistics".

Container logistics is very closely linked to the efficient operation of vessels, which also corresponds to a specific and widely studied type of logistics, i.e. vessel logistics, which consists of optimising the cash flow generated by a vessel while minimising the costs of operating it. Shipping lines remain shipping lines. They fit out and operate vessels. Container logistics is quite closely related to vessel logistics. Once a container ship reaches port, it becomes a puzzle that is broken up into as

many boxes as it contains. The efficient operation of a container vessel, i.e. which enables it to sail with a high load factor and at least cover its fixed costs, begins on shore by bringing together as quickly as possible the pieces needed to put together again this never-ending puzzle. Container logistics, even if it broadens the activity of shipping lines to include inland components, is primarily based on a rationale of supporting maritime shipping.

4.3. Are shipping lines interested in freight logistics?

4.3.1. The logistics of freight forwarders

There is, consequently, beyond "container logistics", "freight logistics", which consists of controlling flows of freight and even transforming it in a process guided by various needs, ranging from those of producers to those of intermediate and final consumers. If we base our assessment on the Internet sites of shipping lines and forwarding agents and advertising in the maritime press, this activity would now appear to be widespread, to have reached maturity and to be made available to shipper clients by all carriers and logisticians. Here again, we must take this with a certain degree of caution both with regard to shipping lines and freight forwarders.

Let us begin with freight forwarders, since this is normally their business. Those with whom we met (SDV in Le Havre, Singapore and Hong Kong; Shenker in Singapore; Rhenus Alpina and Kuehne & Nagel in Antwerp) all focused on the minor extent of the changes that have taken place in the content of their business. The business of forwarding agents can be defined simply. Both now and in the past, they make their money mainly by carrying out consolidation/deconsolidation operations on freight. Forwarding agents make a profit by reconsolidating consignments in a single container for various shippers and consignees and by charging a commission on maritime freight. They are specialists in LCL containers (Less than Container Load). The other traditional strong point of forwarding agents resides in their ability to manage all customs operations. This "primary" activity of forwarding agents can be seen to be clearly identified in the annual reports of the groups in Table 3. For example, it accounts for over 50% of the turnover of Kühne and Nagel and nearly one-third of the activity of Panalpina. These groups perform the same type of activity for air freight.

Should we use the term "logistics" to describe a simple and longstanding activity the content of which has ultimately not changed much over time? According to one of the people we spoke with, a number of planning engineers have formalised concepts of the 1970s-1980s and "given a number of technical sounding words such as packaging or re-packaging to ordinary operations. But we have been handling freight from here and elsewhere for a long time. For many years, we have been adding value to freight at certain points on its itinerary. What does labelling lipstick destined for the United States entail? A handling worker who is paid the minimum wage takes the lipsticks out of cartons, puts them on a conveyor belt which goes through a machine that prints information on the lipsticks, and at the other end another worker puts the lipsticks back into the carton. That's all there is to it."[4]

According to everyone that we interviewed, the importance of supply chain logistics, in which forwarding agents are positioned before and after the production process and manage flows of goods on the basis of the parameters provided by their shipper clients, must not be overestimated in the activity of forwarding agents. In fact, logistics only accounts for a minor percentage of the turnover of groups that have historically focused on maritime forwarding. Should this also include these groups' inland transport activities, which can be interpreted either as being part of seamless logistic services or more simply as a mere transport service provided? These inland transport operations generate significant turnover.

Table 10. **Share of the various activity sectors in the turnover of freight forwarders/logistics operators in 2007. As a %.**

		Freight forwarding			
	Total	**Air**	**Maritime**	**Intermodal**	**Logistics**
DHL Logistics	100.0	21.9	14.1	13.8	50.1
Kuehne&Nagel	100.0	23.6	39.8	14.7	21.5
Shenker	100.0	47.8	0.0	41.0	11.2
Panalpina	100.0	48.7	36.8	0.0	15.8

Source: 2007 Annual Reports.

Today as in the past, the services provided by forwarding agents are based on an in-depth knowledge of the market through networks of agencies whose staff is their main resource. Capital investment is very low, being limited to a few warehouses for consolidation/deconsolidation operations. The real change in the business is due to the emergence of a limited number of global operators who are able to offer their clients worldwide services through a global network of agencies. Information and communication technologies have made it possible to achieve productivity gains and establish these global networks, but it is by no means certain that the content of the business of forwarding agents has radically changed.

4.3.2. Logistics and shipping lines: a myth?

Since freight forwarders admit that they do not do much logistics, what about shipping lines, for whom this is not their core business? In the annual reports provided by shipping lines, the turnover generated by the logistics subsidiary is considered as a whole, without the possibility of distinguishing between consolidation/deconsolidation activity, inland transport services or logistics contracts. In fact, the situation seems fairly simple. Line shipping operators develop direct contacts with large shippers (of automobiles, consumer goods or agri-food) who provide them with regular and large volumes of FCL containers. This privileged relationship between a shipping line and one or more large shippers can account for up to half of the activity of a shipping agency in a given port. For shipping lines, this has many advantages, i.e. the guaranteed and regular filling up of vessels over a long period since the contracts are generally for one year; identical origins and destinations of containers over time, which make it possible to ensure the continuity of maritime service; the establishment of large volume inland transport for pre- and post-shipment carriage, such as block trains and barges; and, lastly, full control of the container fleet. In Antwerp, for example, MSC works for the German car manufacturer BMW which generates sufficiently large flows to justify its own block train to Wackersdorf, Bavaria[5]. This has been the location since 1990 of a BMW logistics centre for the redistribution of parts both inside Germany and from and to foreign countries.

Does this mean that we should speak of logistics in this case? The shipping line does deal with the freight directly, which is entirely the responsibility of the shipper. The container remains sealed. The shipping line makes money by providing a maritime transport service that it controls and that it extends to the inland segment essentially through outsourcing agreements with land-based partners. This service meets logistic needs dictated by the shipper, who requests, for example, that containers be delivered to its warehouses on a specific day because it has scheduled this flow as part of a production and/or distribution process. But the activity of shipping lines remains strictly confined to transport and

does not extend to freight logistics. A large share of FCL containers transported by shipping lines in fact contribute to container logistics from which these lines derive major benefits because they remain essentially maritime-oriented.

Besides this direct relationship with shippers, the main clients of shipping lines continue to be forwarding agents, since shipping lines are not interested in LCL containers since this is not their business. They prefer to leave this task to forwarding agents, with whom they do not wish to compete directly for fear of losing business, which would immediately lead to lower load factors for their vessels. When they develop these activities, they do so through subsidiaries entirely dedicated to this segment of the transport chain. In the opinion of a representative of CMA-CGM, the simplest solution for developing logistics activity is to buy a company specialised in this field, which clearly illustrates the lack of direct relations between the business of shipping lines and that of forwarding agents. When they exist, these logistics subsidiaries do not necessarily maintain privileged relations with the maritime branch of the group. For commercial reasons, the Bolloré group has clearly separated the entities SDV and Delmas since SDV is developing its transit activities worldwide while Delmas is specialising in the regular North-South line to and from Africa. The fact that these two activities are independent was clearly shown by the sale of Delmas by the Bolloré group to CMA-CGM in June 2005, which provides yet another example of vertical disintegration. Inside the AP Möller and APL/NOL groups, the logistics subsidiaries, Maersk Logistics and APL Logistics, choose as maritime carriers either the group's maritime subsidiary or another carrier depending on the market and the client, even though there is in fact a natural tie between the maritime carrier and the freight forwarder of the same group. For example, for Maersk Logistics, its objective, according to its Website, is to provide integrated logistic solutions for its most important clients. But shippers should at no time feel that they only have a single partner, who controls the entire chain and is able to impose its transport and logistics solutions and above all its prices (Heaver, 2002b).

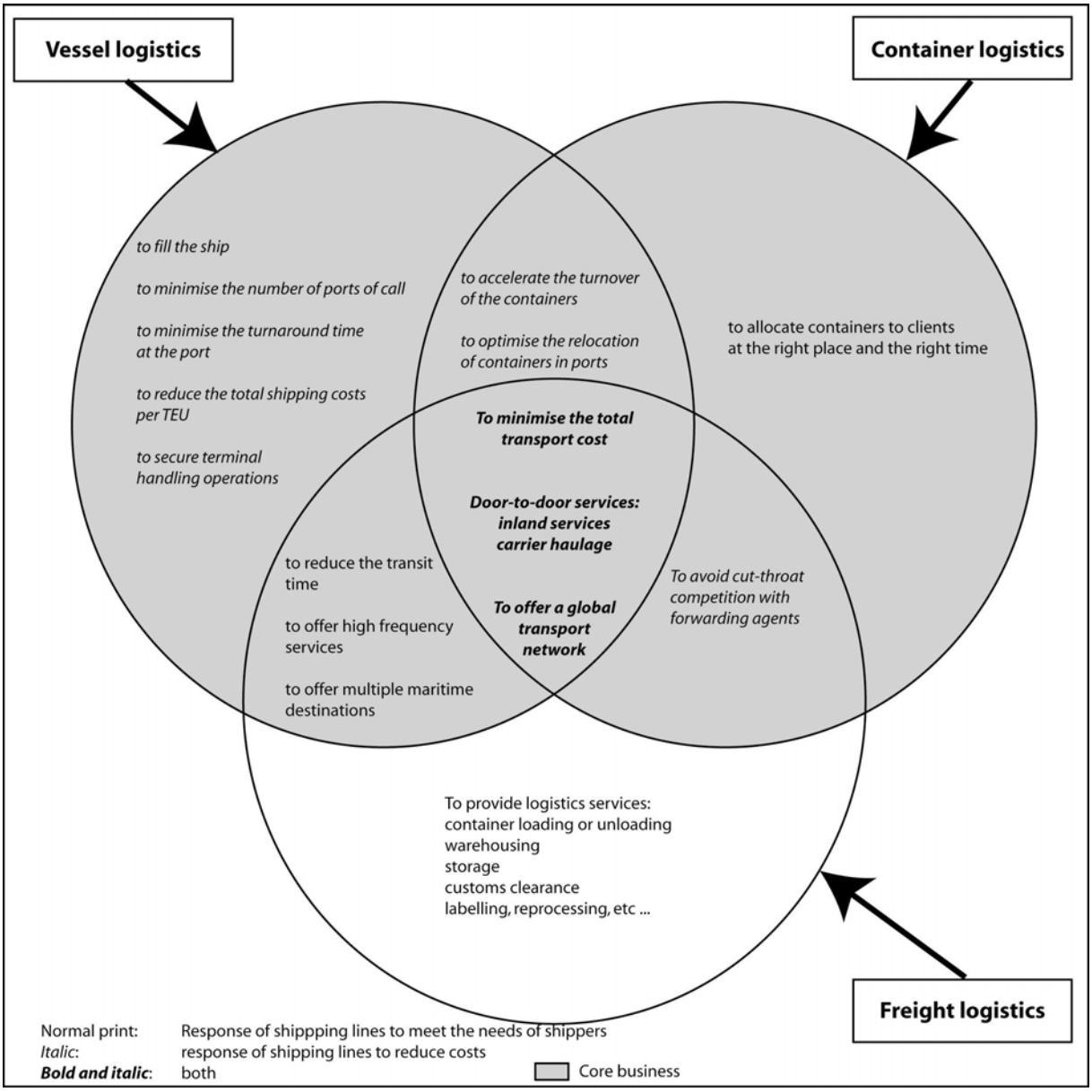
The maritime groups that really develop a logistics activity in addition to their liner shipping operations remain very limited in number, i.e. APL/NOL, NYK and Maersk. These shipping lines, which might be described as consolidators, nevertheless continue to be careful to maintain good relations with forwarding agents, for they cannot do without the volumes of business that they provide. For the other shipping lines, logistics remains an activity that is limited and at the very least uncertain. It has more to do with publicity slogans that with reality.

4.4. Striking a balance between the three types of logistics

4.4.1. Vessel logistics and container logistics predominate

The ongoing integration of the transport chain is a fact that has profoundly altered the activities of the various transport actors. However, the magnitude of the upheavals should not conceal the fact that the process of integration of the chain is far from being complete, as is proved by the distinction made for liner shipping operators between "vessel logistics", "container logistics" and "freight logistics".

Figure 4: The balance between three types of logistics



For liner shipping operators, the objective is to strike the right balance between these three types of logistics in order to generate maximum revenues while meeting the needs of their shipper and forwarder clients. In fact, as Figure 3 shows, the activity of shipping lines is marked by contradictions between the effort to respond to the needs of its clients and the overriding need to remain competitive with its competitors by reducing its costs. Ultimately, shipping lines have very few means of action that enable them to go in both directions simultaneously (to reduce the total transport cost, to provide a global network and door-to-door services). Otherwise, they choose between expanding the range of services provided to their clients, which generates revenues but also additional costs, and optimising their activity, which often means responding less effectively to the client's expectations.

Between container logistics and freight logistics, liner shipping operators are initially focusing their efforts on the former, for it provides them with the greatest operational advantage for managing their maritime lines. This "container logistics" is prompting them to invest significantly in the inland segment of transport, which does not necessarily mean that they are really and deeply involved in "freight logistics". Consequently, the real intensity of vertical integration needs to be strongly qualified. This conclusion highlights the continuing relevance of the core business of shipping lines, i.e. vessel logistics, even though the organisation of their networks of maritime lines can only be understood by taking into account their integration into larger transport chains that include inland segments.

4.4.2. Control of inland transport chains to support the core business

It is clear that carrier haulage of FCL containers by liner shipping operators is perfectly consistent with this desire to control vessel and container logistics. It enables them to remain focused on their core business, which is maritime transport. The inland transport segments support the activity of maritime lines. In the case of carrier haulage of these FCL containers, shipping lines are able to provide a more efficient and less expensive door-to-door transport solution than what shipper clients could provide using their own resources or relying freight forwarders. Why is this so? It is because the management of inland pre- and post-shipment carriage in fact also contributes to vessel logistics, i.e. the efficient operation of maritime lines. It makes it possible to compress door-to-door transport costs while providing an additional service to shipper clients. The same holds true for port stevedoring, since it contributes to vessel logistics, which explains the ever growing integration of this function by shipping lines, with the sole difference that it does not provide an additional service to shipper clients.

To manage these inland transport chains (road, combined rail/road or waterway/road transport), shipping lines cannot, to use the terms of the theory of transaction costs, simply rely on the market to provide inland transport services when needed or ensure outsourcing, for these chains are sustained over a long period of time and require relations of trust if they are to be reliable. Similarly, to internalise the chain completely (a top-down process) requires considerable financial resources and large volumes of freight to justify establishing inland transport companies. Only the group AP Möller has adopted this approach with, for example, its rail subsidiary European Rail Shuttle, even though it does not work exclusively for Maersk Line. This is why liner shipping operators prefer hybrid forms of organisation, in which they play the role of an orchestra conductor. They co-ordinate the contributions of the inland partners of the transport chain – road, rail and/or waterway carriers – particularly in setting up combined transport chains. In this way, liner shipping operators do not replace the other land transport actors, who also remain focused on their core business. However, the latter's activities are co-ordinated upstream by liner shipping operators, and this helps improve the performance of the entire transport chain. The example of CMA-CGM with its intermodal subsidiaries is a good illustration of this approach.

However, this co-ordination of the entire inland transport chain by shipping lines who set up these types of organisation is conducted with a very specific objective, i.e. to contribute to the efficient operation of shipping lines by extending their freight transport services to the hinterland and by optimising the management of the container fleet, while at the same time providing an additional service to their biggest shipper clients. Consequently, this integration of the transport chain by shipping lines is aimed at strengthening their core business, i.e. liner shipping.

5. CONCLUSION

Without questioning the reality of the upheavals in the organisation of transport chains caused by containerisation over the past fifty years, we argue that there is a discrepancy between the assertions of professionals and academics and the actual facts observed regarding the vertical integration of containerised transport by liner shipping operators, which have historically played a key role in all the innovations linked to containerisation. This is no doubt explained by an overworked use of the term "logistics", without any real definition of what it means.

Despite the wide number of possibilities provided by containers, which can range from basic port-to-port service to externalised management of their freight flows by shipper clients, the core business of shipping lines remains the essential factor for understanding the greater or lesser extent of their involvement in the transport chain. The prime concern of shipping lines is to fill their vessels, which must, at the very least, generate sufficient revenues to cover their cost. Everything else is secondary or aimed at meeting this concern.

It is clear, from this perspective, that shipping lines emphasise two types of logistics, i.e. vessel logistics and container logistics. The former leads them to become involved in ports by making major investments in sea terminals. The latter explains why they are becoming involved in inland transport by setting up road, rail and waterway services. The latter services do meet a real demand on the part of clients, or else they would serve no purpose. However, the underlying rationale behind these services remains primarily related to liner shipping, for they are aimed at capturing freight in the hinterland, managing flows of containers and bringing them to ports at the lowest cost in order to fill vessels. Nevertheless, this involvement in inland transport most frequently remains confined to an organising role. It consists of co-ordinating the various links in the transport chain to achieve reliable and competitive door-to-door service, particularly when combined rail/road and waterway/road modes are involved. However, it is much less frequent for shipping lines to become directly involved as inland transport operators. For this, they rely on specialists that provide these services as their core business.

In terms of the core business of shipping lines, freight logistics has little to contribute, except for forcing shipping lines to become involved in a new activity that already has its own specialised operators. However, shipping lines do not have enough financial capacity to invest everywhere, which explains they have chosen to focus on vessel and container logistics that support their core activity to enable them to remain competitive with their competitors. For shipping lines, this balance can be expected to continue in coming years.

On the other hand, one could no doubt imagine vertical integration in the opposite direction, from land to the sea. Certain major logistics groups control very large volumes worldwide and have considerable financial capacity. In response to a shipping line market that is becoming increasingly concentrated, controlling the maritime segment might prove to be a judicious means of optimising services to shipper clients. However, this is a move that would have to be approved by shippers, who rarely like to depend on a single provider for their logistic services.

All this to say, simply, that the assertions of professionals and academics are ahead of the reality observed on the ground, although, with regard to containerisation, these assertions, because of the compelling prospects that they open up, will gradually shape the reality to come.

NOTES

1. *Journal de la Marine marchande*, 30 juin 1966, p. 1468.

2. « Nedlloyd: transport total », *Journal de la Marine Marchande*, 5 October 1989, p. 2406.

3. Instead of taking an import container directly to the port, to try to reuse it directly for export from its import delivery point.

4. Transcription of an interview with a representative of SDV France in Paris in 2001.

5. *Containerisation international* (2004), "MSC blocktrain from Antwerp begins", June, p. 31.

BIBLIOGRAPHY

BROOKS, M.R. (2000), *Sea Change in Liner Shipping*, Pergamon, Oxford.

CARBONE, V. and M. De MARTINO (2003), "The Changing Role of Ports in Supply-chain Management: An Empirical Analysis", *Maritime Policy and Management*, n° 4 (30), pp. 305-320.

DUBREUIL, D. (2002), *Transport intermodal portuaire: le cas de Hambourg*, Paris, INRETS, 130 p. (Report n° 247).

EVANGELISTA, P. (2005), "Innovating Ocean Transport Through Logistics and ICT", in H. Leggate, J. McConville and A. Morvillo (eds.), *International Maritime Transport Perspectives*, Routledge, London and New York, pp. 191-220.

FRANKEL, E. G. (2002), "The Economics of International Trade Logistics and Shipping Transactions", in Costas Th. Grammenos, *The Handbook of Maritime Economics and Business*, LLP Professional Publishing, London, Hong Kong, pp. 877- 898.

FRÉMONT, A. (2007), "Global Maritime Networks: The Case of Maersk", *Journal of Transport Geography*, vol. 15, n° 6, pp. 431-442.

FRÉMONT, A., (2007), *Le monde en boîtes. Conteneurisation et mondialisation*, INRETS, Synthèse n° 53, 145p.

GOUVERNAL, E. and J-P. HUCHET (1998), "La logistique des conteneurs. Le principal enjeu de l'industrie maritime de ligne régulière", in G. Fassio, *La logistique, maîtrise du temps et de l'espace?,* IUT de Saint-Nazaire, Université de Nantes, pp. 77-87.

GOUVERNAL, E. (2002), "Evolution de la ligne régulière et rôle des ports", *Transports,* n° 411, pp. 15-29.

GOUVERNAL, E. (2003), "Les lignes maritimes et le transport terrestre: quels enseignements peut-on tirer du cas 'Rail Link'?", *Les Cahiers Scientifiques du Transport*, n° 44, pp. 95-114.

GUGENHEIM, J.-M., O. HARTMANN and P. SELOSSE (1990) *Stratégie terrestre des opérateurs maritimes*, Ministère de l'Equipement, du Logement, des Transports et de la Mer, Observatoire Economique et Statistique des Transports, Paris, 93 p.

HARALAMBIDES, E. H., M. BENACCHIO and P. CARIOU (2002), "Costs, Benefits and Pricing of Dedicated Container Terminals", *International Journal of Maritime Economics*, n° 4 (1), pp. 21-34.

HAYUTH, Y. (1992), "Multimodal Freight Transport", in B. Hoyle and R. Knowles, *Modern Transport Geography*, Belhaven, London, pp. 200-214.

HEAVER, T. D., H. MEERSMAN and E. VAN de VOORDE (2001), "Co-operation and Competition in International Container Transport: Strategies for Ports", *Maritime Policy and Management*, n° 28 (3), pp. 293-305.

HEAVER, T. D. (2002a), "The Evolving Roles of Shipping Lines in International Logistics", *International Journal of Maritime Economics*, n° 4, pp. 210-230.

HEAVER T. D. (2002b), "Supply Chain and Logistics Management", in C. Th. Grammenos (Ed.), *The Handbook of Maritime Economics and Business*, LLP Professional Publishing, London, Hong Kong, pp. 375-396.

HEAVER, T. D. (2005), "Responding to Shippers' Supply Chain Requirements", in H. Leggate, J. McConville, and A. Morvillo (eds.), *International Maritime Transport Perspectives*, Routledge, London and New York, pp. 202-214.

HEAVER, T. D. (2006), "The Evolution and Challenges of Port Economics", in K. Cullinane and W. K. Talley (eds.), *Port Economics, Research in Transportation Economics*, vol.16, pp. 11-42.

KUIPERS, B. (2005), "The End of the Box?", in H. Leggate, J. McConville, and A. Morvillo (eds.), *International Maritime Transport Perspectives*, Routledge, London and New York, pp. 215-229.

LIM, S-M. (1998), "Economies of Scale in Container Shipping", *Maritime Policy and Management*, n° 25, pp. 361-373.

MOATI, Ph. (2008), *L'économie des bouquets*, ed. De l'Aube, La Tour d'Aigues, 156 p.

MUSSO, E., C. FERRARI and M. BENACCHIO (1999), "On the Global Optimum Size of Port Terminals", *International Journal of Transport Economics*, n° 26 (3), pp. 415-437.

NOTTEBOOM, T. (2002), "The Interdependence between Liner Shipping Networks and Intermodal Networks", paper presented at the *International Association of Maritime Economists*, Panama 2002, 34 p.

NOTTEBOOM, T. (2004a), "A Carrier's Perspective on Container Network Configuration at Sea and on Land", *Journal of International Logistics and Trade*, n° 1 (2), pp. 65-87.

NOTTEBOOM, T. (2004b), "Container Shipping and Ports: An Overview", *Review of Network Economics*, n° 3 (2), pp. 86-106.

NOTTEBOOM, Th. and J-P. RODRIGUE (2008), "Containerisation, Box Logistics and Global Supply Chains: The Integration of Ports and Liner Shipping Networks", *Maritime Economics & Logistics*, Vol.10, n° 1/2, 152-174.

PANAYIDES, P. M. (2002), "Economic Organization of Intermodal Transport", *Transport Reviews*, n° 22 (4), pp. 401-414.

PANAYIDES, P. M. and K. CULLINANE (2002), "Competitive Advantage in Liner Shipping: A Review and Research Agenda", *International Journal of Maritime Economics*, n° 4, pp. 189-209.

ROBINSON, R. (2002), "Ports as Elements in Value-driven Chain Systems: The New Paradigm", *Maritime Policy and Management*, n° 29 (3), pp. 241-255.

SAVY, M. (1995), "Morphologie et géographie des réseaux logistiques", in M. Savy and P. Veltz (eds.), *Economie globale et réinvention du local*, Datar/Editions de l'Aube, Paris, pp. 85-94.

SLACK, B., C. COMTOIS and R. McCALLA (2002), "Strategic Alliances in the Container Shipping Industry: A Global Perspective", *Maritime Policy and Management*, n° 29 (1), pp. 65-76.

SLACK, B. and A. FRÉMONT (2005), "Transformation of Port Terminal Operations: From the Local to the Global", *Transport Reviews*, n° 25 (1), pp. 117-130.

SONG, D.-W. and P. M. PANAYIDES (2008), "Global Supply Chain and Port/terminal: Integration and Competitiveness", *Maritime Policy and Management*, Vol.35, n° 1, pp. 73-88.

STOPFORD, M. (2002), **"**Is the Drive For Ever Bigger Containerships Irresistible?", *Lloyds List Shipping Forecasting Conference*, 26 April, 10 p.
http://www.clarksonresearch.com//acatalog/ci_paper_april2002.pdf

VAN DER HORST, M. and P. W. de LANGEN (2008), "Coordination in Hinterland Transport Chains: A Major Challenge for the Seaport Community", *Maritime Economics and Logistics*, Vol. 10, n° 1-2, pp. 108-129.

WANG, J., D. OLIVIER, Th. NOTTEBOOM and B. SLACK (eds.) (2007), *Ports, Cities, and Global Supply Chains*, Ashgate, 278 p.