Global Maritime Networks. The case of Maersk

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Abstract

Two contrasting approaches to the provision of maritime services are frequently presented: one based on direct port to port services, the other characterised by a hub and spoke network. We demonstrate there is no contradiction between these two models, that in fact they are complementary. Integrating direct services and with a hub structure is necessary for assuring a wider geographical coverage. The complementarity is explained by analysing the world's largest container shipping line, Maersk, which over the last 30 years has created a global shipping network.

Keywords:

Containerisation, Globalization, Maritime networks, Shipping lines, Transhipment.

1. Introduction

Since its appearance on the international scene in the 1960s, containerisation has accompanied the expansion of the world economy in a virtuous circle. Two factors largely explain the success of containerisation. The first involves the productivity gains that containersiation made possible regarding cargo handling in ports, which accounted for the rapid succes and diffusion of containerisation (Hayuth, 1992). The second and more gradual process involved the refinement of the container networks of the major shipping lines. This network evolution can be summarized in the following fashion: the major carriers initially concentrated their resources on the major East-West routes which linked the three poles of the global economy (Rimmer, 2004); but, with the growing liberalization of maritime transport in the 1980s, they began to serve the North-South markets as well (Hoffmann, 1998). The unrelenting growth in the size of ships produced a cascade effect in which the newest and largest ships entering service were deployed on the East-West routes, while the vessels they replaced were diverted to the North-South markets (Guy, 2003). This spatial expansion of networks and services was facilitated by cooperation between carriers through the establishment of strategic alliances (Slack and alii, 2002) or by acquisition and internal growth. Because ports became just one link in transport chains (Heaver, 2002; Slack, 1985 and 1993), hub and spoke networks were established, linking the major East-West maritime motorway with the secondary North-South services. This last factor is the focus of the present paper.

Different types of service models are capable of providing a global network. The two most common are multi-port services, which offer direct connections between ports, and transshipment, two networks that are often seen as being in competition with each other. This distinction has been explored by Baird (2006) in a study of Northern European ports. The essential question is one of comparing the supplementary handling

costs of feedering involved in transshipment with the scale economies achieved by massifying the flows between the hub ports (Cullinane et al., 2000). The continued growth of world trade and the parallel increases in the size of ships accentuates the seeming difference between the alternate strategies: one to emphasize scale economies, the other to offer direct services (Imai and alii, 2006). This distinction in basic network structure is comparable with what has taken place in air transport, which adopted a hub and spoke structure much earlier (Bryan, D. and O'Kelly, 1999; M.E. Goetz and Graham, 2003; Martin and Roman, 2004). In air transport there is a dichotomy between the 'major' carriers that focus routes on national hubs and who are joined in strategic alliances to provide global coverage, with the regional low cost carriers who provide city-to-city connections and frequently make use of secondary airports (Dobruszkes, 2006).

The hypothesis explored in this paper is that the choices between direct shipments and transshipment are not incompatible for individual shipping lines. In contrast it is suggested that mounting a global network, involving having a presence along the main East-West corridors as well as on the lesser North-South routes, requires a complementarity between direct services and transshipment. Thus, a mixture of direct services with hub and spoke services are not incompatible, and indeed may be necessary to provide a global coverage.

The paper begins by presenting a number of different strategies for linking the different regions of the world. A purely theoretical example shows how regular shipping lines are able to serve the same two regions of the world with differently configurated maritime networks.

In the second part, we study the case of the world's leading carrier, Maersk Line[1]. Since the 1980s, this carrier has gradually built a global maritime network that integrates a network of direct East-West and North-South services while establishing a number of traffic hubs that interconnect the different services and enhance the overall connectivity of the system. It enables Maersk to link the different regions of the world and to operate at different scales, from the global to the local. In this way, Maersk is able to serve the world economy while also responding to the very local situations of each port and their hinterlands.

2. The configuration of containerized maritime networks: the theoretical possibilities

2.1. Theoretical hypothesis concerning the linking of two continents

The theoretical example given below shows how a single origin/destination matrix and a given quantity of transported containers can provide the multimodal transport operator with several possible combinations.

The hypothetical situation considered involves the linkage of two continents with a flow of exports from cities of origin (CO) and ports of origin (PO) towards ports of arrival (PA) and cities of arrival (CA). The exported volumes are proportional to the masses (M) of the cities and the ports measured, for example, by their economic importance or the size of their populations. It is accepted that:

- $M_{VO1} = M_{P01} = M_{PA1} = M_{VA1}$
- $M_{VO2} = M_{P02} = M_{PA2} = M_{VA2}$
- $M_{VO3} = M_{P03} = M_{PA3} = M_{VA3}$

[1] We use the term « the Maersk line » throughout the paper. In fact, after Maersk's purchase of Sea-Land and Safmarine in 1999, the name of the Danish shipping line became Maersk-Sealand, and Safmarine remained a subsidiary. We consider in this paper Maersk-Sealand/Safmarine as a whole. Since the purchase of P&ONedlloyd in 2005, the company reverted to its initial name "the Maersk line".

- $M_{V03} = 2*M_{V02} = 4*M_{V01}$

INSERT TABLE 1

2.2. The direct maritime service solution

A first configuration (Figure 1) involves a direct land link between the ports and the cities of origin or destination and the existence of two maritime services[2]. A pattern of this type can occur for two reasons. In the first phase of containerization, the transport capacity of container vessels was still limited and the existence of two services is justified in view of the volumes to be transported. The second possibility is that the market generated by CO3 and PO3 is significantly large to justify a dedicated maritime service.

The second configuration is when the increase in the size of container vessels and economic and political integration in the export zone permit rationalization of the two maritime services, which are merged into one. This second solution permits economies of scale to be made on the maritime leg, but only on segment PO3-PA1 where the vessel carries all the containers for export from the region of origin to the region of destination. This makes it necessary to use higher capacity vessels and reduces the number of maritime links between ports. As in the first configuration, the six ports are hinterland ports whose importance varies directly with the capacity of their hinterland. Here it is the ports' centrality (Fleming and Hayuth, 1994) that accounts for the major part of their traffic.

2.3. The transhipment hub solution

The third configuration is structured by one or more very high capacity maritime services which only call at the most important ports, PO3 and PA3. These pendulum

[2] It would be possible to devise a maritime scenario which is even more spread out than this first configuration with direct maritime links between all the ports, i.e. a total of 9 maritime links.

services[3] do not just serve the two ocean seaboards in question, they also serve other very large ports on other ocean seaboards not shown here. Two feeder services link the secondary ports with the major ports. In the import region, the use of block trains makes a direct inland link between PA3 and the terrestrial inland end destinations competitive while the two secondary ports PA1 and PA2 lose their land link. In contrast, PA3's hinterland is no longer restricted to CA3 but is considerably enlarged. The number of containers handled in PO3 and PA3 increases considerably as a result of feedering-related transhipment operations. The increase in these operations is greater in PO3 than PA3 as the latter concentrates on inland services. PO3 and PA3 are hubs or pivot ports as traffic from both the sea and the land is concentrated in them. They act both as maritime and terrestrial hubs and as transhipment and hinterland ports. The importance of these two ports reflects their centrality as well as their intermediacy (Fleming and Hayuth, 1994).

In the fourth configuration we shall consider, exports from the region of origin depend on a maritime transhipment hub (TH in Figure 1) located near the region but also near major East-West ocean traffic flows. As a result of this maritime hub, very large mother vessels do not need to deviate from their circumterrestrial route and can avoid making a detour to visit a seaboard whose volumes are not large enough to justify direct calls by large mother vessels (Zohil, 1999). A very high capacity feeder connects PO1, PO2 and PO3 to this transhipment hub (HT). This feedering and transhipment hub, where several other maritime services call, can also be used by the shipping line to send other containers, not considered here, from the region of origin to other ocean seaboards, which further increases maritime massification. The transhipment hub has no other terrestrial link with a hinterland, and all the containers are handled twice: it is a

[3] An example of a pendulum service consists of the West Coasts of North America, Eastern Asia, Southern Europe, Northern Europe and back.

pure maritime transhipment hub whose success is entirely based on its spatial quality of intermediacy. It was created with no antecedents and its traffic, in TEUs, confers on it first position in the port hierarchy. By setting up a direct high capacity terrestrial link with an inland centre (IC in Figure 1), PA3 has strengthened its hold on the extended and consolidated hinterland as well as its role as a hinterland port. Paradoxically, the end of transhipment activities results in a reduction in the number of containers handled.

INSERT FIGURE 1

2.4. The hub: increasing port traffic and the number of links

An analysis of the table shows that the transhipment techniques used in configurations 3 and 4 artificially increase port traffic as a result of double cargo handling. Port traffic is increased by a factor of 1.6 in configuration 3 and 2.2 in configuration 4. These increases are only justified if the economies in scale generated by massification exceed the additional cargo handling costs.

INSERT TABLE 2

The hub also allows a large number of markets to be served by adding additional links to the hub from a network that is already in place. This increases the potential for massification. The hub opens up the possibility for the shipping line to serve secondary markets at a lower cost, because a single additional physical link immediately provides a large number of potential destinations. In addition to being responsible for considerable massification, the hub provides a genuine increase in the number of destinations. It provides a large number of markets with a comprehensive rather than a segmented service (Rodrigue and alii, 2006).

In addition, the hub provides regular shipping lines with greater flexibility with regard to the organization of their networks. While it is less costly to inaugurate a new line, it is also less costly close a secondary link which is considered to be unprofitable, as the network as a whole will not be put under threat. Depending on how the volumes carried on the different routes change, it is possible to switch vessels from one route to another more easily. Such cascade effects become increasingly easy to set up the more substantial the network.

2.5. Advantages and disadvantages of the four scenarios

The four theoretical configurations considered in Figure 1 are not mutually exclusive. They can be mixed, depending on the objectives of the shipping line but also, above all, according to the market situation and thus the choice of the shippers. Table 3 summarizes the advantages and the disadvantages of each solution. The first two are quite appropriate if the volumes to be transported are sufficient to justify setting up a service that may operate more frequently than once a week, the widespread industry norm. This would provide shippers (the clients of the container operators) with the shortest transit times and the greatest accessibility to the market. On the contrary, the hub solution lengthens transit times, increases the number of transhipment operations and requires the different regular shipping lines which call at the port to be perfectly coordinated. It is complicated to organize and the quality of operations to some extent determines the efficiency of the entire system of regular lines which depend on it. It is a nerve centre of the network so its selection by the shipping line is critical. Hubs might give greater flexibility, but disruptions along the chain make the whole system very vulnerable.

INSERT TABLE 3

3. Maersk's role in linking the different regions in the world

In 2002, Maersk's 264 vessels represented a transport capacity of almost 700,000 TEUs which accounted for 9% of global containerized transport capacity. It is by far the largest shipping line in the world. Its 97 maritime services offer worldwide coverage, calling at 232 ports. Maersk constitutes a remarkable illustration of the possibilities provided by a "hub and spoke" network. It played a trail-blazing role amongst shipping lines in creating this type of network. However, the network was not established spontaneously. Rather, it evolved out of developments that took place in the 1980s.

3.1. The emergence of the hub and spoke network in the 1980s

This global network consists of a network of hub ports which link the East-West services with to each other or to the North-South services. At the end of the 1970s, Maersk's activity was based on the historical transpacific services, set up in 1928, and on the more recent services (1968) between Europe and the Far East. These two were containerized after 1975. But, even if these two services met in the ports of the Far East, they were not coordinated at the time. Boxes were not exchanged between the two.

It was not until the mid-1980s that the first transhipment operations were introduced. In 1984, Maersk introduced a maritime service between the West Coast of the United States and the Middle East which involved transhipment at Hong Kong. This technique for serving new markets became a genuine strategy when in the two years that followed, the Algeciras and Dubai hubs were inaugurated. Algeciras allowed Maersk to set up feeder lines in the West Mediterranean sector and gain a foothold on the West African coast, and Dubai was used to operate services to the East African coast (see Figure 2).

INSERT FIGURE 2

Algeciras was more of a genuine innovation than Hong Kong or Dubai, and went on to be imitated by the other shipping lines. It serves no hinterland, its only advantage being its location on a circumterrestrial East-West maritime route which connects with more or less nearby regional markets. It allows mother ships to call at a port without deviating from their principal route. These vessels can perform transhipment operations either among themselves or with vessels assigned to the North-South lines or with feeder vessels for geographically closer markets (Zohil et *al.*, 1999). Algeciras was the forerunner of all the major transhipment hubs which were to develop during the 1990s.

However, at the end of the 1980s and the start of the 1990s, this global coverage strategy was still in the early stages of implementation, as can be seen from the map of the ports served in 1994[4] (see Figure 3).

INSERT FIGURE 3

3.2: A global network in the 1990s

The Maersk maritime network took on a global dimension during the 1990s thanks to considerable internal growth and merger/acquisition operations. These culminated with Maersk's purchase of Sea-Land in 1999 which allowed the group to strengthen its position on the East-West route while in the same year the purchase of Safmarine made Maersk a major shipping line in South Africa.

[4] The Weekly Containerized Transport Capacity (WCTC) is a measure of the number of TEUs provided each week by a shipping line on a link or at a port on the basis of its available nautical capacities. The figure is obtained from the "containerized transport capacities" database (see Frémont and Soppé, 2004) which is concerned with the commercial offer of transport capacity on the part of the 26 largest regular shipping lines in the world in 1994 and 2002. The database includes all the regular lines operated by the 26 shipping companies on the basis of weekly transport capacities made available on each maritime service. The information about the lines was obtained from the "*Containerization International Yearbook*" and from the websites of the shipping lines in question.

This growth gave birth to an increasingly complex maritime network. Between 1994 and 2002, the number of shipping services increased from 30 to 91 (see Table 4). In absolute terms, the main increase was on the major East/West routes. Only four services were added to these routes, but capacity on them increased by 282,000 TEUs, which means that Maersk increased capacity by 62% between 1994 and 2002. For Maersk, like the major Asian operators which belong to alliances, the first requirement in order to dominate the market is massive presence on the East-West circumterrestrial route.

INSERT TABLE 4

However, the considerable amount of effort put into the East-West trade route does not prevent the development of global coverage. To achieve this, Maersk has increased its number of hubs which are located mainly along the three major East-West routes (see Figure 4).

INSERT FIGURE 4

3.3. The role of the hubs

Algeciras provides a good example of the large number of possibilities for interconnections provided by this technique. Eighteen of the 91 lines in the Maersk group's network pass through Algeciras, which itself is linked to 88 of the 232 ports that are served. Eighteen percent of the services link 37% of the ports in the network together via a single hub. Four of these 18 lines are East-West lines which call at ports in North America, Northern Europe and Eastern Asia. They are sufficient to link Algeciras to Maersk's other major hubs. A network of North-South lines then fans out, six towards Africa, three towards South America and the West Indies, and finally five

feeder lines to nearby regional markets (countries in the Maghreb and on the Atlantic Coast).

Each hub links several major regions by transferring traffic between the different types of line (see Table 5 and Figure 4). In the Mediterrannean, Gioia Tauro supplements Algeciras with a specialization in intra-Mediterranean services. Tanjung Pelepas covers South-Eastern Asia but its services also extend to the Indian subcontinent and Australia/New Zealand. Salalah serves the Middle East, East Africa and the Indian Ocean, linking up with the Europe-Eastern Asia trade route. Last, Miami in the United States and Manzanillo in Panama organize the American network.

INSERT TABLE 5

These pure transhipment hubs complement the hinterland ports which also perform an interconnection function. In Northern Europe, Rotterdam, Felixstowe and Bremerhaven play an important role in this respect. They are located at the intersection of the East-West services using mother vessels from Eastern Asia and North America, which allows Maersk to provide high volume links between the economic heartland of Europe and the rest of the world. However, at the same time, these ports are also visited by the North-South lines serving Africa or Latin America and the intra-regional lines serving peripheral markets such as the Baltic. In Eastern Asia, Hong Kong first of all serves the Pearl River delta but also permits connections with Chinese ports. Last, although Yokohama is primarily the port for Japan, it also organizes services in North-Eastern Asia. These ports serve a strategic double function. They act mainly as hinterland ports but also possess transhipment functions. This is why the Möller group seeks to operate dedicated terminals operated by its subsidiary, AP Möller Terminals.

3.4: A niche shipping line

This global coverage of markets by means of "hub and spoke" network also permits Maersk to operate as a niche shipping line. The Danish company has a monopoly position (100% of the available WCTC) at 31 ports. It provides more than 50% of the WCTC in 62 ports in the world and more than 30% in 110 ports (see Figure 5). These are secondary ports, and usually very small, but they are ports where the position of monopoly or strong domination doubtless provides secure profits and considerable freedom as regards freight pricing. These ports are located in zones which are served from the hubs, in the Western Mediterranean/North African and Western African/South African ranges from Algeciras, the Baltic range from Bremerhaven, the Middle Eastern ranges from Salalah and the East Coast of North America and the East Coast of South America from Miami or Manzanillo. The hub therefore provides the shipping company with a means of specializing in the coverage of a specific geographical zone, which is how a niche shipping service is defined.

INSERT FIGURE 5

3.5. Maersk in the 21st century, the worlds leading carrier operating a very complex and diversified network

In 2002, Maersk is the world's leading carrier in part of its very complex and diversified network. As with the other leading carriers, the Danish shipping line's maritime network is shaped by the major flows of international trade. Eastern Asia, Europe and North America accounted for 73% of the Maersk's Weekly Containerized Transport Capacity (WCTC) in ports. It allows the company to offer high volume services to the three poles of the Triad. In order to possess sufficient capacity on the major East-West routes, other shipping lines need to group together and form major maritime alliances. Alone, Maersk is the market leader on these routes, only pushed into second place, sometimes, by the major maritime alliances.

Maersk is also a worldwide operator. Twenty-seven percent of Maersk's WCTC serves the countries of the South, which means its network is global in nature. It operates at a global level, as almost every region of the world (Madagascar being an exception) was visited by a Maersk vessel. Last but not least, it is also a niche shipping line as it is very often in a position of monopoly or very strong domination in many secondary ports.

INSERT FIGURE 6

INSERT FIGURE 7

The traffic volumes on the East-West routes and even on many North-South routes are sufficiently large to justify separate multi-port services. But the hub and spoke network superimposed on the direct services provides greater connectivity and more frequent services to clients. It also facilitates the search for scale economies by deploying the largest ships on the densest East-West corridors. It is for this reason that we argue that the direct multi-port service configuration and a hub and spoke network are complementary in maritime transport. Hubs, because of their complexity, are the nerve centres of container shipping, yet they also contribute flexibility to the network and permit adjustments to be made at relatively little cost.

3.6. The role of the shipping services in creating the network of ports

Because of their importance and vulnerability hubs require sophisticated management. Maersk differs from other shipping lines not only by virtue of its role as a trail-blazer in the creation of a “hub and spoke” network, but also by virtue of the highly specific nature of its port network, particularly its network of hubs.

In Maersk’s port hierarchy, such global ports as Hong Kong and Rotterdam still have an important position, but Kaohsiung, Singapore and Busan have been relegated to

"secondary" status. On the other hand, some ports which have lower positions in the world port hierarchy play a dominant role in Maersk's maritime network. The differences are particularly striking in the case of the pure transhipment hubs: Algeciras, Tanjung Pelepas, Gioia Tauro, Salalah or Manzanillo (see Table 6).

INSERT TABLE 6

What are the reasons for this interest in "secondary ports"? Maersk is responsible for a major share and sometimes the totality of activity in these ports (Algeciras, Salalah). In ten of the twenty ports at which Maersk calls most frequently, the company's share of port WCTC exceeds 18%. In these ports, Maersk is also a terminal operator via the cargo handling subsidiary of the AP Möller group, APM Terminals, which holds a variable interest in these terminals. The only exceptions are Hong Kong, Singapore, Felixstowe and Manzanillo. Control of the port link is regarded as fundamental in order to limit the overall costs of the transport chain. It is also a source of profits. To draw the maximum benefit from these two factors, by far the best strategy to adopt is independence. Independence of this type is much easier to find or acquire in relatively "minor" ports than in global ports where there may be a strong port authority or where the largest international cargo handlers such as Hutchinson or PSA are present.

The AP Möller group attempts to attain a key and dominant position in a port it selects as a hub so as to secure its port operations in the long term, with, no doubt, the ability to influence policy within the port as well. Maritime services play a key role in creating A.P. Möller's port network. The services have a degree of geographical flexibility which means that Maersk can modify its network according to the opportunities that arise and its financial capacities. The inauguration of a new service may provide a high volume of traffic immediately to justify investments in a terminal.

In 1998, Maersk vacated Jebel Ali, a port in the United Arab Emirates, for Salalah in Oman. The latter offers very good draft for vessels (16 metres). It has a good location on the Europe-Eastern Asia route, which means that mother vessels do not have to be diverted from their ocean route and makes it possible to serve the Middle East, Eastern Africa and the islands in the Indian Ocean by a network of North-South lines. From 1998 to 1999, the traffic passing through Salalah increased by a factor of 37, from 17,493 to 648,613 TEUs.

In the transhipment hubs, Maersk handles a considerable proportion of the ports' WCTC, more than 80% in Algeciras and Salalah. These are "Maersk ports", which depend completely on the shipping line's maritime network.

When no competition exists between ports, Maersk's power means it is able to create one, even against the most powerful ports. In December 2000, Maersk suddenly announced that it was leaving the port of Singapore for the neighbouring port of Tanjung Pelepas, thus threatening Singapore's quasi-monopoly position as a transhipment hub in South-Eastern Asia and taking almost 2 million TEUs of traffic away from it. In a few months, all the shipping services switched to the new port. The traffic at Tanjung Pelepas increased by a factor of 5 between 2000 and 2001, from 418,000 to 2 million TEUs.

4. Conclusion:

In 2005, Maersk-Sealand purchased P&ONedlloyd and changed its name to Maersk Line. The Danish operator strengthened its dominant position, accounting for more than 18% of the transport capacity of the twenty largest shipping lines in the world. The merger permitted a reorganization of lines which has, so far, resulted in an increase in the number of services in order to use all the vessels belonging to the two

shipping lines. Ultimately, Maersk Line could implement new scenarios for scale economies. The launching in August 2006 of the *Emma Maersk,* with a capacity of between 11 000 and 15 000 TEUs is further indication that Maersk wishes to exploit still further scale economies through its existing hub and spoke network.

The case study of Maersk demonstrates that direct maritime services and transhipment configurations are not incompatible. The multi-port model is complementary to the hub and spoke system, since the two network models possess different advantages and disadvantages, and when combined permit an extensive global coverage. Thus the hubs, located at strategic points along the prime East-West artery, interconnect with other mainline North-South and East-West services. The latter are essentially multi-port services linking different maritime ranges. The hubs provide great flexibility to the entire network, a flexibility measured in three ways: 1) providing the means for the company to serve a very wide market; 2) enabling the company to deploy ships of different capacities in efficient manner given traffic imbalances; and, 3) offering customers an extensive choice of services across a global spectrum of markets.

Feedering services are a distinct and separate element in the network and are entirely dependent on a hub configuration. However, an increase in traffic between two markets may lead the shipping line to replace indirect feeder services with direct port connections, thereby supplanting the inconveniences of one system with the advantages of another.

Because they serve primarily as interconnection points between mainline services, hubs are the control centres of the network. This is not without danger. Any dislocations in a hub may have major repercusions throughout the entire network. The response of Maersk to this potential threat has been to establish its own hub ports over the last 20 years, operating them under its subsidiary, AP Möller Terminals.

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TABLES

Table 1: Origin/destination matrix, in TEUs*

	CA1	CA2	CA3	PA1	PA2	PA3	TOTAL
CO1	1	2	4	1	2	4	14
CO2	2	4	8	2	4	8	28
CO3	4	8	16	4	8	16	56
PO1	1	2	4	1	2	4	14
PO2	2	4	8	2	4	8	28
PO3	4	8	16	4	8	16	56
TOTAL	14	28	56	14	28	56	196

* a multiple of the figures indicated can be used

Table 2: The number of containers handled in the ports and the inland centre according to the different configurations

Configu-ration	PO1	PO2	PO3		PA1	PA2	PA3		IC	TH		Total
	TEU	TEU	TEU	%*	TEU	TEU	TEU	%*	TEU	TEU	%*	TEU
	28	56	112	0	28	56	112	0				392
1	28	56	112	0	28	56	112	0	-	-		392
2	28	56	112	0	28	56	112	0	-	-		392
3	28	56	280	60	14	28	238	35	-	-		644
4	28	56	112	0	0	0	196	0	84	392	100	868

* indicates the percentage of containers passing through the port that are transhipped.

Table 3: Advantages and disadvantages of the different transport solutions covered in Figure 1

	Advantages		Disadvantages		Outcome	
	Shipping line	**Shipper**	**Shipping line**	**Shipper**	**Shipping line**	**Shipper**
1	- Réseau point à point facile à exploiter - Closeness to the market	- Short transit time	- No massification - Nombreux navires nécessaires pour assurer des fréquences suffisantes.	- low service frequencies if volumes are not high enough - nombre de destinations offertes est limité	- Possible if volumes are high on the segment in question - Possible for a niche market - Segmented network	- rapidité et qualité de service si fréquence suffisante - risque d'un service cher
2	- More maritime massification than in 1	-	- service plus long. Plus de navires sont nécessaire pour assurer une fréquence égale	- Longer transit time		
3	- Maritime massification - More flexibility as regards assignment of the vessel and container fleet	- Possible increase of the number of markets served by the hinterland hub	- Complex organization - Possible congestion at the hinterland hub	- Longer transit time - Distance from the market	- More densely interconnect network - Broader geographical coverage - Economies of scale	- possible si les tarifs sont moins chers qu'avec des services directs.
4	- Location of the maritime hub on the major East-West navigation routes - Denser interconection between the East-West, North-South and feedering shipping lines - Choice of the maritime hub by the shipping line	- Nombreuses destinations géographiques possibles : un seul armement peut traiter l'ensemble des trafics du chargeur	- Very great increase in the number of transhipment operations	- Idem que ci-dessus - Ne pas être dépendant d'un seul armement pour l'ensemble de ses trafics. Nécessité de jouer sur plusieurs transporteurs.	- Possibility of a fully interconnected network through the setting up of several hubs. - Possibility of coverage of the whole world. - Economies of scale	- idem que ci-dessus. - possibilité partenariat entre armement global et chargeur global - risque de dépendance par rapport à l'armement.

Table 4: Type of maritime services provided by Maersk, number of lines per link and capacity per link (TEUs), 1994-2002

	1994		2002	
	No.	TEUs	No.	TEUs
EAST-WEST LINES:	**12**	**143 884**	**16**	**425 909**
Simple:	**9**	**86 620**	**11**	**211 603**
Europe/Eastern Asia	3	66 158	2	100 026
Europe/CE North America	1	-	4	43,910
Eastern Asia/CO North America	5	20 462	3	35 074
Europe/Middle East	0	-	1	22 200
Eastern Asia/Middle East	0	-	1	10 393
Pendulum:	**3**	**57 264**	**5**	**214 306**
Europe/Eastern Asia/WC North America	0	-	2	92 400
EC North America/WC North America/Eastern Asia/Europe	0	-	1	53 014
EC North America/WC North America/Eastern Asia	0	-	1	34 489
EC North America/Europe du Sud/Middle East	2	10 128	1	34 403
Europe/CE North America/WC North America	1	47 136	0	-
	18	**37 761**	**75**	**210 594**
Intra-regional lines within the Triad:	**7**	**1 500**	**31**	**49 819**
intra-European	7	1 500	20	35 116
intra-Eastern Asian	0	-	11	14 703
To Australia/New Zealand breaking down into:	**2**	**3 950**	**5**	**36 032**
Eastern Asia/Australia/New Zealand	2	3 950	4	24 038
North America/Australia/New Zealand	0	-	1	11 994
North-South lines breaking down into:	**9**	**32 311**	**39**	**124 743**
Simple North-South breaking down into:	**9**	**32 311**	**24**	**88 260**
Europe/Africa	2	12 858	8	28 667
Europe/South America	0	-	4	26 264
North America/South America	4	7 387	6	14 161
Eastern Asia/Africa	0	-	1	7 988
North America/Africa	0	-	1	6 219
Middle East/Africa	1	3 000	4	4 961
Eastern Asia/Southern Asia	2	9 066	0	-
North-South pendulum lines:	**0**	**-**	**1**	**15 633**
Middle East/Africa/East Coast of South America	0	-	1	15 633
Intra-regional South-South lines breaking down into	**0**	**-**	**14**	**20 850**
intra-South American	0	-	8	10 649
intra-Middle Eastern	0	-	5	9 773
intra-African	0	-	1	428
TOTAL	**30**	**181 645**	**91**	**636 503**

EC= East Coast; WC= West Coast.
Source : WCTC Database 1994 et 2003.

Table 5: Number of maritime lines of each type of the Maersk-Sealand group's principal transhipment hubs in 2002

Transhipment hubs	Number of maritime lines				
	East-West	North-South	Intra-regional	Australia/New Zealand	Total
America					
Manzanillo	3	1	2	1	**7**
Miami	3	4	0	0	**7**
Northern Europe					
Rotterdam	8	5	2	0	**15**
Bremerhaven	6	3	5	0	**14**
Felixstowe	8	2	2	0	**12**
Southern Europe					
Algeciras	4	9	5	0	**18**
Gioia Tauro	3	1	10	0	**14**
Middle East / Indian Ocean					
Salalah	2	7	3	0	**12**
Eastern Asia					
Hong Kong	9	3	4	1	**17**
Tanjung Pelepas	4	2	3	3	**12**
Yokohama	5	0	2	1	**8**

Source: WCTC Database 2003

Table 6 : Maersk's port hierarchy in 2002

	Position in Maersk's port hierarchy on the basis of WCTC	Position in the world port hierarchy on the basis of WCTC	Position in the world port hierarchy on the basis of traffic in 2002	Maersk's percentage of the port's WCTC
Hong Kong	1	1	1	7.4
Algeciras	2	45	27	81.1
Felixstowe	3	13	19	23.2
Tanjung Pelepas	4	42	22	62.8
Gioia Tauro	5	17	18	22.4
Rotterdam	6	6	7	13.4
Salalah	7	79	59	97.2
Bremerhaven	8	27	17	32.7
Yokohama	9	14	26	18.5
Kaoshiung	10	3	5	9.0

Source: WCTC Database 2003

Figures

Figure 1: Maritime and inland configurations

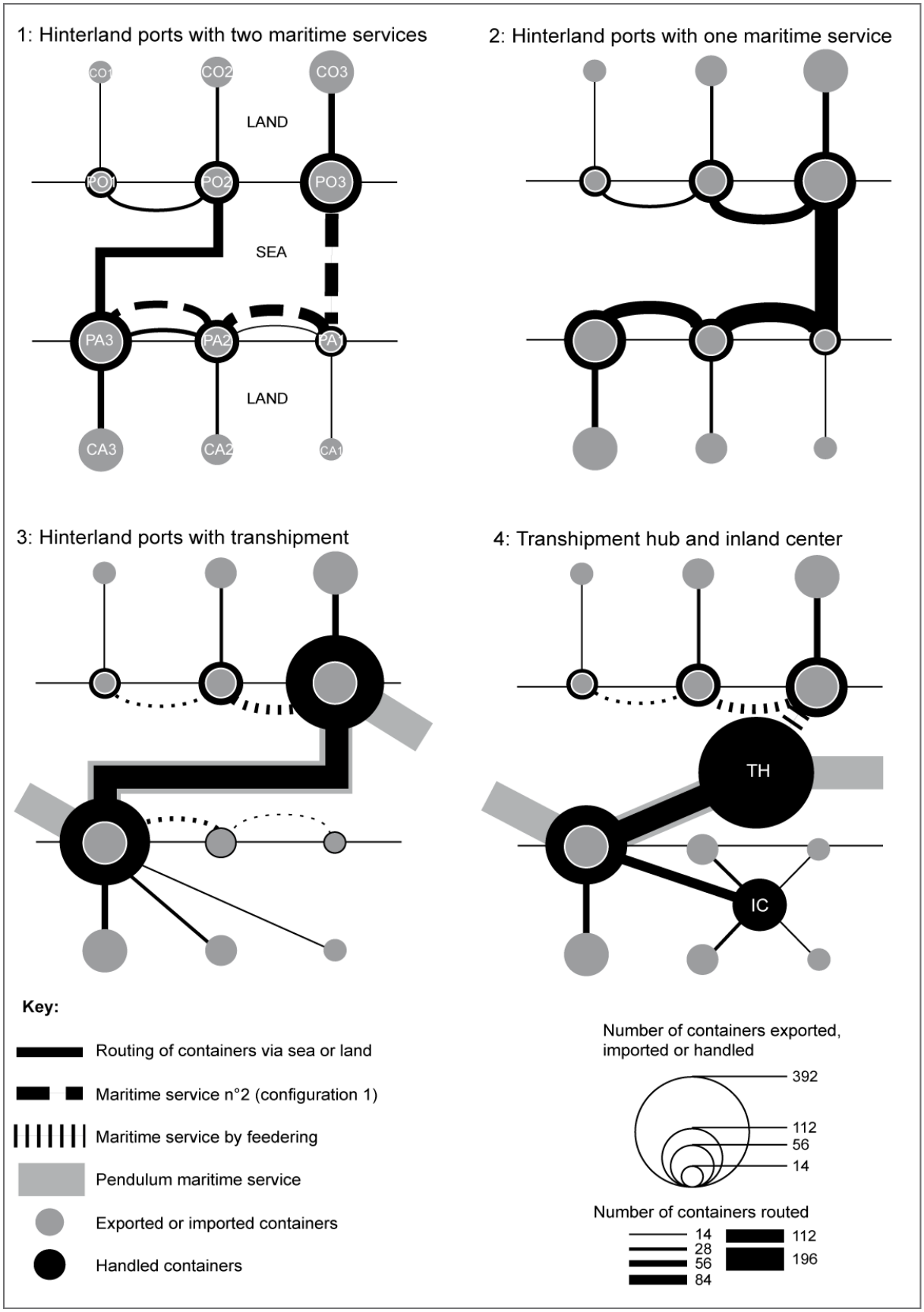

Figure 2: The emergence of a hub and spoke network at the end of the 1980s

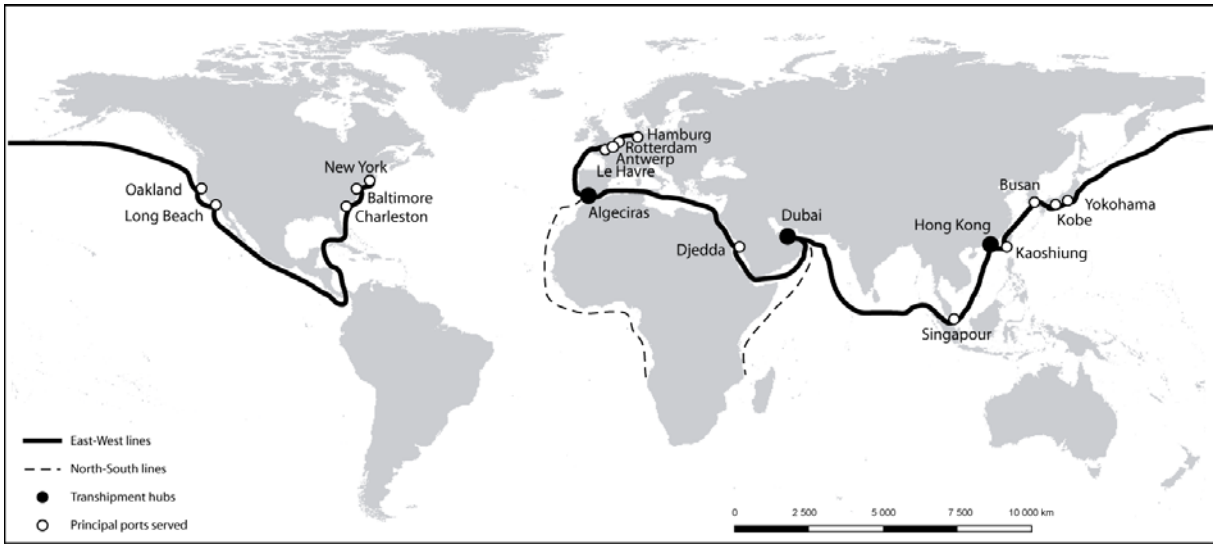

Figure 3: The ports served by Maersk in 1994

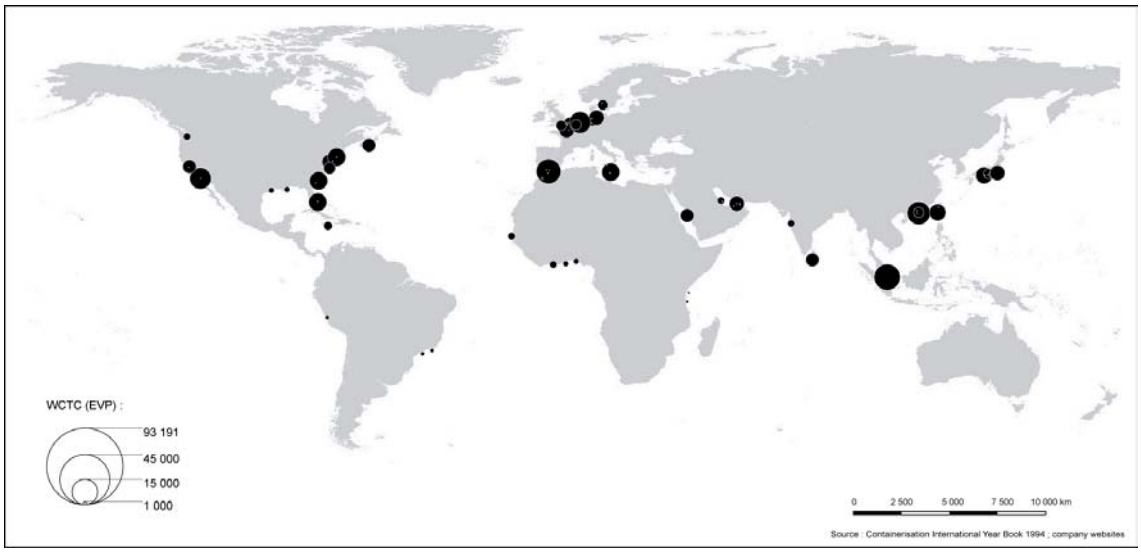

Figure 4: Global coverage of markets in 2002

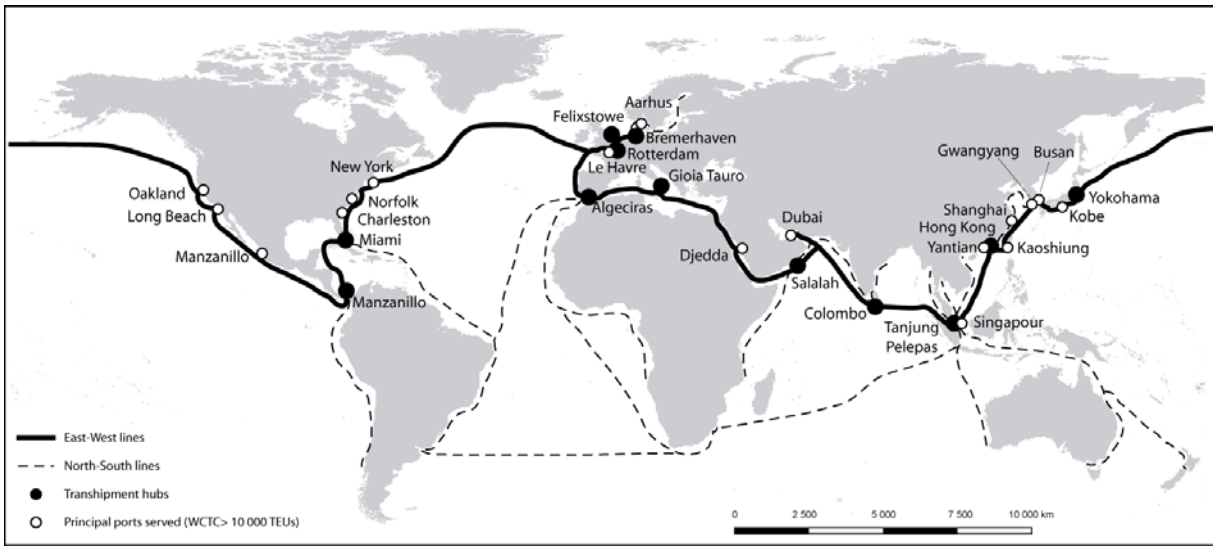

Figure 5: Maersk as a niche shipping line. The location of the ports where Maersk provided more than 30% of total port WCTC in 2002

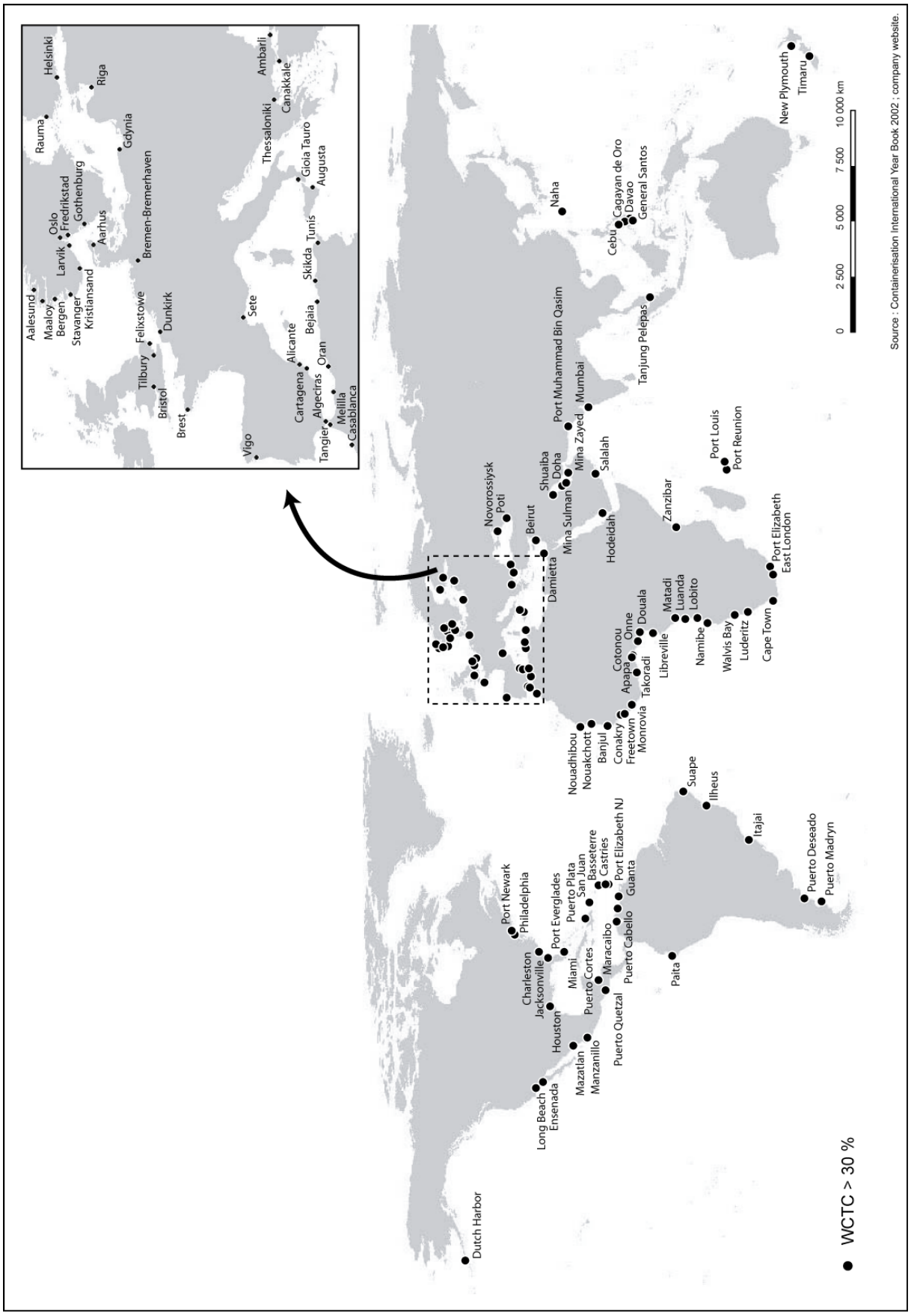

Figure 6: The ports served by Maersk-Sealand/Safmarine in 2002

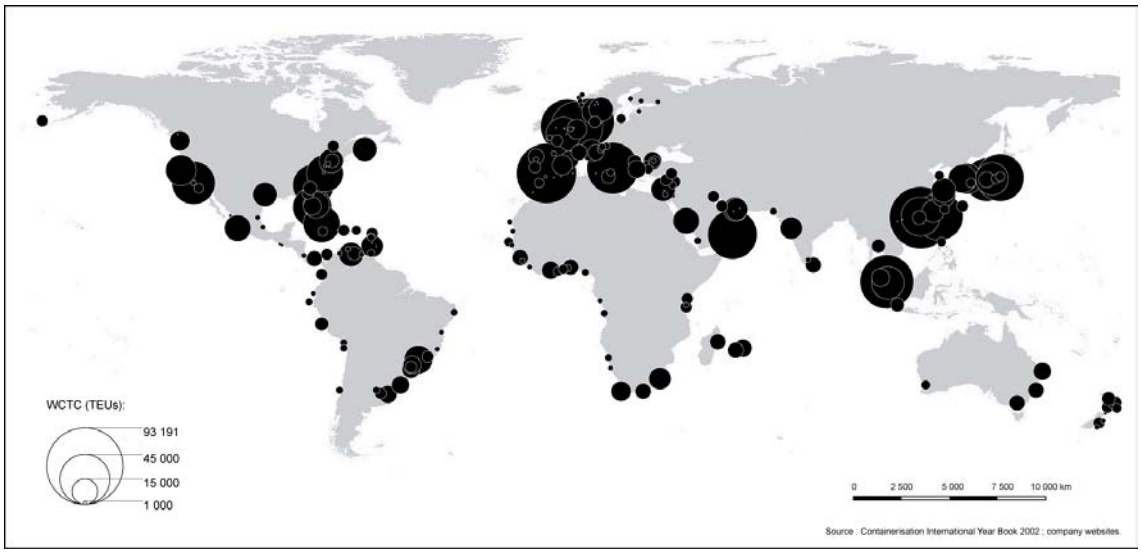

Figure 7: Maersk-Sealand/Safmarine's maritime network in 2002