The Response of Liner Shipping Companies to the Evolution of Global Supply Chain Management

1. Introduction

The purpose of this chapter is to review developments in liner shipping in the light of the evolution of concepts and practices associated with supply chain and logistics management. The long-term developments have featured the shift in management philosophy away from managing functions individually to managing them as linked components of supply chain business processes (Lambert, 2001). This has had important implications for the expectations of shippers and the service decisions of shipping companies. Recently, shippers have shifted their strategies and priorities as a result of challenges in international logistics associated first with the congested conditions in container trades, especially in 2004–2005, and then with the recession of 2008 and 2009.

For many years, shipping lines were encouraged by their cost structure and the service interests of shippers to extend their services through horizontal and vertical corporate integration. The horizontal integration was pursued through internal growth, mergers and acquisitions and the on-going evolution of alliances. The vertical integration was achieved through shipping companies or the corporations of which they are a part extending their services through internal growth and acquisitions in three main areas. They are the management of container terminals, the provision of intermodal services and the provision of logistics services. The relationship of each of these services with the shipping activities deserves individual attention.

The extent and forms of integration have varied over the years as the challenges and opportunities for service suppliers have changed in the light of economic conditions and the interests of shippers. For example, the trade boom and congested conditions of 2004–2005 brought to light discontinuities in logistics management practices and in transportation capabilities associated, in particular, with port hinterland connections. As a result, attention has focused more than previously on the effective coordination among operations in and related to ports irrespective of ownership. This makes it appropriate to distinguish between the use of ‘integration’ referring to corporate and related organisational relationships and “coordination” referring to communication and operating relationships. This is to avoid the use of “integration” for both common ownership and the coordination of services and to give greater recognition to the challenges of achieving effective coordination along logistics chains.

In this chapter the evolving conditions in supply chain management and logistics are reviewed. This sets the stage to describe the responses of lines. Both the horizontal and vertical restructuring of lines are covered but the emphasis is on the latter. This part of the chapter draws, in particular, on Evangelista *et al*. (2001) and Heaver (2002). Interpretation of the patterns of relationships draws on the literature dealing with supply chain management, out-sourcing and transaction cost economics. The evolving organisational relationship between the shipping and logistics services of lines is explored in the concluding part of the chapter. The interests and conduct of shippers in the allocation

of traffic among lines and in the negotiation of liner rates and services appear vital to the relationships of shipping with logistics services.

2. Evolving Conditions in Supply Chain Management and Logistics

Liner shipping is but one of the myriads of service and product activities that are necessary for the delivery of the goods and services required by consumers. The opportunities and challenges faced by the lines are affected by the network environment in which they operate. As the environment changes under technological, economic and political conditions, so the lines have opportunities to follow strategies that give them an advantage in serving customers needs. These strategies have implications for the organisational structure of the liner industry. This section of the chapter starts by defining the concepts of supply chain and logistics management and then proceeds to examine the implications of customer needs and the associated challenges and opportunities for shipping. It concludes by describing some of the changes in the logistics industry that affect the position of liner shipping companies.

2.1 The definition of supply chain management and logistics management

The advance of more integrated approaches to the management of intra-corporate and inter-corporate relationships is well documented (Hall and Braithwaite, 2001). Even though Hall and Braithwaite suggest "there is little point in seeking to document a perfect definition for supply chain management", a definition is useful as it captures the importance of coordination. Mentzer *et al*. (2001) define supply chain management as: "the systematic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole."[1] That the "chains" referred to are more likely "networks" of private and public goods and services providers distributed globally is one of the possible shifts in the terminology that, fortunately, is generally treated as too esoteric to worry about.

Supply chain management is the wide framework within which logistics functions. The definition of logistics by the US Council of Supply Chain Management Professionals, formerly the Council of Logistics Management, reflects this. The definition is: "Logistics is that part of the supply chain process that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services, and related information between the point of origin and the point-of-consumption in order to meet customers' requirements."[2] It recognises that logistics management is only a part of the supply chain.

2.2 Customer needs and the challenges and opportunities for liner shipping

Global improvements in logistics performance have contributed to and been required by increased competition in product markets. The reduction of tariff and other trade barriers, improvements in the efficiency of transport services and the increased value and reduced weight of many products have all contributed to the ability of products from distant locations to compete locally. Multi-national firms that used to be organised with regional marketing and production divisions switched to product-based supply chains that source and market globally. Spatial competition (the competition in common markets for products from far away) is more important now than ever before.

Increased competition heightens pressures for the redesign of supply chains and logistics systems. The competition drives the need to reduce costs while, at the same time, maintaining or improving

service levels. While the actions taken to reduce costs and to improve services work concurrently and dynamically, it is convenient to describe them individually. Such actions are considered next, prior to considering their implications for shipping lines.

2.2.1 Developments in logistics

Four strategies provide examples of the central role for logistics in improving supply chain performance. They are: sourcing in low-cost locations; just-in-time delivery; postponement; and improving supply chain visibility.

Sourcing in low-cost locations: Industries have always made trade-offs among alternate locations based on the benefits of locating close to low cost resource inputs compared with the benefits of proximity to markets. Typically, industries in which labour costs are high gravitate to low wage-cost locations. The ability of firms to do this is dependent on efficient logistics services to get products to where they are needed. Examples of the pull of low cost production are the shift of manufacturing textile, footwear, automobile, electronic and toy products to Asia, particularly China. However, the attractiveness of shifting to low-cost production locations has decreased recently if logistics conditions for those locations have not been compatible with the operation of manufacturing and retailing with low inventories. For example, the changing pattern of activities in the hard disk drive industry in Asia has been affected by various aspects of time responsiveness, including transit and order cycle times (McKendrick *et al*., 2000). Similarly, the location and role of facilities of the Taiwanese computer manufacturer Acer reflects the trade off between costs of manufacture and assembly in Asia and the time of delivering product to consumers (Nemoto and Kawashima, 2000). The congestion experienced in ports in 2005 and the need for quicker responsiveness in supply chains made evident during the 2008–2009 recession have increased the value placed on shorter and more diversified supply chains. Shippers remain attracted to low cost locations but have become more alert to the logistics disadvantages that they may imply for their supply chains.

Just-in-time delivery: The concept of just-in-time delivery (JIT) has been a major reason for the redesign of logistics systems. The successful use of the *kanban* system in the Japanese automobile industry had a major influence on all industries around the world as they have shifted to new delivery systems. JIT is just one approach to reducing inventories in supply chains through frequent, small quantity and highly reliable deliveries. These deliveries are timed to respond to immediate user needs; the products are pulled through the supply chain by demand. This is a major difference to the time when goods were produced in long, low-cost runs based on forecasts well ahead of demand. When manufacturers are the immediate recipients of goods, terms such as lean manufacturing are used to describe the new environment. When the recipients are retailers, the term lean retailing may be used.

For these systems to work effectively transportation services must be reliable; delivery is required at precise times. Many systems are also built on short lead times, thereby placing requirements for premium transportation or geographical proximity of the supplier to the user. However, the benefits of reliability as an attribute of transportation which reduces inventory costs are fundamental in logistics. The consequences of relatively low reliability and the long transit times generally associated with liner shipping have received heightened attention as a result of the congestion of 2004–2005 and then the need for agile responses to the recession of 2008–2009.

Postponement: The strategy of postponement involves the delay of processes. Manufacture of

products may be delayed until a customer places an order; this is most likely when product manufacture or assembly can be done quickly. More frequently, undifferentiated products are held in a centralised inventory, thereby reducing the total inventory held and the costs built into it. When more information is obtained about demand, differentiating processes can be performed whether the final manufacture of a product, the labelling to national market requirements or simply shipping to one market rather than another.

For products with highly uncertain demand, the ability to defer production until as much as possible is known about demand is especially advantageous. Thus, the geographical shifts of manufacturing in the textile industry reflect the predictability of demand for particular product groups. For example, increased manufacture of fashion textiles has taken place in the Caribbean and Central America at the expense of Asia as time to North American customer has assumed greater importance (Abernathy *et al*., 2001). Similarly, the efforts of the automobile industry to provide individual car buyers with the style, colour and options they desire within ever-shorter times and at reasonable cost requires a responsive supply chain. The nature of trade-offs can be illustrated with an example.

Car seats are usually assembled close to the auto assembly plants, for the obvious reason that their bulk makes them expensive to transport. However, the manufacture of components of seats may be more widely distributed, for example in the manufacture of leather seat covers. This manufacturing is labour intensive. As a result, production is found in Asia often using imported materials. The finished covers may be shipped back by sea container. Products of good quality have been produced in systems that have had long though precise round-trip cycles. However, the pressures to give car buyers choice and fast delivery, at reasonable cost, is difficult for such a supply chain. To achieve the responsiveness to meet variable demands without excessive inventory close to auto markets requires a much more flexible logistics system. In the absence of forecasts of demand long enough in advance, some seat covers, at least, may have to be sent by airfreight. The difference in costs between sea and airfreight is such that the viability of exports from Asia is threatened. The challenge increases the competitiveness of alternate locations with low labour costs closer to the major markets, for example, Eastern Europe for Western Europe and Mexico or the Caribbean for North America. A general consequence for consumers if effective supply solutions are not found is that the range of options available in short times becomes limited.

Supply chain visibility: Reductions in the order cycle and delivery lead times have been achieved through many changes in the design and operation of supply chains and logistics systems. Vital contributions to the changes have been made by the developments in information and communications technologies (ICT). Notable has been the transfer of data and other information resulting in reduced order cycle times. However, another vital benefit of ICT systems is enhanced supply chain visibility.

Firms are striving to achieve better visibility, forwards and backwards, along their supply chains. Forward information reveals point of sale information from bar code scanning, shared real time or frequently through automatic electronic transmission. This allows members of supply chains to make quick and consistent decisions (with different levels of sophistication among supply chains) about replenishment based on common information. It enables the use of cost-effective methods such as Manufacturing Resource Planning or Continuous Replenishment Planning and avoids the violent fluctuations of inventories associated with sequential and delayed information provided along disjointed supply chains (Forrester, 1958). Visibility backward along supply chains enables receivers

to be fully aware of the status of orders so that early actions can be taken to minimise costs associated with delays in supplies or with changes in requirements. The visibility of the status of purchase orders from the time they are placed until goods are delivered is one of the competitive services offered by major logistics service companies. Visibility is a key benefit at the heart of increasingly sophisticated supply chain software.

2.2.2 Challenges and opportunities for liner shipping

Each of the strategies described above is associated with a range of changes in the characteristics of supply chains and logistics systems. These create challenges and opportunities for shipping lines.

Relationships among supply chain participants tend to be closer. To achieve this, buyers seek to use fewer suppliers of particular goods and services. For shipping lines and other carriers, this means that shares of shippers' business are larger but go to fewer firms. One of the attributes desired by shippers as they develop closer relationships with fewer lines is that those lines have an extensive service network able, therefore, to serve them in various trade lanes. The pressure on lines is to develop more extensive service networks.

The reduction of time is becoming a more important logistics strategy to reduce costs and to improve customer service. Hummels estimates that for manufactured goods imported into the US each day of travel is worth an average of 0.8% of the value of the good and that each day in transit reduces the probability of a country as a source by 1.5% (Hummels, 2001). The related feature is the greater attention to reliability of products and processes. The costs of "disruptions," whether associated with variations in demand, logistics or supplier performance warrant close attention (Levy, 1995). The effects of disruptions are particularly great when lead times are long, even with good information systems, hence the importance of the unanticipated congestion in 2005. Greater recognition of the costs of disruptions discourages strategies of reliance on low-cost long supply chains and encourages the use of a variety of sources and the use of, at least, some shorter, faster supply chains. More local sourcing, the use of improved IT and of expedited logistics services are encouraged. The liner shipping industry faces prospects of a diminishing role, at least in percentage terms, in international trade if the threat of congestion were to remain. The competitive advantages accruing to lines offering short reliable transit times would increase. These are lines on short routes, with fast ships and with related services that ensure fast and reliable door-to-door service. Whether the heightened value of short transit times would be sufficient to create a market to support new fast ships in ocean services remains to be seen.

In pricing their services, lines face heightened competitive conditions. The competition for market share is increased by the traffic allocation strategies of shippers, the legislative weakening of conferences and the rapid increase in capacity resulting from the new generations of larger ships. The competitive mix has also been affected by the entrance into international logistics, including the services using liner shipping, of the integrated carriers such as United Parcel Service (UPS) and FedEx. Also, shippers have available to them a widening range of manufacturing locations and logistics strategies that place limits on the rates chargeable by lines on particular routes.

These changed conditions create opportunities for the lines that respond well. Notably, the strategies of lines to ensure faster, more reliable services are resulting in greater attention to the coordination of operations along the logistics chain and to on-going shifts in the span of activities in

which the shipping lines are engaged. Striving to provide enhanced customer service is taking lines into additional service areas and redefining relationships in international logistics service. Before examining the position of shipping companies in other services, it is appropriate to examine developments in the logistics services sector.

2.3 Changes in the logistics industry

It is customary for firms with small volumes of international traffic destined for or originating in a foreign country to use a freight forwarder. Freight forwarders have long been specialists in arranging the transportation, storage and handling of goods along with associated documentation activities between and within countries.[3] They manage the activities through their own offices and through those of partners. They may act as agents in arranging transportation or act as a non-vessel owning common carrier (NVOCC) co-loading freight onto a shipping line's vessel and issuing their own bill of lading. For example, DHL provides this service as Danmar Lines. In the trade of countries with highly specialised logistics and transportation conditions, even large firms with substantial volumes of trade into the country have traditionally sought the assistance of such specialists.

The increased demand for logistics services in the last 20 years has arisen with the growth of global supply chains and the greater use of outsourcing for logistics services. The result has been the creation of a multi-faceted, large and complex logistics services industry. It has evolved from various bases the most important of which has been the traditional freight forwarding firms, the largest of which commenced from European roots and had a wide international presence for most of the twentieth century. They were present in most continents but had varied intensities and relied on partners in some countries. In the last two decades they have increased the number of countries in which they have a direct presence and have increased the intensity of their presence in most countries. They have generally done this by acquisitions and mergers. In 2008, the Swiss-based Kuehne & Nagel had an invoiced turnover of US$20.3 billion (CHF21.6 at CHF1 is US$.94) of which US$9.4 billion was for sea freight services. In 2008, Panalpina also Swiss-based, had revenue from its forwarding services of US$10.0 billion (CHF10.6 at CHF1 is US$.94). The other leading European forwarders Danzas and Schenker are now owned by Deutsche Post and Deutsche Bahn respectively. Deutsche Post acquired Danzas in 1998 and branded its forwarding and logistics services as the Danzas Group but following the acquisition of DHL (and Exel) in 2005, it branded the services as DHL Global Forwarding and DHL Freight. In 2008, Deutsche Post World Net reported revenue from forwarding, freight and supply chain services as US$41 billion (€27.9 billion at €1 is US$1.47). Express services had revenue of US$20.0 billion. Deutsche Bahn acquired Schenker in 2002 (and Bax Global in 2005) and conducts its global business under DB Schenker Logistics. In 2008, DB Schenker Logistics had revenue of US$21.6 billion (€14.7 billion at €1 is US$1.47).

The logistics services industry has also experienced growth from firms with previously more specialised businesses. They include domestic transportation and warehousing companies, courier and parcel services and liner shipping companies. Particularly in North America, changes occurred in transportation and logistics services in response to the opportunities and challenges associated with the growth of companies, the deregulation of the transportation industry and the heightened service demands of evolving supply chain management practices. Contract logistics suppliers have developed to take advantage of the interests of some large companies to out-source logistics activities. The best

examples of these new third party logistics providers in the US are Schneider Logistics and Ryder Logistics, which expanded into logistics from trucking operations, and C.H. Robinson that had a produce warehousing base. These companies have subsequently expanded into international logistics and supply chain services. However, while the firms are substantial in total, as public companies Ryder System and C.H. Robinson Worldwide reported revenues of US$6.2 billion and US$8.6 billion respectively, their international revenues are still modest. This is identifiable for Ryder in 2008 as US$800 million, which is one half of the company's Supply Chain Solutions revenue.

Companies in the express and parcel businesses have also added logistics and freight services. UPS expanded into international logistics services rapidly since it acquired Menlo Worldwide Forwarding in 2004 and incorporated it into a newly formed UPS Supply Chain Solutions. In 2008, the revenue from Supply Chain Solutions and Freight was US$8.9 billion and from the international package business was US$11.3 billion. (Revenue from domestic packages was US$31.3 billion.) FedEx has also expanded its portfolio of services. In 2000, FedEx acquired Tower Group International, a leader in the business of international logistics and trade information technology and used this as the core of its new FedEx Trade Networks. In 2008, FedEx Trade Networks initiated its first ocean-ground distribution service with a service from Asia to the US West Coast. (In 2008, the total value of FedEx international business was US$8.5 billion compared with US$27 billion of domestic revenue.)

Finally, shipping lines have made a significant entry into logistics services. Responding to the interests of shippers to deal with fewer suppliers and to outsource logistics activities, most liner companies had introduced some logistics services. However, the lines providing the most substantial logistics service remain those that were the entry leaders between 1970 and 1980 serving the interests of importers of manufactured goods from Asia. Importers of Asian goods felt the need for better assistance in managing the flow of imports. The value of imports from Asia was increasing and the shipping lines were interested in extending their range of services to customers. The result was the development of consolidation services, most notably initially by Sea-Land (1970, known as Buyers), Maersk (1977, known as Mercantile), and American President Lines (1980, known as American Consolidation Services [ACS]). The services differed in some important respects from the balanced directional services offered by freight forwarders. They were focused on the needs of importers from Asia for monitoring the movement of goods to consolidation points, managing the consolidation of goods and shipping according to the specifications of the buyers. The companies were aided in the development of these services by existing familiarity with the buyers' needs through their shipping services. They were able to offer consolidation services with high visibility by utilizing their existing links with the shipping lines' documentation processes.

Subsequently, these and other shipping lines entered into logistics services with optimism for a greater rate of growth of logistics than liner shipping; however, they have remained a modest part of the companies' business. The development of these businesses is reviewed later.

For all of the logistics services companies, growth has also been marked by a shift of suppliers' strategies from being asset driven to being knowledge driven. An essential component of the knowledge base is built around ICT. Traditional freight forwarders have generally lagged behind new logistics service companies in the use of ICT technologies. However, increasingly, all logistics companies are introducing web-based capabilities so that shippers can perform activities on line, including arranging shipments and accessing information about the status of their shipments. In

addition to the benefits for shippers of being able to track their shipments, the resulting database becomes an integral tool for them to plan, budget, forecast, negotiate, and manage their businesses. The capabilities are being provided through proprietary systems and through shared portals. The trade literature is replete with logistics companies adding to their ICT capabilities.

Utilising their information-based systems and specialised knowledge, the logistics service companies have assumed greater supply chain and logistics chain design and management responsibilities characteristic of 3PL services.

3. The Horizontal and Vertical Restructuring of Lines

Shipping lines have faced pressures in the changing market place to expand their services geographically and to widen the range of services offered. The response of lines has differed depending on their views of market opportunities, their resource base in terms of their financial resources, the initial geographical extent of their services, the range and level of supporting services, especially in information technology, and the depth and breadth of their human resources.

3.1 The horizontal restructuring of liner shipping

As large shippers have followed supply chain strategies involving the use of fewer suppliers, they have placed heightened value on the extent of the network of services offered by liner companies. This is the primary reason given by American President Line (APL) in 1995 for the introduction of its first service from Asia to Europe through a slot-charter agreement. The new service was a significant shift in APL's policy as up to that time it had a Pacific-only service strategy. The shift of major lines to global networks is a major reason for the increased concentration in liner shipping on a global basis. However, on a route basis, the actual markets for shipping services, there has not been an increased concentration although the 2008–2009 recession has led to more vessel sharing agreements between lines.

The strategies of lines in extending the network of their services have been covered extensively in the literature and feature prominently elsewhere in this book. The addition of routes by lines has been dominantly by slot charter, alliance and merger or acquisition rather than the extension of own services. These methods limit the need for new investments while extending route networks and avoid reductions in the density of traffic in relation to infrastructure costs by route, an important consideration in network industries.

There has been speculation that the growth of global carriers will lead to the development of global contracting for services by major shippers. However, it does not appear that global contracts are common even though shippers have a preference for dealing with fewer carriers and, therefore, with carriers with large networks. Contracts still appear to be related mainly to traffic volumes and service conditions by route. This is not to say that in negotiations, traffic volumes and conditions across routes are irrelevant. Simply, there is no evidence so far that the more global orientation of logistics is having a major effect on shipping beyond encouraging the geographical expansion of companies' services. It is possible that the legal end of liner conferences in European trades on 18 October, 2008 may lead to greater interest in multi-route contracts, but given the prior existence of confidential contracts, the influence is not likely to be strong. Also, the interest in many global companies in 2009 to increase responsiveness in their business by shifting to regional rather than global responsibilities is consistent with route rather than global negotiations. The effects of logistics on the vertical

structure of the industry are more prominent.

3.2 The vertical restructuring of liner shipping

The vertical structure of liner shipping has been affected by developments in logistics in a number of ways. The interests of shippers in dealing with fewer suppliers have influenced lines to extend the vertical reach of their services. The interests of shippers in faster and more reliable services have not only affected the design of shipping services but also the relationship among the services necessary to deliver value to shippers, for example, by door-to-door services. The interests of shippers in outsourcing logistics services have created an opportunity for shipping lines (and others) to expand their third-party logistics services. The expansion of lines into services beyond shipping has lead to greater vertical integration in the industry but the organisational relationships vary with the nature of activities and the interests of shippers in those activities. The added services common in shipping are divided into three. They are terminal operations, intermodal services and logistics services.

3.2.1 Involvement in terminal management

Container terminals are providing mainly intermediate services in international logistics. They are designed to ensure the fast and efficient transfer of containers at hub terminals in shipping networks and at throughput terminals for transfer to inland carriers. On-dock cargo-handling services, such as container stuffing and de-stuffing, that might be requested by shippers have become an insignificant part of the modern terminal business. The terminals view their main customers as the shipping lines as the contracts with them are the single largest determinant of their business volume. However, in the long run, the success of terminals is dependent not only on how efficiently they serve the ships but also the efficiency of the closely related on-dock operations and the connections with inland carriers. Efficient terminal operation is measured by the speed and reliability with which containers can be moved through terminals at a competitive cost in order to meet the logistics needs of shippers. Terminals must have levels of capacity and performance compatible with the same-day-of-the-week services of shipping lines. Increasingly, they need to be able to tailor their operations to serve the differentiated needs of shippers for expedited movement inland, including boxes moving in time-defined services.

Traditionally, the port authority or a stevedoring company local to the port or region managed port terminals. However, starting with the introduction of containerisation and the focus on customer service by Malcolm McLean of Sea-Land Services in the US in the 1970s, the interest of large lines in dedicated terminals has increased. For companies with a sufficient volume of traffic, dedicated terminals were seen to provide better opportunities to coordinate the operating philosophy and day-to-day operations of vessels, terminals and inland transportation. Sea-Land, for example, required containers to be placed on chassis on terminals and not grounded. Dedicated terminals are intended to serve the vessels of a parent company. However, when surplus capacity exists (berth time slots and on-dock capacity) other lines may be served.

Dedicated terminals became common first in the US, in part because of the philosophy of Sea-Land. Elsewhere, concerns of governments and public port authorities about the effects of dedicated terminals on competition led to policies that inhibited dedicated terminals. In the 1990s, the shortage of capital available to port authorities, the general increase in privatisation and greater interest in intermodal developments, resulted in a change in attitudes so that dedicated terminals are now

commonplace. Given the importance of a close operating philosophy and of operating practices between a line and its terminal, it is not surprising that lines with dedicated terminals often began by managing those terminals as units integrated with the shipping line. Only occasionally did some lines contract with specialised terminal management companies for the management of their terminals leased long-term to them by port authorities.

The rapid growth of container shipping and the concurrent need for more capital investment in ports created new opportunities in terminal management. In part, the need was met by shipping lines entering into the terminal management business, initially to serve primarily their own needs. Companies such as Sea-Land, APL and Maersk continued for a number of years to manage these terminals within the framework of their shipping lines. However, some lines, as they developed their expertise, soon sought advantage for these terminal enterprises as successful profit centres by expanding into the terminal operating business serving others. For example, P&O Steam Navigation Co., which had a 50% interest in P&O Nedlloyd, established P&O Ports. Orient Overseas International Ltd (OOIL), which owns Orient Overseas Container Line (OOCL) managed four ports through a Terminal Investment unit (the terminals were in Vancouver, New Jersey, New York and Venice) although it retained two container terminals operated as a part of and for OOCL. These were in Kaohsiung and Long Beach.

Subsequently, other shipping companies have increased the separation of their lines from terminal management. In 2001, A.P. Moller made its Maersk Ports, which was the terminal operating company for the dedicated terminals of Maersk Sealand (Maersk acquired Sea-Land in 1999) a stand alone unit known as APM Terminals (Economics Intelligence Unit, 2001). The objective of APM Terminals was "to strive for excellence in terminal management while actively seeking new opportunities in port and terminal development" (Economics Intelligence Unit, 2001). A.P. Moller saw its terminal management business as having a scale warranting a stand alone status and it anticipated that its substantial business with Maersk Sealand (then 90% of its throughput) would not jeopardise its position with other lines. APM Terminals subsequent growth and the growth of traffic of other carriers to 38% in 2008 attests to the validity of the A.P. Moller position. In 2008, APM Terminals was the fourth largest container terminal operator in the world with 34 million TEUs handled.

More recently, other shipping lines have separated off their terminal businesses. In 2006, OOIL announced the sale of its four container terminals to Ontario Teachers' Pension Plan Board (The Standard, 2006). It saw the US$2.35 billion as yielding benefits greater than those of ownership. In 2008, Neptune Orient Lines established three separate business units, APL (the container line), APL Logistics and APL Terminals to facilitate Terminals expanding its business in new locations (Container Management, 2008). The implications of these changed relationships are considered later.

The greatest change in terminal management has been the growth of terminal management companies as these firms have responded to the need for more capital investment in ports to serve the growth in port businesses. Some companies, such as Seattle-based SSA Marine, formerly Stevedoring Services of America, provide terminal management services to a variety of types of terminals, although container terminals are important to the company. However, the dominant global companies in the industry focus on container terminal management as the container business has been the leading growth sector in ports.

The leading container terminal management companies today are Hutchison Port Holdings of

Hutchison Whampoa, PSA International (PSA) and DP World which handled 67.6 million, 63.2 million and 46.8 million TEUs respectively in 2008. DP World's sudden emergence as a global player after the founding of Dubai Ports International only in 1999 is largely the result of acquisitions, CSX World Terminals in 2005 and P&O Ports in 2006.

3.2.2 Involvement in intermodal services

Traditionally, the business of shipping lines was the movement of cargo on a port-to-port basis. This may still be true of smaller lines competing on a low-cost strategy and is necessary for most or all lines in regions in which intermodal movements are impractical. However, in Europe and in North America all the major lines now offer door-to-door service. The door-to-door services are designed to make available to shippers reliable fast service through a single supplier.

Shipping lines have largely provided inland transport, so called carrier haulage, (the alternative is 'merchant haulage' whether arranged by a shipper or freight forwarder) through the purchase of inland transport. It has been done mainly through a combination of long-term contracts and short-term purchases under the responsibility of a group within the shipping business, such as Maersk Intermodal at Maersk. Some lines own some trucking capacity. The incidence of carrier haulage varies from region to region depending on the length of the inland movement, the characteristics of the inland transport industry and the role of freight forwarders in the trade.

Shipping lines were leaders in the development of rail intermodal services in North America and are now playing leading roles in Europe and China because they have been in a better position than freight forwarders to commit for the volume of traffic necessary to make dedicated rail service viable under long-term contracts. The need for direct ownership of rail services is greater in Europe than elsewhere because of the domination of that industry by state-owned passenger-oriented railways. However, under the current deregulated environment in Europe, there are more opportunities for services such as the Maersk-owned European Rail Shuttle (ERS), started by other shipping lines in 1994, to play key roles in intermodal services.

The extension of shipping lines into intermodal services was consistent with the logistics needs of shippers and facilitated by the transaction economies enjoyed by the lines and the effectiveness for coordinating operations. Shippers remain free to select the port-to-port or the door-to-door service.

3.2.3 Involvement in logistics services

Unlike intermodal services which are managed within the shipping business, the conduct of logistics services is largely done in independent business units, although these are frequently branded to carry the group name. For example, Mercantile and Buyers were joined as Maersk Logistics and ACS became APL Logistics. Other shipping companies added such units, for example Cosco Logistics and NYK Logistics, but not all lines have adopted this as a global initiative. For example, Evergreen which had formerly focused its strategy on excellence in meeting shippers' requirements through their shipping and door-to-door service capabilities, announced, in June 2002, that it would invest in forwarding and logistics in Asia and South America. In 2007, it established Evergreen Logistics Corp offering a full range of logistics services in China, North America and Europe.

The early development of logistics services by lines was in locations in which the lines had particular knowledge. For P&O, Nedlloyd and Maersk, the early services were developed to serve mainly European shippers, for APL and Sea-Land to serve the needs of US shippers. Subsequently,

however, the lines saw value-added services in logistics as offering faster growth and better profitability than shipping. The developments at APL, P&O Nedlloyd and Maersk Sealand reflect the past and current interests of these lines in logistics. There has been a great change in expectations in less than ten years.

Following its acquisition of APL in 1997, NOL reorganised its logistics services into APL Logistics (APLL) to advance its strategy of rapid growth in the logistics area. APLL was then the fastest-growing business unit in the NOL Group. Its growth in 2001 was 72% reflecting the acquisition of GATX Logistics, the second largest warehouse-based contract logistics company in the US. The acquisition enabled APLL to serve customers more effectively through the primary (importing) and secondary (national) distribution phases of the supply chain. Flemming Jacobs, the President of NOL stated that he wanted "the logistics business to challenge the Liner business as a major breadwinner of the Group". In 2001, liner revenues were US$3.6 billion, logistics revenues were US$723 millions. The Annual report for 2008 shows APL revenue as US$7.9 billion and APL Logistics revenue as US$1.3 billion, so that the percentage of logistics to shipping revenue has declined from 20.1 to 16.5%.

With the acquisition of Sea-Land, A. P. Moller also re-branded its logistics services, naming it Maersk Logistics (ML) but it left the management independent of the shipping line. ML's mission was to be an independent organisation operating worldwide through locally incorporated companies. It is engaged in satisfying customers' expectations in respect of competitive, international export and import management services. It is largely a non-asset-owning company managing its quality through the careful selection of subcontractors. It has offices in 93 countries.

The A. P. Moller Group has been less open than NOL about the role expected of ML within the Group. However, Soren Brandt, the head of ML, noted, "the logistics activity could grow to outperform those of the liner, but it will take a while" (Le Lloyd, 2001). He also characterised the shipping and logistics businesses "as distinct businesses." ML made a number of acquisitions during 2001 of which the largest was the US-based Distribution Services Limited (DSL) which had offices in 60 countries and 1,500 employees, compared with ML's 3,500 employees. Wal-Mart was one of DSL's major clients (Maersk Logistics, 2001).

In 2005, Maersk acquired the freight forwarding business Damco as a part of the acquisition of P&O Nedlloyd. In 2007, Maersk Logistics' air freight and landside services and its DSL Star Express was renamed "Damco". In its 5 June 2009 News Release, Maersk announced that it will merge its supply chain management activities branded as Maersk Logistics and its freight forwarding activities branded as Damco, under the single brand name "Damco". Thus Maersk has returned to the strategy of a separate branding for its shipping and logistics-related businesses.

The experience of the now defunct P&O Steam Navigation Co. (P&O), the senior company that held the 50% interest in P&O Nedlloyd, with logistics management is still instructive. Most of the logistics services of P&O were in different businesses from P&O Nedlloyd but one was integral to the shipping business. When P&O Nedlloyd was created by the merger, it brought together the previously separately identified Global Logistics and some logistics services that had evolved as ancillary to shipping activities. The new group was named Value Added Services. It was intended to work with P&O Nedlloyd customers in providing advanced logistics or supply chain management services. Intermodal transport arrangements were not the responsibility of VAS; they were managed within

shipping services. P&O Nedlloyd was attempting to bridge the gaps of different personnel skills and backgrounds among its own employees in shipping and VAS. It had one sales force, which it hoped would develop effective contact levels with clients to deal with shipping and logistics interests. It expected to identify effectively those clients for whom an integrated approach of a line with its logistics service was practical and attractive.

P&O did not follow this model only. It had three other logistics service groups that operated quite separately from the shipping services. Damco, a separate but wholly-owned subsidiary of P&O Nedlloyd, engaged in freight forwarding with its own offices in nine countries in NW Europe and the Far East and with partnerships with local forwarding agents in a further 40 countries. P&O also owned P&O Trans European, a European-based logistics service company, and Cold Logistics, which specialised in serving the cold-product sector globally. The Chairman of P&O in his message to shareholders in the 1999 Annual Report notes that the company's logistics services are "high growth, high return businesses" and that "the ongoing P&O would focus on its high return logistics activities."

With the exception of VAS, the logistics businesses of these companies were organised as corporate units quite separate from shipping. A major reason for this was the expectation of shippers that logistics service providers (LSPs) act independently of interests in carriers when choosing modes of transport and carriers to meet shippers' logistics needs. Thus, even though logistics units may be branded with the name of the shipping corporation, their executives pointed to the independence of those units in selecting carriers.

There were also operating conditions relevant to the level of integration. Executives of VAS recognised that the skills and outlooks of managers in consignor and consignee firms generally differed between those responsible for the management of transportation services and those responsible for the management of supply chains. VAS hoped that the differences would lessen and an integrated approach would become possible. However, in June 2002, P&O Nedlloyd announced the reorganisation of VAS into P&O Nedlloyd Logistics. The experiment was over.

In spite of the organisation of logistics units as separate structures, the actual level and ways of sharing resources and information between the business units remains uncertain. The utilisation of common information systems provides economies. However, it is in the sharing of market intelligence that uncertainty about relationships exists.

4. Assessment of the Organisational Structure

Examination of the attributes of the relationships of shipping with each of the three services described above provides insights into the probable future of the organisational structures. The structure of each of the services is considered in turn.

4.1 The organisation structure for terminal management

A line may prefer a dedicated terminal so that it can ensure harmonisation of operating practices through its network of operations. This was the original reason that Sea-Land operated with dedicated terminals. Similarly, Maersk's interest in a dedicated terminal in Rotterdam in 2000 is believed to have been based on its preference for operating practices that allow for the flexibility in throughput rates it expects of its terminals. Also, the development of well-integrated ICT can be facilitated through dedicated terminals. Thus, terminal management by a line can be efficient when a line has a sufficient volume of traffic to achieve an economic utilisation of the terminal capacity and the line

has a network of routes and terminals to achieve economies of scale and proficiency in terminal management. Alternatively, a line may contract a terminal management company to operate a terminal on its behalf.

Therefore, it can be argued that dedicated terminals operated as a component of the shipping line can be consistent with efficiency and coordination between the shipping and terminal operations. Benefits can be achieved without raising conflicts with the immediate interests of shippers as terminals provide intermediate services in the process of moving containers between inland and ocean transport. Shippers retain the choice of arrangements for the movement of goods to and from terminals.

Concerns that dedicated terminals may reduce competition between shipping services have diminished as overall trade has grown and competition among lines and routings has increased. Lines and shippers have effective choices as long as one or two of the major terminal management companies do not gain too much control in a port range. The protection of competition is not about dedicated terminals but about the number of terminals controlled by one or two terminal companies in a port range.

While dedicated terminals remain common, recent experience, for example APL and Mearsk, has been for the management of lines and terminals to be treated as separate businesses. This allows the terminal management to focus more effectively on commercial opportunities in its business. Further, the evolution of terminal management has been associated with increased sophistication and in many ways more standardised basic approaches as terminals strive to increase throughputs through space-restricted terminals. The result is that the benefits for a line of operating its own terminals in close association with its line may be less now than formerly.

4.2 The organisation structure for intermodal services

The case for the close involvement of a shipping line in intermodal services is comparable to that for terminals, except for two factors. First, the diversity of traffic flows and modes would make it difficult for a single agent to invest in, contract for and arrange all inland moves. The business is heterogeneous so that control of all inland movements by lines is impractical. Second, the diversity of shipper interests in the nature of inland transport arrangements means that the right of choice is important for shippers to ensure that the right mix of service, control and cost are preserved. Whether the efficient coordination of the inland transportation into the supply chain processes is achieved best by use of carrier or merchant haulage (a “traditional” freight forwarding function) is best left to the choice of shippers.

However, shipping lines can have an advantage over shippers and freight forwarders in arranging intermodal transport services when the ability to commit volumes of traffic is important to the viability of a service. This has been the case with the introduction of dedicated trains and certain barge services where reliable volume commitments are important. These are situations in which there are economies of scale.

The arrangement of intermodal services by shipping lines has been a way for them to provide door-to-door pricing and to provide a single responsibility along logistics chains with good visibility. It has provided a competitive service to the freight forwarders offering door-to-door services as NVOCCs. However, the needs of shippers have changed over time with the evolution of global supply chain

management. The result has been some new responses from the lines to coordinate shipping and inland transport services.

The recession of 2001 resulted in surplus liner capacity and pressure on freight rates. It came at a time when there was concern that container shipping service had become so commoditised, so similar among lines, that competition was based on price. In March 2002, C.C. Tung, the chief executive office of OOCL, expressed concern about competition among "commoditised" shipping services as contributing to the reduction of rates. To avoid "over-commoditization" he urged "offering value-added products" (American Shipper, 2002). Earlier in 2001, the president of NOL, Flemming Jacobs, said that "Shippers and ocean carriers are 'confused' when they focus on narrow yearly negotiations on freight rates, instead of looking for opportunities to increase overall supply chain efficiencies" (American Shipper, 2001). He went on "I am going to give a wake-up call to those who still get their kicks from yearly, or even more frequent, fights over freight rates with their ocean carriers – those who just cannot wait for the 1st of May to come around and who derive the greatest satisfaction from succeeding in squeezing another $50 from the carriers, even though in the process they miss tons of opportunities in the total supply chain."

The subsequent expansion of global supply chains gave rise to the congestion problems of 2004–2005. The pressures on shipping capacity were severely aggravated by congestion inland from ports. Traffic was backed up so that terminals became congested. Shippers responded subsequently by adopting new strategies to reduce the risks of service failures. They included extending the peak by shipping earlier, using a greater number of shipping routes and negotiating new provisions in confidential contracts with lines.

One of the responses of lines has been to consider services publicised with guaranteed delivery times, an approach made more relevant in the international market by the presence of the international package and freight services and their logistics services such as UPS Supply Chain Solutions and FedEx Trade Networks. However, the provision of a truly guaranteed service requires priority treatment for freight at port terminals, for vessel space and for intermodal connections. In 2006, APL Logistics was the first line to offer a port-to-door time guaranteed less-than-container (LCL) service from China into the USA, with Con-way Freight performing the inland carriage in the USA. The ocean carrier is APL (Shippingline.biz, 2009). Japan, South Korea, Singapore and Taiwan were added as origins in 2007 and Mexico was added as a destination in 2009. In 2008, a full-container guaranteed service was introduced from China to the USA (3PL wire, 2008). The services require not only new segmented operating practise in terminals and for container handling on and off vessels but, also, new types of agreements with specific intermodal carriers. In 2009, Hanjin and MOL have introduced time-guaranteed services on routes from Asia to the US West Coast with distribution in the USA being handled by Old Dominion Freight Line and the railway company BNSF, respectively.

The time-guaranteed services are the latest evidence of lines and their associated businesses working together to design and operate services that can provide more reliable services to shippers. However, the examples also show that the design and operation of a well-coordinated service does not require common ownership.

Concurrently, other lines have increased their attention to service reliability without the introduction of service guarantees. Whether the costs of differentiation turn out to be worthwhile and appropriate for more lines depends on the size of the market segment for the premium service. A

study by Kouvelis and Li (2009) identifies that there is a market niche but its size and profitability remains to be determined. Whether this form of service differentiation becomes a major strategy of lines in the future, as suggested in a report by IBM Institute for Business Value (2005), remains to be seen.

4.3 The organisation structure for logistics services

The organisation structure appropriate to the relationships of logistics services with shipping lines involves more issues than the relationships considered so far for terminals and intermodal services. The range and scale of logistics functions affect the potential for economies from integrated management and the interests of shippers in dealing with integrated or separate service providers. The appropriate market structure is one that reflects the potential for economies of scale and scope in integrated management and the interests of shippers in their management of logistics and shipping service purchases.

Small shippers have long used freight forwarders because of the rate and service benefits that forwarders can provide through the consolidated volume they control. New LSPs can offer similar services. For small shippers, then, that do not have the volume of traffic to negotiate effectively with shipping lines, the relationship of the LSP with the shipping line is not important. They have the ability to choose among the different types of service offerings.

Large shippers are in a different position. They have become more interested in outsourcing more aspects of logistics to LSPs. The LSPs may be relatively new to the logistics business, as are some of the new “independents”, or they may be linked to transportation companies or they may have a long history in freight forwarding. Large shippers do have volumes of traffic that enable them to negotiate contract rates with lines so that the choice of negotiating separate logistics and shipping services is relevant to them. Therefore, it is appropriate to ask do large shippers negotiate rates and traffic allocations with shipping lines or do they use LSPs offering integrated logistics and transportation services at integrated rates?

It appears, based on discussions with a few shippers, carriers and writers on the liner shipping business that large shippers prefer to retain responsibility for the negotiation of liner rates and the allocation of traffic among lines. Although there are undoubtedly exceptions to this, they appear to be very infrequent and their incidence has been little affected by the trade uncertainties of recent years. The reason for shippers retaining responsibility for negotiating rates with lines can be accounted for by four factors. They are: the quality of the logistics chain; the value transportation services negotiated; the nature of the negotiations; and tradition.

4.3.1 The quality of the logistics chain

The value of the quality of service required in a logistics chain is important to the structure of the chain. Chains in which time-sensitivity is high may require “managed delivery” under tightly prescribed conditions. The efficiency of delivering time-sensitive products may be improved by placing the transport and inventory management with a single management and with a single price for the services. Examples are: the just-in-time delivery of automobile parts to an assembly plant involving both trucking and parts management; and the international delivery and inventory management of computer components by a courier company. In these cases, the design of separate functions into an integrated service is the business equivalent of the creation of a mixture in

chemistry. The characteristics of the mixture can be varied through different proportions to serve particular purposes but the mixture is more valuable than the component parts separately.

The liner shipping function by its nature is not as tightly bound to other logistics activities as trucking or air transport in the examples above. The length and uncertainty of time involved in the movement of goods by sea prevents such tight coordination of transport and logistics operations. A result is that a liner service between ports or extending inland through intermodal services may be as readily provided by one line as another. Indeed, in this sense, the service is commoditised although this is not to deny the existence of important differences in service attributes among lines. Consequently, shippers are unlikely to bundle the design and pricing of logistics and shipping services together in the way that is done for more time-sensitive services.

The recent marketing of the LCL and, more recently, CL guaranteed fast service by three lines and associated companies offers differentiated premium intermodal transportation services. However, the services do not involve the service providers assuming responsibility for logistics decisions of when and how much to ship.

4.3.2 The value of transportation services

Confidential independent contracts between shippers and lines became the norm for large shippers subsequent to the US Ocean Shipping Reform Act, 1998. The elimination of conferences from European trades in October 2008 and their expected demise elsewhere boost the importance of shipper negotiation. Shippers consider the negotiation of liner contracts as important to them because of their financial value. Negotiations are also often complex.

4.3.3 The nature of negotiations

The negotiation of rate and service conditions by a shipper is usually the responsibility of a specialised management group. Such an internal organisation structure tends to preserve the negotiation role with shippers, but it appears to do so for good reason and not just resistance to change.

Large shippers negotiate on the basis of their traffic volume on single as well as on multiple routes although volume is only a powerful argument when the shipper has choices of other carriers and routes. Shippers negotiate, therefore, on the basis of a range of competitive and logistical alternatives actually or potentially available to them. For example, a new plant or a new sourcing or marketing alternative that may shift traffic from one region to another and from one carrier to another or diminish the amount of ocean shipping needed in total can be arguments for improved rate or service conditions. These are not arguments that can be effectively executed by LSPs. However, subsequent to the conclusion of shipper-carrier contracts, the administration of the logistics activities, cargo tracking from the time of purchase order, maintaining cargo allocations among lines and monitoring freight charges are readily and commonly undertaken by LSPs under contract to shippers.

Therefore, although new dimensions of service have become important in confidential rate contracts between lines and shippers, the negotiation of shipping rates and services by shippers has been conducted separately from the negotiation of logistics services. The separability and substitutability of shipping services, the importance attached to the negotiations by shippers and the advantages that shippers have over LSPs in the negotiating process indicate that this structure is likely to persist.

5. Overview of Responses of Lines to Supply Chain Management

The relationships discussed in this chapter are evolving as lines respond to the challenges and opportunities associated with the growth of trade and greater emphasis on SCM. Greater horizontal integration in the industry is one of the major developments in liner shipping, discussed in some detail elsewhere in this book. This chapter deals with the addition of added value services by lines or their parent companies.

The advantages of integrating terminal management closely with shipping services gave rise to the entry of shipping lines into terminal management. They were initially generally managed by a unit closely related to the line or may be managed by a contracted terminal operating company. However, subsequently, the organisation of APM Terminals and APL Terminals as profit centres separate from the lines and the sale of terminals by OOIL suggest a weaker case today for integrated ownership and operations than was previously the case. The stronger opportunities to pursue terminal management as a separate business and the need and opportunities for close coordination between lines and terminals irrespective of ownership have weakened the case for lines and terminals to be under the same management.

The ownership of terminals by lines is not detrimental to the public interest. Terminal operations are one of the intermediate services needed to deliver goods to shippers. There is no direct conflict for shippers in closer relationship of terminal management with the lines. Shippers and the public do have an interest in making sure that the terminal management business continues to operate in a competitive environment.

The development of intermodal transport capability is one of the inherent advantages introduced with containerisation. The advantages of lines in their ability to commit volumes of traffic to warrant specialised inland rail and water services has been important to the success of intermodal services. The carrier haulage arranged by the lines is provided largely through contracts although lines participate in the ownership of some trucking and, in Europe, of rail services. It is important that shippers have available the option of port-to-port service so that they or their agents can arrange merchant haulage. The congestion experience in 2004–2005 has made all parties aware of the critical nature of the port-inland connection and the capacity of inland routes. Shippers have spread their shipping peak, diversified routes and made some changes to their supply patterns. Shipping lines have learned to pay more attention to coordination with their inland carriers.

Development of logistics services by corporations with shipping lines is an important aspect of the vertical integration in shipping. Some shipping lines commenced their consolidation services during the early days of containerisation and these have expanded through internal growth and acquisitions to be substantial LSPs. They are operated mainly as stand alone business units. They are important units to the parent corporations but have grown less rapidly than the companies hoped during the last decade. They remain small relative to the LSPs that have expanded from freight forwarder origins. The existence of the lines' LSPs is somewhat controversial with this latter group. The freight forwarders see the lines as competing directly against them.

The lines' LSPs have enjoyed an advantage in the integration of their ICT capability with that of their related line, but this advantage appears to be diminishing with the general development of ICT capabilities. On the other hand, the line-related LSPs have been at a disadvantage in that some

shippers are concerned about a possible bias to the related shipping line. Large shippers have preferred to negotiate liner rates and traffic volumes quite separately from logistics services, no matter who the LSP. The position of large shippers appears rational in the light of the separability of the shipping service from logistics services and the substitutability among shipping lines. Further, large shippers are likely to regard the negotiation of rates and traffic allocations as of a size and character to be of strategic importance. They are unlikely to see the interests of LSPs sufficiently aligned with their own and they have better and sometimes confidential grounds for the negotiation of rate and service conditions. It is likely, then, that the lines' logistics services will remain in quite separate entities for most lines.

The recent development of defined delivery dates as a guaranteed service is a significant initiative to add service differentiation to lines' services. It remains to be seen whether the size of the market and the rates supported will cover the added costs of the processes required. However, the services go to the core of a major interest of shippers; greater service reliability. This type of service is unlikely to change the structure of the managerial relationship of lines with the terminals, inland carriers or logistics providers. However, improved coordination will be paramount.