General description of Liners (passenger – intermediate – cargo)

ΑΚΑΔΗΜΙΑ ΕΜΠΟΡΙΚΟΥ ΝΑΥΤΙΚΟΥ
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ΠΤΥΧΙΑΚΗ ΕΡΓΑΣΙΑ

ΕΠΙΒΛΕΠΩΝ ΚΑΘΗΓΗΤΗΣ: ……

ΘΕΜΑ:

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ΤΟΥ ΣΠΟΥΔΑΣΤΗ: ……

Α.Γ.Μ:

Ημερομηνία ανάληψης της εργασίας:

Ημερομηνία παράδοσης της εργασίας:

Α/Α	**Ονοματεπώνυμο**	**Ειδικότης**	**Αξιολόγηση**	**Υπογραφή**
1				
2				
3				
ΤΕΛΙΚΗ ΑΞΙΟΛΟΓΗΣΗ				

Ο ΔΙΕΥΘΥΝΤΗΣ ΣΧΟΛΗΣ :

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Introduction

In the mid 1960's international liner shipping entered a new development phase. Technical, political and economic changes in sea, land and air transport and in the

demand for general and break bulk cargo movements made necessary a far-reaching restructuring of the liner industry.

Since the mid 19th century liner shipping has dominated both deep-sea and short-sea general and break bulk cargo transports, a result of the Industrial Revolution which required a system of regular, public transport services between European countries separated from the mainland by short-seas and between Europe and the overseas markets. Last century transport costs formed a powerful trade barrier restricting transocean trade to high-value commodities and making liner shipping the major form of deep-sea transports. Political factors, such as the development of colonial empires and the settlings of North America, favored regular movements of passengers and cargo, which stimulated the growth of the liner industry.

Short-sea liner shipping in the 19th century was well developed in the Baltic and the North Sea. A system of regular and public services between Scandinavia and United Kingdom on the one hand, and the European mainland on the other was a sine qua non for the growth of the Scandinavian industry as well as for the trade between Great Britain and the Continent. The development of railways had only limited impact on the modal allocation of general break bulk cargo flows in the short-sea markets.

The growing demand of the industrialized world for energy and raw materials at the end of the last and the beginning of this century formed the base for development of specialized vessels and increased the need for wholevessel shipments, creating a division of the seab9rne trade into several cargo submarkets. Specialization made possible a relative decrease of transport costs, resulting in an increasing number of low-value commodities entering international trade. The general cargo share in trade declined as did the liner-tonnage share.

The development of long-distance road transports in the interwar and, particularly in the postwar period, had far-reaching influences on the technique, economy and organization of the short-sea liner services. To meet the new market conditions, the short-sea operators had to integrate their services with the land transport system, recognizing the superiority of the wheel for general cargo movements in these markets, adopting the technique and organization of the supplied shipping services accordingly. The new technique changed the structure of general cargo traffic from a

flow of heterogeneous units to a fairly homogeneous flow with trucks and containers being the basic units.

The experience of unitized traffic in military and short-sea transports provided experience for unitization of deep-sea transports, which allowed mechanization of general cargo handling and made large vessels economic. The new technique increased the advantages of liner shipping, which in the 1960's and 1970's had to meet growing competition from special carriers in break bulk cargo transports and from land and air transport in the general cargo market. A main result of cargo unitization was increased interdependence between land, port and sea services. Deepsea and, particularly, short-sea liner shipping has to be viewed as an integrated element of the total transport system.

The system approach is a guide-line of this study. It has a twofold objective: to analyze development tendencies in the international liner industry and to examine changes in the demand for the services for this industry, particularly the modal and port distribution of flows in Sweden in the 1960's and 1970's. Chapter 1 is focused on development tendencies in the liner industry, analyzed in terms of technical, political, economic and organizational changes 'and their interrelations. The analysis covers the development of international liner shipping from the 1810's to the present. Tradition and historical experience play an important role in technical, economic and organizational thinking and decision-making in this industry. The study of organizational changes on the markets is focused on shipping between Europe and other continents and on the Baltic and the North Sea routes. These markets are of primary importance from the Swedish and European points of view.

The development of the liner industry has been divided into three periods, the first two covering the foundation (1810-1870) and expansion (1870-1965) phases. The third period, the diversification phase, started in the late 1960's. The analysis of the first two periods should give a broad view of the processes which led to the economic and organizational pattern of the modern liner shipping. It is based on printed sources. Often definitions of the industry, markets and ships vary. The lack of standardized definitions and statistics make international comparisons about the liner industry difficult. For fleets and firms national literature has been used as the main source since it provides the most detailed data. The discussion of the shipping policy of

individual countries was based on views expressed by both national and foreign authors.

The analysis of the development tendencies in the third period is mainly based on international statistics. Common definitions are used for all countries for vessel type, forms of aid etc., which allows more precise international comparisons of fleets, policy measures and economic results. National and international laws, agreements and documents were used for the analysis of the shipping policy of individual countries. Both data reliability and international comparability are better for the third period than for the first and second.

CHAPTER 1 – LINER SHIPPING

1.1 Introduction

Shipping is a service industry that generally provides cargo transportation of international trade. Approximate 90% cargo volume of international is transported by sea. Often, the shipping industry is categorized into two major sectors: (1) the bulk shipping which provides services mainly in the transportation of raw materials such as crude oil, coal, iron ore, and grains; and (2) the liner shipping which provides services in the transportation of final and semi-final products such as computers, manufacturing product and other consumption goods…etc.Cargocarriedbylinershippinghascometobeknownasgeneralcargo.Liner shipping is to provide regular services between specified ports according to time-tables and prices advertised well in advance. The service is, in principle, open to all shippers and in this sense it resembles a public transportation service. The provision of such a service, often offering global coverage, requires extensive infrastructure in terms of ships, agencies, and equipment.

The vast majority of liner cargo is containerized –that is, it is carried in sealed metal containers from point of origin to destination. These containers come in standard sizes (typically20',40',and45'inlength)and may include various specialized technologies, such as refrigeration units for chilled and frozen foods, or internal hanger systems for

carrying garments. Containers serve, in essence, as a packing crate and in-transit warehouse for virtually every type of general cargo moving in international commerce. The standard measure of the volume of containerized cargo is a TEU (twenty-foot equivalent unit). For example, one forty-foot long container of cargo would be counted as two TEUs of cargo.

Most of the world's non-bulk cargo travels in marine shipping containers. The worldwide fleet of marine containers in circulation at the beginning of 2005 is estimated to be about 13 million containers with overall capacity of approximately 20 million TEUs. Containers move along a network of nodes and links (see Figure 1). The nodes are physical locations where container movement is interrupted and/or containers are handled. Many of these concern multimodal transfer points where containers are transferred from one mode to another. The links between nodes are characterized both by a mode of transport (road, rail, inland waterway) and a supporting infrastructure (roadway, canal/river, railroad track, rail marshalling yard, etc.). As containers move along this network they can either be empty, loaded with a single consignment (Full Container Load, FCL) or loaded with multiple consignments (Less-than Container Load, LCL).

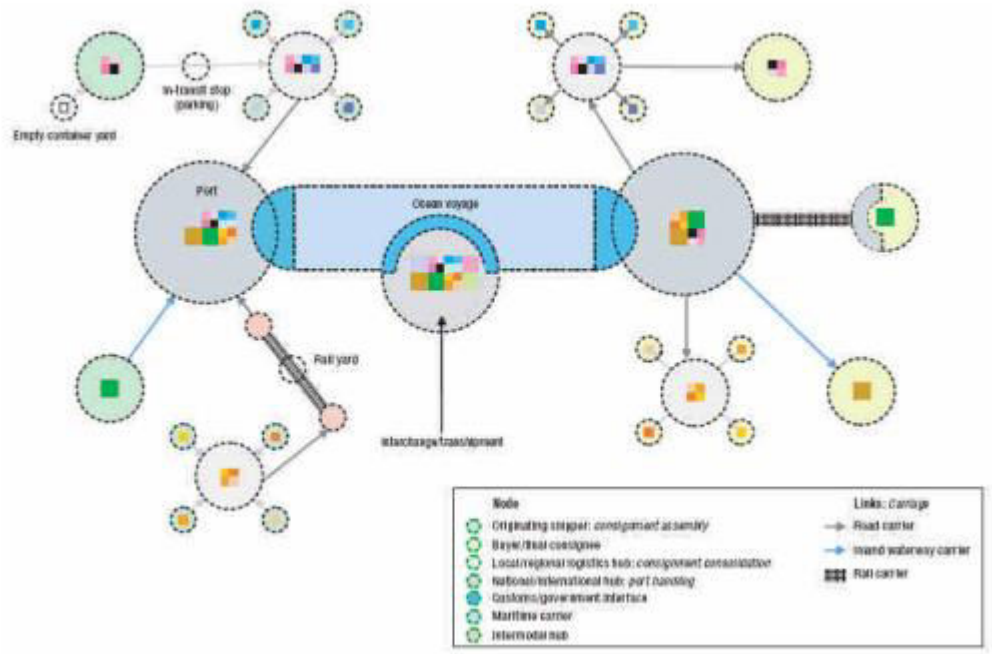

Figure 1. Container transport chain

The Containerized cargo moves from inland point to inland point via a multi-modal network linking vessels, port terminals, trucks and trains. At the heart of this service network is the planning, tracking and delivery of cargo and state-of-the-art information systems needed to provide certainty and reliability to shippers. These standardized boxes have revolutionized the international transport of goods involving a sea leg since their first appearance in the 1950s and have given rise to a multitude of specialized road, barge and rail carriers, a fleet of over 2,700 cellular container ships and the emergence of a global network of several hundred highly automated port handling facilities. The basic shipping container is nothing more than a reinforced steel box with one double door providing access on one side. These "drybox" containers are supplemented by many other container types including tank containers for gaseous or liquid cargoes, open frame containers for transporting odd-sized consignments, soft-top containers, containers fitted with special garment racks and/or refrigeration units("reefers")for transporting chilled food.All of these containers share standard fittings on all corners that allow them to be stacked and racked on board vessels, train wagons, truck chassis, etc.

Role	Actors involved
Primary customers	Seller (manufacturer/originating shipper/exporter)
	Buyer (consignee, importer)
Transaction facilitation	Buying agent
	Freight forwarder or NVOCC
	Customs broker
Transport task (physical movement of container)	Empty container depot operator
	Warehouse/container freight station operator
	Inland terminal operator (*e.g.* road-rail, road-barge, rail-barge)
	Road carrier (local, long-distance)
	Rail carrier[1]
	Barge operator
	Ocean carrier
	Port terminal operator
	Other port service operators
Authorising/regulatory	Transport authorities
	Customs authority
	Import/export licensing authority
	Phytosanitary, sanitary and veterinary control licensing authority
	Port authority
	Import/export statistical agency
	Other actors (chambers of commerce, consulates, etc.)
Financing	Bank (seller's or advising bank, buyer's or issuing bank)
	Insurance provider (carriage insurance)

Actors in the container transport chain

1.2 The trade and container flow

Most container moves involve an international sea leg. Figure 2 illustrates global flows of containers along the principal trade routes in 2002. These flows accounted for 37.7 million TEUs or roughly 24.3 million actual box moves concentrated in the dominant Trans-Pacific, Asia-Europe and trans-Atlantic trades. Container traffic figures for world ports from Containerization Online indicate that over 264 million containers were handled in 2002. These figures account for all containers handled at the various ports including transhipped containers, empty container moves on both the export and import sides. These trade volumes are expected to increase in coming years as world trade increases.

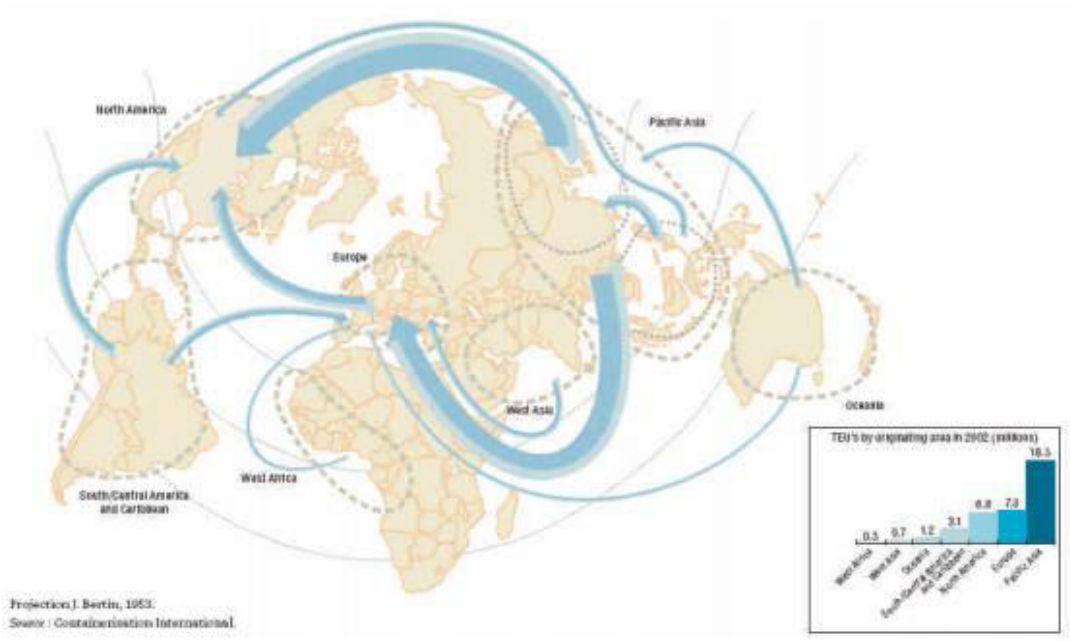

Figure 2. Global flows of containers along the principal trade routes in 2002

A closer look at Figure 3 shows that cargo flows are not balanced on the most important trade routes. Flows from Asia to the USA exceed those in the opposite direction; likewise, flows from Asia to Europe and from Europe to the USA are significantly higher than the respective flows back.

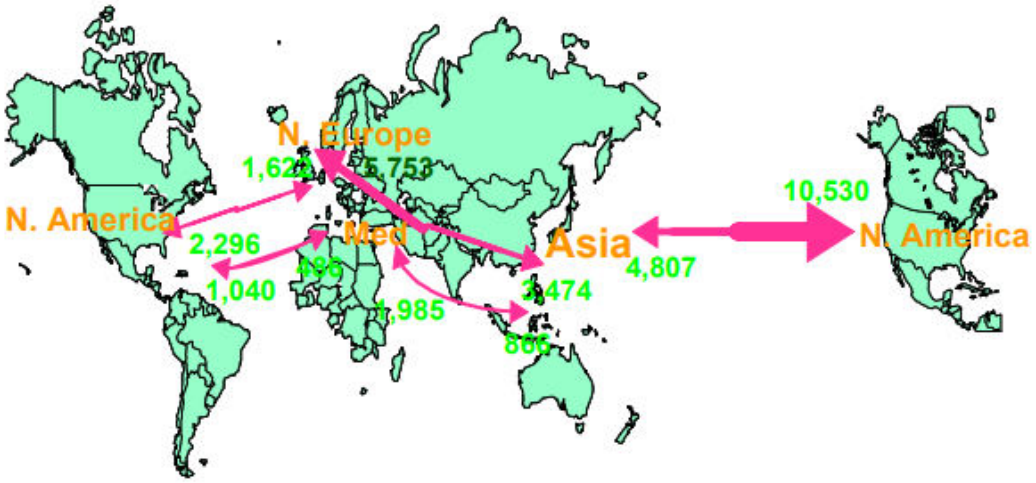

Figure 3. Container trade flow volumes of east/west axis in 2004

1.3 The shipping lines and strategic alliances

Strategic alliances have formed in order to extend economies of scale, scope and network, through strategies such as the integrating of individual service networks, vessel sharing, slot-chartering, joint ownership and/or utilization of equipment and terminals and similar endeavors on better harmonization of operations. Liner carrier alliances are developing at least two different types: (1) core alliances with a set of global partners, (2) multi-consortia networks of slot exchanges covering individual traders. Through this kind of global alliance arrangement, a lot of scale benefits can be achieved: more frequent service, shorter transit times, wider port coverage, lower slot costs and a stronger bargaining position in negotiating with terminal operators, container depots and inland/feeder transportation carriers. Liner alliances operational cooperation are summarized as follows: (1)Joint terminals or terminal contracts, (2)Joint mainline services, (3)Joint feeder services, (4)Joint purchase or ownership of ships, (5)Joint purchase and usage of containers, (6)Joint intermodal, rail or trucking operations, (7) Joint container depots, (8)Jointly-managed pools of containers and equipments, (9)Joint EDI systems, (10)Joint bunker purchase, and (11)Interchange of empty containers.

Liner	Country	Number of Ships	Capacity in TEU*	Share of world capacity
Maersk/Sealand	Denmark	305	848,611	9.4%
MSC	Switzerland	250	649,403	7.2%
P&O Nedlloyd	UK/Netherlands	144	412,519	4.5%
CMA CGM	France	124	353,678	3.9%
Evergreen	Taiwan	124	344,285	3.8%
APL	Singapore	96	307,094	3.4%
Cosco	China	110	274,465	3.0%
Hanjin	Republic of Korea	68	271,644	3.0%
CSCL	China	103	247,812	2.7%
NYK	Japan	74	243,339	2.7%
Sum		1,398	3,952,850	43.6%
World fleet		7,594	9,070,065	100%

*TEU: Twenty foot equivalent unit.
Source: Containerization International online database accessed 29 January 2005.

Top 10 shipping lines

Rank	CONTAINER LINE *(Owner)*	Annual TEUs Carried
1.	MAERSK SEALAND	2,673,606
2	APL	1,452,312
3.	EVERGREEN LINE	1,440,974
4.	HANJIN SHIPPING	1,416,947
5.	MEDITERRANEAN SHIPPING	1,115,360
6.	P&O NEDLLOYD	971,012
7.	OOCL	940,310
8.	COSCO	900,637
9.	HYUNDAI MERCHANT MARINE	890,754
10.	NYK LINE (NIPPON YUSEN KAISHA)	864,206
11.	HAPAG LLOYD	841,020
12.	K LINE (KAWASAKI KISEN KAISHA)	812,924
13.	YANG MING LINE	748,949
14.	MOL	642,322
15.	CHINA SHIPPING CONTAINER LINE	552,472
16.	ZIM CONTAINER	552,323
17.	CMA-CGM	495,111
18.	LYKES LINES *(C.P. Ships)*	404,393
19.	LLOYD TRIESTINO *(Evergreen)*	399,474
20.	CROWLEY LINER SERVICES	259,260
21.	HATSU MARINE *(Evergreen)*	242,208
22.	DOLE OCEAN CARGO EXPRESS	237,885
23.	GREAT WHITE FLEET LTD	183,682
24.	TMM LINES *(C.P. Ships)*	175,355
25.	COLUMBUS LINES *(Hamburg Sud)*	154,056
26.	WAN HAI LINES LTD	117,407
27.	COMPANIA SUD AMERICANA DE VAPORES	116,627
28.	ATLANTIC CONTAINER LINE	112,949
29.	SAFMARINE *(Maersk-Sealand)*	<100,000
30.	CONTSHIP CONTAINERLINES *(C.P. Ships)*	"
31.	AUSTRALIA NEWZEALAND DIRECT LINE *(C.P. Ships)*	"
32.	UNITED ARAB SHIPPING	"
33.	NORASIA (CVSA)	"
34.	CROWLEY AMERICAN TRANSPORT *(Hamburg Sud)*	"
35.	ITALIA LINE *(C.P. Ships)*	"
36.	LIBRA NAVEGACAO	"
37.	EMPRESA DE NAVEGACAO *(Hamburg Sud)*	"
38.	WALLENIUS WILHELMSEN LINES	"
39.	HOEGH UGLAND AUTO LINERS	"

Note: Annual TEU figures for May 1, 2003– April 30, 2004

Top 40 shipping lines

Alliances, acquisitions and mergers have been seen as elements of an industry-wide strategy to return to profitability via cost cutting and rationalization. While intense competition and low profitability have encouraged rationalization, the preferred method of achieving the objective has changed over time. Strategic alliances were preferred in the late 1980s and early 1990s, culminating in the formation of the Grand and Global Alliance. More recently the emphasis has switched to merger and acquisition.

Co-operative ventures in container shipping began with the formation of consortia in the late 1960s and 1970s in order to raise the capital required to mount container services. However, the services provided by these consortia were marketed collectively, restricting the ability of member lines to differentiate their product. Strategic alliances of the late 1980s and 1990s differ from the early consortia so far as the geographical scope of their operations and marketing practices are concerned. Whilst consortia of the 1970s operated in a single trade, alliances of the 1980s and 1990s are global in scope.

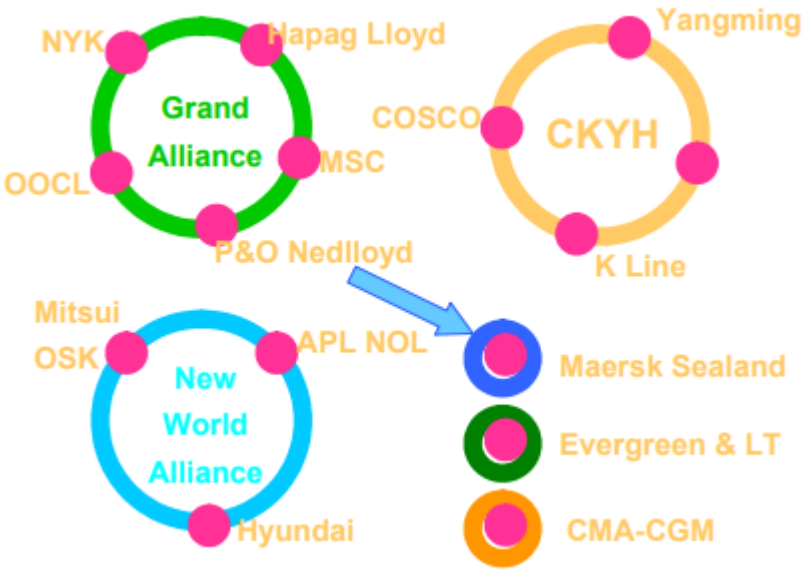

Figure 4. Mega carriers and shipping alliances

Thus, Hapag-Lloyd, NOL, NYK and P&O formed the so-called‘GrandAlliance’in1995 to operate services in both the Europe-Asia and Asia-North America trades. APL, MISC, Mitsui-OSK, Nedlloyd and OOCL responded by forming the short-lived ‘GlobalAlliance’, while Maersk and Sea-Land created a global operating network featuring vessel-sharing agreements in the Europe-Asia, trans-Atlantic, trans-Pacific and intra-Asian trades. Note also that today’s alliances leave marketing in the hands of individual member lines.

Mergers Supersede Alliances. To achieve the desired scale economies, liner shipping companies have begun forming global alliances since the beginning of the 1990s. These have been less stable than initially expected because members of different alliances have merged, forcing the alliances to adjust their schedules. This instability prevents alliances from making long-term investments, especially in land-based

activities. As a consequence, the full cost saving potential cannot be realized, which in turn reduces the willingness of carriers to make.

Mergers and acquisitions have resulted in some very large liner shipping companies; the top 20 carriers now control more than half of the world's container slot capacity. Since the beginning of the 1990s, liner companies have begun to form global alliances; the largest 10 groupings now control about two-thirds of the world's container slot capacity.

1.4 The containerships

The average container ship size has increased by two-thirds from 955 TEUs in 1980 to more than 1,600 in 1996. One of the factors contributing to this trend is the introduction of the so-called post-Panamax containerships. The first post-Panamax containership was built in 1988, yet only in 1995 did the worldwide container-carrying capacity of post-Panamax vessels start to increase significantly. So far, post-Panamax vessels are employed only on two major routes: (1) trans-Pacific and (2) between Europe and the Far East. The latter is sometimes part of a pendulum service that reaches the U.S. East Coast.

The historical tendency for ship size to increase re-emerged in the mid 1990s, several owners choosing to order vessels that were too large to transit the Panama Canal, thus sacrificing operational flexibility. Hyundai, Maersk, Mitsui-OSK, NYK, OOCL and P&O Nedlloydordered'post-panamax'tonnageinthelatteryearsofthe1990s.Maerskcommissed several 6,000-6,600teu post-Panamax vessels, while P&O Nedlloyd introduced four 6,700teu vessels and NYK five 5,700teu vessels into Europe-Asia service. Post-Panamax vessels operate exclusively on the Europe-Far East and US West Coast-Asia-Europe routes.

Year Size	*Class or Type*	*Capacity (TEU)*	*Constraints on Ship*
1964-67	1st Generation	1000	None
1967-72	2nd Generation	1500	None
1972-84	3rd Generation	3000	Panama Canal width (32.3m)
1984-95	4th Generation	4500	Panama Canal length (294m)
1995-channels	5th Generation (Post-Panamax)	6000+	Depth of port

Growth in size of containerships

While the average size of container vessels employed in the major trades continued to increase after 1985, the size of the largest vessels stabilized at the 4500teu level for almost a decade. Why didn't owners invest in larger tonnage? Two explanations have been suggested. First, it has been argued that vessel size was constrained by limitations of length (294m) and width (32.3m) imposed by locks on the Panama Canal. Second, it has been argued that Vessel Sharing Agreements, which encourage owners to take full advantage of economies of ship size, remained relatively uncommon until the 1990s.

Technological developments in ship design and construction, and the ensuing economies of scale of larger ships, have also promoted trade, particularly that of developing nations, by making economical the transportation of goods over long distances. Nowadays, containers are increasingly carried by specialized container ships many of which are able to carry more than 5000 TEUs, while designs for 8000, 10000, or even 15000 TEU ships are already on the drawing boards of naval architects.

Size Range (Teu)	No. of Vessels	%	Total Capacity (Teu)	%	Average Speed (Knots)
<500	447	14.0%	137,859	2.1%	14.0
500-999	587	18.3%	415,973	6.4%	16.7
1000-1499	510	15.9%	605,583	9.3%	18.4
1500-1999	405	12.6%	687,206	10.5%	19.5
2000-2499	267	8.3%	606,025	9.3%	20.6
2500-2999	231	7.2%	628,765	9.6%	21.5
3000-3999	277	8.7%	949,527	14.5%	22.5
4000-4999	238	7.4%	1,046,353	16.0%	23.9
5000-5999	131	4.1%	720,159	11.0%	25.4
6000-6999	80	2.5%	517,378	7.9%	25.2
7000-7999	27	0.8%	197,610	3.0%	25.0
8000+	2	0.1%	16,126	0.2%	26.0

Source: Fossey et al., 2004.

World containership fleet by size range

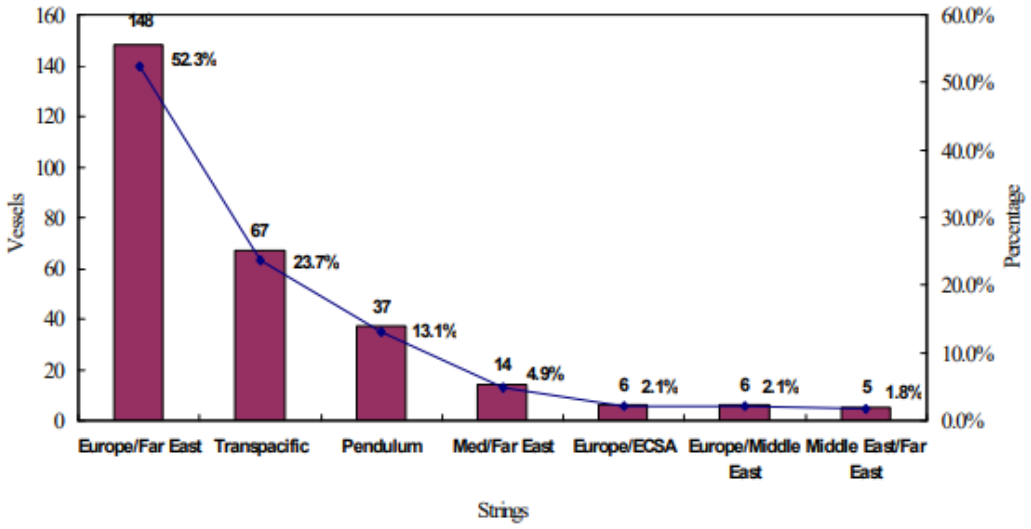

Figure 5. 2004 Post-Panamax containership deployment patten

Of the 84 post-Panamaxes afloat, or on order, 50 have been ordered in batches of five or six, a number suggesting use on 35-or 42-day transpacific round voyages, at least initially. It looks, however, as if 40% of the declared ships will, in the event, find employment on the Far East/Europe run. The operators intending to use them on the Pacific all operate multiple strings there: the big ships are likely to be employed on the most prolific routes. The opportunities for mixing and matching on Far East/Europe are less, because of the essentially linear nature of the route.

Intense competition and economies of vessel size lie behind recent increases in the size of container ships. Economies of vessel size arise from the technical characteristics of container shipping: the capital cost per container slot falls as vessel size increases, while the ratio of crew to carrying capacity and the consumption of fuel per unit of cargo carried also decline as vessel size increases.

1.5 The Service Routes

Currently, shipping lines operate three general types of deep-sea itineraries: end to end, pendulum and round the world service routes, which are shown in Figure 6. End to end services schedule vessels back and forth between two continents. Pendulum services schedule vessels back and forth between three continents with one of these continents as a fulcrum, with the points at either end of the pendulum swing linked only through the fulcrum. This type of service offers a way to fill container slots four

times on the same voyage and to eliminate certain overlapping port calls in the fulcrum area. The merging of separate end-to-end services into a pendulum or round the world service serves the two main purposes of broadening the range of through services and reducing the number of ships required to provide the same coverage. This gives a major cost saving by merging the previously duplicated port calls in the central region of the pendulum. Also round the world services can overcome the problems of end-to-end operations, by accommodating the needs of global corporations.Theworld's three principal trade corridors are tied together into one and this type of service can move in either direction, moving westward or eastward or in both directions.

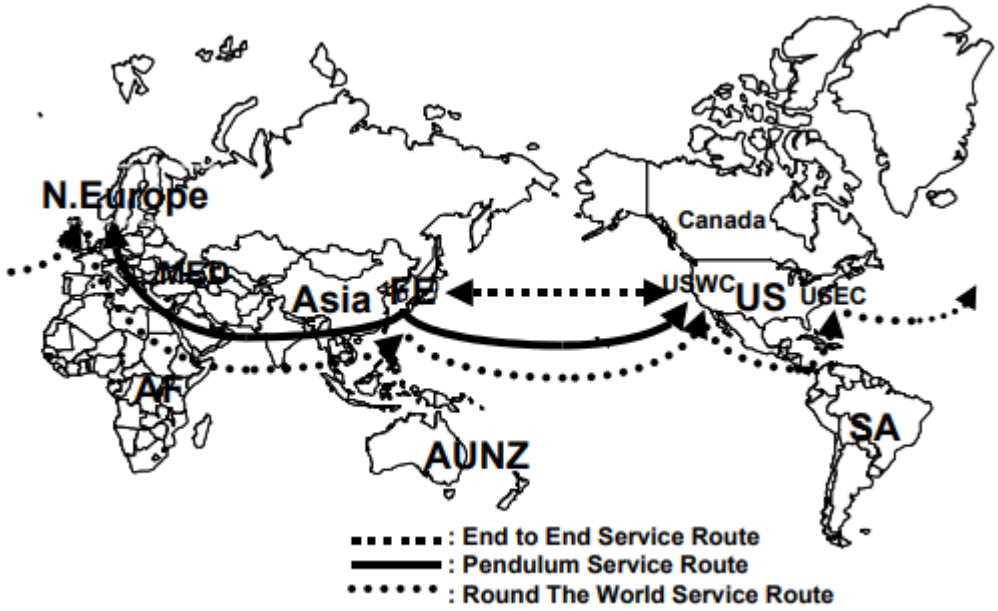

Figure 6. Three types of liner service routes

Intense competition in container markets not only makes it necessary for ship owners to offer high quality services between major trading regions but also makes it imperative for them to optimize fleet utilization. Such pressures have led to the development of multi-route operatingpatterns,notably'Round-the-World'and'Pendulum'services,enablingcarriers to maximize vessel employment and slot utilization.

North America-Europe-Asia, with vessels continually circling the globe in an eastbound or westbound direction. 'Pendulum' services, operated by a large number of carriers including Hanjin and Yang Ming, typically operate over all or some

portion of the route linking the East Coast of North America, via Europe and Asia to the West Coast of North America, returning via the same route. Since vessels employed on 'Pendulum' services, unlike those employed in RTW services, are not required to transit the Panama Canal, post-Panamax vessels may be used.

The number of multi-string services expanded greatly during the 1990s. Owners offering multi-string services broaden the scope for direct calls by operating a number of strings stand-alone services with dedicated vessels each of which offers different port calls and/or a different port rotation. There is a tendency for vessels employed in each string of a multi-stringoperationtocallatcommonor'core'portsSingapore,HongKong,Oakland and Long Beach in the case of the trans-Pacific trade as well as a range of 'non-core'ports. Non-core ports may be served by only one string of a multi-string service. Containers consigned to and from non-core ports are transhipped at core ports. Since a multi-string operation requires a rather large number of vessels a trans-Pacific string requires a minimum of five vessels owners typically co-operate to provide services.

There was a substantial re-engineering of multi-string services in 1998 and 1999 in response both to the volatility of trade flows during and after the Asian financial crisis and to the continuing growth in the volume of Chinese exports. In the trans-Pacific trade, the Grand Alliance added a seventh string, while Maersk/Sea-Land, Cosco and Evergreen also added strings. The introduction of new strings was encouraged by highly competitive time charter rates for container ships. The trend was sharply reversed in 2000-01. A weakening in demand for container shipping services led to the consolidation of multi-string services.

1.6 The container ports and 'hub-and-spoke' networks

Container lines have sought to minimize costs by limiting the number of port calls. In so doing they have re-emphasized the importance of regional hub ports, notably Singapore and Hong Kong. Cargo to and from the region served by a hub port is handled by feeder shipping and/or by land transport. In archipelagic South East Asia, an extensive network of regional feeder services has evolved. The emerging pattern of mainline and feeder services is analogous with the `hub-and-spoke' system.

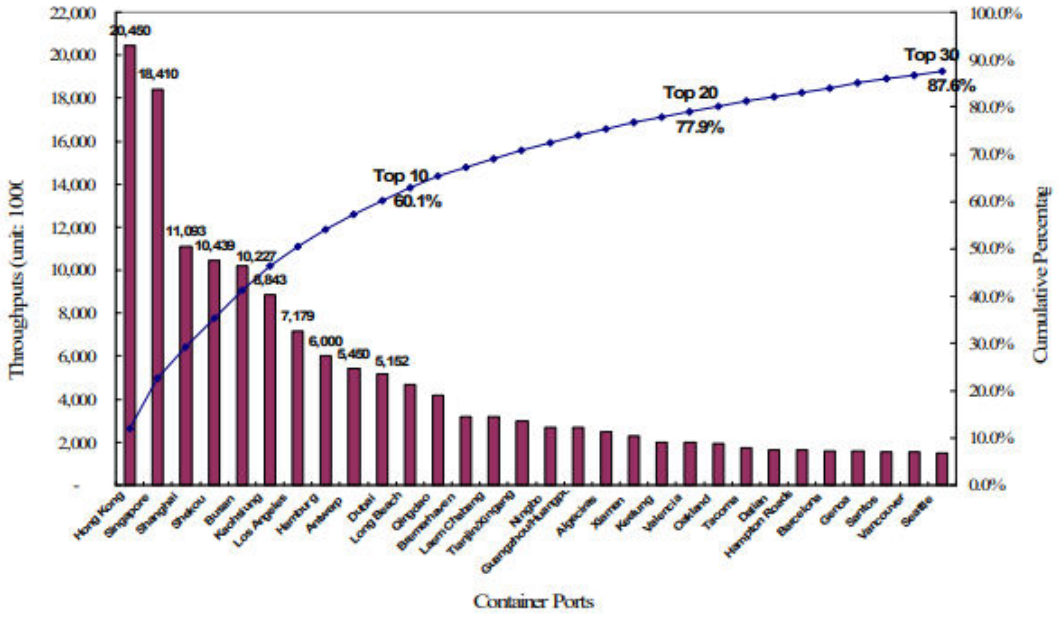

Figure 7. Top 30 container port throughputs

The feeder networks based on major hub ports are expanding geographically. Thus, the feeder network operating from Singapore, developed to serve South East Asia (Malaysia, Indonesia, Thailand), has spread eastward to Vietnam and the Philippines, westward to the Indian sub-continent and the Gulf, as well as southward to Australasia. In some cases feeder links into major hubs have replaced direct services. For example, Hapag-Lloyd abandoned its direct Europe/Indonesia service in 1990, preferring to feeder cargo via Singapore into its Europe/Far East service. Economic forces appear to be favoring the emergence of 'super-hubs': the changing pattern of port calls by vessels in the Europe-Far East trade suggesting that Singapore, Hong Kong and Tokyo are strengthening their competitive position vis-a-vis other hubs in East Asia.

Frequent changes in the pattern of mainline and feeder services suggest that the system is still evolving; that the economic forces driving change have not as yet been fully accommodated. Rapidly changing trade patterns, especially in East and South East Asia, add to this instability. Hence we would expect to see further modifications to the pattern of mainline and feeder services, as well as changes in the absolute and relative status of regional ports, over the next decade.

A likely long-term future scenario implies the use of container ships with 8,000-15,000 TEU capacity on the major east-west routes, calling at just four or five mega

hubs, i.e. only one or two on each continent. These mega hubs will be almost entirely based on transshipped cargo, implying various levels of regional and sub-regional transshipment centers. Containers are increasingly transshipped, and hub ports that provide transshipment services have experienced particularly high growth rates.

1.7 The mega trends

Arguably, such intense competition stems from:

- The cost characteristics of container shipping, especially the high level of fixed costs;
- The continuing imbalance between the supply of and demand for container shipping, stemming from a high level of entry and widespread and continuing subsidization of both shipping and shipbuilding;
- The ease and efficiency with which containers can be transhipped, enabling shippers to route containers via a number of paths through a dense transport network.

The intense competition felt in all major Northern Hemisphere container shipping trades in the 1990s and 2000s forced shipping companies to adopt innovative, productivity enhancing and cost-cutting strategies. These include:

- Employing larger vessels on routes where cargo volumes permit, especially in mainline East-West Northern Hemisphere trades;
- Developing new service patterns, including 'Round the World', 'Pendulum', and 'multi-string' services;
- Reducing the number of port calls, leading to the growth of regional 'hub' ports;
- Developing a network of feeder services linking hub and regional ports in South East Asia.

Vessel sizes, mergers, and transshipment are closely interrelated. As the maximum ship sizes go up, so does the economic incentive to transship containers from and to smaller vessels. More transshipment leads to global mainline and feeder networks. Global networks and bigger ships together require a high initial capital expenditure, which only very large commercial units can afford. Larger ships and more

transshipment oblige ports to incur high investments in dredging, information technology, and gantry cranes. Simultaneously, as port productivity increases, the time ships have to spend in port decreases, which in turn encourages more transshipment and the use of even larger ships.

The mega trend for liner shipping industries is characterized as follows:

(1) More large containerships to be deployed to main trade routes

Technological developments in ship design and construction, and the ensuing economies of scale of larger ships, have also promoted trade, particularly that of developing nations, by making economical the transportation of goods over long distances. Carriers have been conducting the incessant drive to cut costs through the deployment of larger ships. Nowadays, containers are increasingly carried by specialized cellular container ships many of which are able to carry more than 5,000 TEUs, while designs for 8,000, 10,000, or even 15,000 TEU ships are already on the drawing boards of naval architects. These so-called post-Panamax ships have been deployed to east-west main trade routes, and many of similar type ships are under construction and delivered in a couple of years.

(2) Trade imbalance and surging repositioning costs

One of the major cost items in liner shipping has to do with containers. The container flow across the world does not coincide with the routing of container ships, because containers do not spend all their time onboard ships. They need to be picked up and delivered at inland locations, maintained, and repaired, or may be repositioned. On main west-east trade routes, more cargo moves in one direction compared to the other. Such a route is known as an unbalanced route, or a route with trade imbalance. This is the case, for instance, of the Far East –Europe and Asia –U.S. west coast, two of the three main liner routes where most of the full containers travel westbound and eastbound respectively.

(3) High fixed costs and freight variable costs

To keep pre-advertised time schedules, ships of one fleet must leave ports of call regardless of whether they are full or not. Voyage costs thus become fixed (i.e. independent from the amount of cargo loaded). Next, imagine the admittedly simplified case where, minutes before the ship sets sail, an unexpected customer

arrives at the port with one container to the ship. If the vessel has unfilled capacity, which is often the case in liner shipping, its operator would be tempted to take on the extra container even at a price as low as merely the extra (marginal) cargo-handling costs involved in taking the container onboard. If this were to become common practice among operators, competition among them would push prices down to the level of short-run marginal costs and consequently the liner service would not be sustainable in the long-run, as operators would not be able to cover full costs (most importantly capital costs such as depreciation allowances for the eventual replacement of the ships).

(4) Undifferentiated services

Apparently, containerization makes it increasingly difficult to justify price segmentation on the basis of the alleged need for different treatment of goods according to their particular characteristics (e.g. volume, stowage, cargo-handling). Major service quality variables are considered to be similar: the provision of information and EDI systems; logistics services; better coordination and integration with inland transport companies; ownership of terminals and equipment; frequency of service; geographical coverage; and efficient response to the requirements of customers.

(5) Price wars and destructive competition

The industry with over capacity and lower price elasticity of demand is highly competitive with freight rates fluctuating wildly even in the course of a single week. A pessimistic concept in explaining the structure of liner shipping markets is that of destructive competition (Davies, 1990). This process, whereby competition will eventually lead to the destruction of the liner service itself, provides the basis for some new perspectives on the market structure of liner shipping.

(6) Streamlining terminal operations

Port industry has invested a lot in order to cope with the technological requirements of containerization. Modern container terminals equipped more efficient quay cranes have been built, and more efficient organizational forms including privatization have been adopted in an effort to speed up port operations. Operational practices have been streamlined, the element of uncertainty in cargo flows largely removed, forward

planning has been facilitated, port labor regularized and customs procedures simplified. These developments took place under the firm understanding of governments and local authorities that ports now constitute the most important link and node in the overall door-to-door transport chain.

(7) Hub-and-spoke operations

Capital intensity and large ships in this industry obliges container ships to limit their ports of call at each end to some of hub ports such as Singapore, Hong Kong, and Rotterdam, from where a great deal of containers are further transshipped with feeders to regional and local ports. A complex hub-and-spoke networks have thus developed, thus fine-tuning and optimization of service network and schedules have been demanding by carriers.

(8) Strategic alliances

Regularity and frequency of service, the two imperatives of liner shipping, combined with deploying very large container ships, can easily lead to low capacity utilization for independent carriers. Therefore, strategic alliances have formed in order to extend economies of scale, scope and network, through strategies such as the integrating of individual service networks, vessel sharing (i.e. joint fleet), slot-chartering, joint ownership and/or utilization of equipment and terminals and similar endeavors on better harmonization of operations. Alliances are also coalitions of carriers, but contrary to the route-based character and price-setting objectives of conferences, alliances aimed at rationalizing operations, rather than involving in price-setting strategies.

CHAPTER 2 – OCEAN LINER

An ocean liner is a passenger ship primarily used as a form of transportation across seas or oceans. Liners may also carry cargo or mail, and may sometimes be used for other purposes (e.g., for pleasure cruises or as hospital ships).

Cargo vessels running to a schedule are sometimes called liners. The category does not include ferries or other vessels engaged in short-sea trading, nor dedicated cruise ships where the voyage itself, and not transportation, is the prime purpose of the trip.

Nor does it include tramp steamers, even those equipped to handle limited numbers of passengers. Some shipping companies refer to themselves as "lines" and their container ships, which often operate over set routes according to established schedules, as "liners".

Ocean liners are usually strongly built with a high freeboard to withstand rough seas and adverse conditions encountered in the open ocean. Additionally, they are often designed with thicker hull plating than is found on cruise ships, and have large capacities for fuel, food and other consumables on long voyages.

The first ocean liners were built in the mid-19th century. Technological innovations such as the steam engine and steel hull allowed larger and faster liners to be built, giving rise to a competition between world powers of the time, especially between the United Kingdom and Germany. Once the dominant form of travel between continents, ocean liners were rendered largely obsolete by the emergence of long-distance aircraft after World War II. Advances in automobile and railway technology also played a role. By 2015, the only ship still in service as an ocean liner is the RMS Queen Mary 2 after RMS Queen Elizabeth 2 was retired in 2008. Of the many ships constructed over the decades, only nine ocean liners made before 1967 survive.

2.1 Overview

Ocean liners were the primary mode of intercontinental travel for over a century, from the mid-19th century until they began to be supplanted by airliners in the 1950s. In addition to passengers, liners carried mail and cargo. Ships contracted to carry British Royal Mail used the designation RMS. Liners were also the preferred way to move gold and other high-value cargoes.

The busiest route for liners was on the North Atlantic with ships travelling between Europe and North America. It was on this route that the fastest, largest and most advanced liners travelled. But while in contemporary popular imagination the term "ocean liners" evokes these transatlanticsuperliners, most ocean liners historically were mid-sized vessels which served as the common carriers of passengers and freight between nations and among mother countries and their colonies and dependencies in the pre-jet age. Such routes included Europe to African and Asian colonies, Europe to South America, and migrant traffic from Europe to North America in the 19th and

first two decades of the 20th centuries, and to Canada and Australia after the Second World War.

Shipping lines are companies engaged in shipping passengers and cargo, often on established routes and schedules. Regular scheduled voyages on a set route are called "line voyages" and vessels (passenger or cargo) trading on these routes to a timetable are called liners. The alternative to liner trade is "tramping" whereby vessels are notified on an ad-hoc basis as to the availability of a cargo to be transported. (In older usage, "liner" also referred to ships of the line, that is, line-of-battle ships, but that usage is now rare.) The term "ocean liner" has come to be used interchangeably with "passenger liner", although it can refer to a cargo liner or cargo-passenger liner.

Beginning at the advent of the Jet Age, where transoceanic ship service declined, a gradual transition from passenger ships as mean of transportation to nowadays cruise ships started. In order for ocean liners to remain profitable, cruise lines have modified some of them to operate on cruise routes, such as Queen Elizabeth 2 and SS France. Certain characteristics of older ocean liners made them unsuitable for cruising, such as high fuel consumption, deep draught preventing them from entering shallow ports, and cabins (often windowless) designed to maximize passenger numbers rather than comfort. The Italian Line's SS Michelangelo and SS Raffaello, the last ocean liners to be built primarily for crossing the North Atlantic, could not be converted economically and had short careers.

2.2 Characteristics

2.2.1 Size and speed

Since their beginning in the 19th century, ocean liners must meet growing demands. The first liners were small and thus overcrowded, leading to unsanitary conditions on board. Eliminating these phenomenons required larger ships, to reduce the crowding of passengers, and faster ships, to reduce the duration of transatlantic crossings. The iron and steel hulls and steam power allowed for these advances. Thus, SS Great Western (1,340 GRT) and SS Great Eastern (18,915 GRT) were constructed in 1838 and 1858 respectively.The record set by Great Eastern was not beaten until 43 years later in 1901 when RMS Celtic (20,904 GT) was completed. The tonnage then grew profoundly: the first liners to have a tonnage that exceeded 20,000 were the Big

Four of the White Star Line. The Olympic-class ocean liners, first completed in 1911, were the first to have a tonnage that exceeded 45,000. SS Normandie, completed in 1935, had a tonnage of 79,280. In 1940, RMS Queen Elizabeth raised the record of size to a tonnage of 83,673. She was the largest passenger ship ever constructed until 1997. In 2003, RMS Queen Mary 2 became the largest, at 149,215 GT.

In the early 1840s, the average speed of liners was less than 10 knots (a crossing of the Atlantic thus took about 12 days or more). In the 1870s, the average speed of liners increased to around 15 knots the duration of a transatlantic crossing shortened to around 7 days, owing to the technological progress made in the propulsion of ships: the rudimentary steam boilers gave rise to more elaborate machineries and the paddlewheel gradually disappeared, replaced first by one helix then by two helixes. At the beginning of the 20th century, Cunard Line's RMS Lusitania and RMS Mauretania reached a speed of 27 knots. Their records seemed unbeatable, and most shipping companies abandoned the race for speed in favor of size, luxury, and safety The advent of ships with diesel engines, and of those whose engines were oil-burning, such as the Bremen, in the early 1930s, relaunched the race for the Blue Riband. The Normandie won it in 1935 before being snatched by RMS Queen Mary in 1938. It was not until 1952 that SS United States set a record that remains today: 34.5 knots (3 days and 12 hours of crossing the Atlantic). In addition, since 1935, the Blue Riband is accompanied by the Hales Trophy, which is awarded to the winner.

2.2.2 Passenger cabins and amenities

The first ocean liners were designed to carry mostly migrants. On-board sanitary conditions were often deplorable and epidemics were frequent. In 1848, maritime laws imposing hygiene rules were adopted and they improved on-board living conditions. Gradually, two distinct classes were developed: the cabin class and the steerage class. The passengers traveling on the former were wealthy passengers and they enjoyed certain comfort in that class. The passengers traveling on the latter were members of the middle class or the working class. In that class, they were packed in large dormitories. Until the beginning of the 20th century, they did not always have bedsheets and meals. An intermediate class for tourists and members of the middle class gradually appeared. The cabins were then divided into three classes. The facilities offered to passengers developed over time. In the 1870s, the installation of

bathtubs and oil lamps caused a sensation on board RMS Oceanic. In the following years, the number of amenities became numerous, for example: smoking rooms, lounges, and promenade deck. In 1907, the RMS Adriatic even offered turkish baths and a swimming pool. In the 1920s, SS Paris was the first liner to offer a movie theatre.

2.3 Routes

2.3.1 North Atlantic

The most important of all routes taken by ocean liners was the North Atlantic route. It accounted for a large part of the clientele, who traveled between ports of Liverpool, Southampton, Hamburg, Le Havre, Cherbourg, Cobh, and New York City. The profitability of this route came from migration to the United States. The need for speed influenced the construction of liners for this route, and the Blue Riband was awarded to the liner with the highest speed. The route was not without danger, as storm and icebergs were common in the North Atlantic. Many shipwrecks occurred on this route, the most famous of which was that of RMS Titanic. This route was the preferred route for major shipping companies and was the scene of fierce competition between them.

2.3.2 South Atlantic

The South Atlantic was the route frequented by liners bound for South America, Africa, and sometimes Oceania. The White Star Line had some of its ships, such as the Suevic, on the Liverpool-Cape Town-Sydney route. There was no competition in the South Atlantic as there was in the North Atlantic. There were fewer shipwrecks. The Hamburg Süd operated on this route. Among its ship was the famed SS Cap Arcona.

2.3.3 Mediterranean

The Mediterranean Sea was frequented by many ocean liners. Many companies benefited from migration from Italy and the Balkans to the United States. Cunard's RMS Carpathia served on the Gibraltar-Genoa-Trieste route. Similarly, Italian liners crossed the Mediterranean Sea before entering the North Atlantic Ocean. The opening of the Suez Canal made the Mediterranean a possible route to Asia.

2.3.4 Indian Ocean and the Far East

Colonization made Asia particularly attractive to shipping companies. Many government officials must travel there from time to time. As early as the 1840s, the P&O organized trips to Calcutta via the Suez Isthmus, as the canal had not yet been built. The time it took to travel on this route to India, Southeast Asia, and Japan was long, with many stopovers. The Messageries Maritimes operated on this route, notably in the 1930s, with its motor ships. The most famous of its ships was the Félix Roussel. Similarly, the La Marseillaise, put into service in 1949, was one of the flagships of its fleet. Decolonization caused the loss in the profitability of these ships.

CHAPTER 3 – CARGO LINER

A cargo liner is a type of merchant ship which carries general cargo and often passengers. They became common just after the middle of the 19th century, and eventually gave way to container ships and other more specialized carriers in the latter half of the 20th century.

3.1 Characteristics

A cargo liner has been defined as:

A vessel which operated a regular scheduled service on a fixed route between designated ports and carries many consignments of different commodities.

Cargo liners transported general freight, from raw materials to manufactures to merchandise. Many had cargo holds adapted to particular services, with refrigerator space for frozen meats or chilled fruit, tanks for liquid cargos such as plant oils, and lockers for valuables. Cargo liners typically carried passengers as well, usually in a single class. They differed from ocean liners which focussed on the passenger trade, and from tramp steamers which did not operate on regular schedules. Cargo liners sailed from port to port along routes and on schedules published in advance.

3.2 History

The steam powered cargo liner developed in the mid-19th century with the advancement of technology allowing bigger steamships to be built. As cargo liners were generally faster than tramp cargo ships, they were used for the transport of perishable and high-value goods, as well as providing a passenger service. At first, they were mostly used in Europe and America as well as across the Atlantic Ocean between Europe and America. Longer routes, such as that to Oceania, mainly remained in the hands of sailing ships a little bit longer, due to the inefficiency of the steamship of the time, until the late-1860s when the 1869 opening of the Suez Canal put sailships to disadvantage.

The use and increased reliability of the compound steam engine gave greater fuel efficiency and opened these routes up to steamships. Alfred Holt pioneered the use of these engines in his steamships. By the last third of the 19th century it was possible for a steamship to carry enough coal to travel 6,000 miles (9,700 km) before needing to refuel. The opening of the Suez Canal in 1869 and the Panama Canal in 1914 also made the use of cargo liners more profitable, and made possible regular scheduled overseas services.Cargo liners soon comprised "the great portion of the British merchant fleet", the largest in the world.

With a focus on high-value freight, most cargo liners carried a limited number of passengers, most commonly 12, as British regulations required a doctor for ships with over 12 passengers.

The decline of the cargo liner came in the 1970s with the introduction of container ships. Surviving examples include RMS St Helena and Claymore II.

A number of large container vessels still offer a small number of berths to paying passengers. Typically a maximum of 12 passengers are carried as the ship would be legally required to carry a doctor if a greater number were on board. The recreational facilities are those used by the crew and may be limited to a lounge, a gym with exercise equipment and a small swimming pool. Such journeys are of interest to people seeking an unusual travel experience.

CHAPTER 4 – INTERMODAL LINER

Intermodal shipping is a method of moving cargo that involves more than one kind of transportation, whether truck, rail, ship or plane. It uses special containers so goods can be transferred from ship to rail to truck without having to be repacked. The most common combination used is truck and rail. In a typical example, cargo is picked up at the point of origin by truck, transported to a loading site onto a train and shipped the majority of the distance by rail, and then unloaded and transported by truck to the final destination. A major benefit of this arrangement is lower fuel costs, as trains are around three times more efficient than long-haul trucks. Drawbacks include less flexibility, as firms are limited to places where there are train routes, and slower shipping times. Rail intermodal moves totaled 14,078,952 in 2007.

The transportation industry depends on a healthy economy to keep goods moving around the country. When consumer demand falls, fewer goods are shipped and intermodal shipping companies lose revenue. Another factor that will affect transportation firms is fuel costs. In the short term, rising gas prices will increase demand for intermodal services, as they are more efficient than trucking alone.

Intermodalism originated in maritime transportation, with the development of the container in the late 1960's and has since spread to integrate other modes. It is not surprising that the maritime sector should have been the first mode to pursue containerization. It was the mode most constrained by the time taken to load and unload the vessels. A conventional break bulk cargo ship could spend as much time in a port as it did at sea. Containerization permits the mechanized handling of cargoes of diverse types and dimensions that are placed into boxes of standard sizes. In this way goods that might have taken days to be loaded or unloaded from a ship can now be handled in a matter of minutes.

The emergence of intermodalism has been brought about in part by technology and requires management units for freight such as containers, swap bodies, pallets or semi-trailers. In the past, pallets were a common management unit, but their relatively small size and lack of protective frame made their intermodal handling labor intensive and prone to damage or theft. Better techniques and management units for transferring freight from one mode to another have facilitated intermodal transfers. Early examples include piggyback (TOFC: Trailers On Flat Cars), where truck trailers are

placed on rail cars, and LASH (lighter aboard ship), where river barges are placed directly on board sea-going ships. A unique form of intermodal unit has been developed in the rail industry, particularly in the US where there is sufficient volume. Roadrailer is essentially a road trailer that can also roll on rail tracks. It is unlike the TOFC (piggyback) system that requires the trailer be lifted on to rail flat car. Here the rail bogies may be part of the trailer unit, or be attached in the railway yard. The road unit becomes a rail car, and vice-versa.

While handling technology has influenced the development of intermodalism, another important factor has been changes in public policy. Deregulation in the United States in the early 1980s liberated firms from government control. Companies were no longer prohibited from owning across modes, which developed a strong impetus towards intermodal cooperation. Shipping lines in particular began to offer integrated rail and road services to customers. The advantages of each mode could be exploited in a seamless system, which created multiplying effects. Customers could purchase the service to ship their products from door to door, without having to concern themselves of modal barriers.

The most important feature of intermodalism is the provision of a service with one ticket (for passengers) or one bill of lading (for freight). With one bill of lading clients can obtain one through rate, despite the transfer of goods from one mode to another. This has necessitated a revolution in organization and information control. At the heart of modern intermodalism are data handling, processing and distribution systems that are essential to ensure the safe, reliable and cost effective control of freight and passenger movements being transported by several modes. Electronic Data Interchange (EDI) is an evolving technology that is helping companies and government agencies (customs documentation) cope with an increasingly complex global transport system.

Intermodal transport is transforming a growing share of the medium and long-haul freight flows across the globe where large integrated transport carriers provide door to door services, such as the high degree of integration between maritime and rail transport in North America. In Europe rail intermodal services are becoming well-established between the major ports, such as Rotterdam, and southern Germany, and between Hamburg and Eastern Europe. Rail shuttles are also making their appearance

in China. While rail intermodal transport has been relatively slow to develop in Europe, there are extensive interconnections between barge services and ocean shipping, particularly on the Rhine. Barge shipping offers a low cost solution to inland distribution where navigable waterways penetrate to interior markets. The limits of intermodality are imposed by factors of space, time, form, pattern of the network, the number of nodes and linkages, and the type and characteristic of the vehicles and terminals.

4.1 Companies involved

Many intermodal shipping don't own their own trucks and trains. These companies, known ase non-asset based transportation firms or intermodal marketing companies (IMCs), contract with third-party carriers to ship goods. The firm buys container-hauling space in bulk from carriers, and then sells the space to clients at rates cheaper than what they could negotiate independently. This arrangement is also favorable to carriers because IMCs can offer large, consolidated shipping volumes. The major railroads, who dominate the intermodal market, rely on IMCs for their intermodal business.

Hub Group (HUBG): This non-asset based transportation company ships goods such as consumer products and retail merchandise. Intermodal operations constituted for 73% of total revenues in 2007. The remainder of HUBG's earnings comes from its truck brokerage (19%) and logistics (8%) segments. Operating 21 facilities throughout the U.S. and Canada, Hub Group has become the largest intermodal marketing company in the country and one of the top five truck brokers. Total revenue in 2007 was $1.66B.

C.H. Robinson Worldwide (CHRW): C.H. Robinson is a non-asset based shipping firm that holds contracts with 48,000 third-party carriers and shipped ~6.5M packages for approximately 29,000 customers in 2007. CHRW has 218 offices throughout North America, Europe, Asia and South America. Gross revenues in 2007 was $7.3B, 88% of which came from the transportation of goods; the balance of revenues came from distributing fresh produce, and its T-Chek Service Unit which provides management services to the trucking industry.

Pacer International (PACR): This non-asset based shipping company transports goods such as building materials, automotive parts, and electronics. The company's intermodal operations accounted for ~80% of total revenues in 2007. The remainder of PACR's revenue comes from its logistics segment, which provides international freight forwarding, supply chain management, and warehousing and distribution services. Total revenue in 2007 amounted to $1.97B.

J.B. Hunt Transport Services (JBHT): J.B. Hunt is a non-asset based transportation company that ships forest and paper products, building materials, food and beverage, chemicals, and automotive parts. It operates four business segments: intermodal (JBI), dedicated contract services (DCS), truckload freight (JBT) and integrated capacity solutions (ICS). In 2007 revenues were $3.5B, 47% of which came from JBI, 27% from DCS, 24% from JBT and 2% from ICS.

UTi Worldwide (UTIW): UTi is a shipping company that helps companies move goods between international manufacturers and markets. In 2007, UTi had a global network of ~440 facilities in which it consolidated shipments, and over 200 packaging and distribution centers in 65 countries. The company has operations in an additional 78 countries through relationships with independent, agent-owned offices. Revenues in 2007 totaled $3.6B, 57% of which were generated outside the U.S.

Expeditors International of Washington (EXPD): Expeditors International provides global shipping services to manufacturing and retail customers through third-party suppliers. At the end of September 2007, EXPD ran 174 full-service offices and had operations in over 30 countries. Net revenue was $1.5B in 2007. Airfreight services accounted for 36% of company revenues in 2007, while ocean freight operations made up 24% and customs brokerage comprised 40%.

Burlington Northern Santa Fe (BNI): BNI is the second-largest U.S. railroad company with over 6,300 locomotives and 32,000 route miles. The company ships freight throughout the western two thirds of the United States. BNI's consumer products' freight business (which includes the firm's international and domestic intermodal operations) generated ~37% of the company's $15.8B revenues in 2007. BNI operates 33 major intermodal hubs located across the U.S. and holds the largest market share in the domestic rail intermodal market at 43.9%.

Union Pacific (UNP): The Union Pacific railroad stretches from the Mississippi River to the Pacific Ocean and is the only railroad that serves all six major gateways to Mexico. UNP caters to six commodity groups: agricultural, automotive, chemicals, energy, industrial products, and intermodal. The firm generated revenue of $16.3 billion in 2007, 19% of which came from intermodal services. The firm holds 20.5% market share in the domestic rail intermodal market.

Norfolk Southern (NSC): Norfolk Southern operates ~21,000 miles of railroad track primarily in the eastern United States. NSC handled 3.1 million intermodal units in 2007, the revenues from which accounted for 20% of the company's railway operating revenues for the year. Total railway operating revenue was $9.7B in 2007. The firm holds 15.6% market share in the domestic rail intermodal market.

CSX: CSX operate a rail network comprised of more **than** 21,000 miles of track throughout the U.S. and Canada. Its main divisions are merchandise, coal , intermodal and automotive. Revenues totaled $10.0B in 2007. Intermodal operations accounted for ~14% of revenues and 30% of volume in that year. The firm holds 14.1% market share in the domestic rail intermodal market.

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