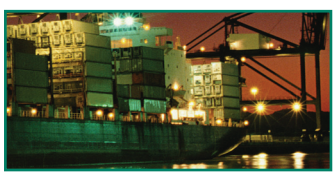
PORT REFORM TOOLKIT

SECOND EDITION

M O D U L E 2

THE EVOLUTION OF PORTS IN A COMPETITIVE WORLD



THE WORLD BANK

MODULE 2

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ISBN-10: 0-8213-6607-6
ISBN-13: 978-0-8213-6607-3
eISBN: 0-8213-6608-4
eISBN-13: 978-0-8213-6608-0
DOI: 10.1596/978-0-8213-6607-3

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Acknowledgments
This Second Edition of the Port Reform Toolkit has been produced with the financial assistance of a grant from TRISP, a partnership between the U.K. Department for International Development and the World Bank, for learning and sharing of knowledge in the fields of transport and rural infrastructure services.

Financial assistance was also provided through a grant from The Netherlands Transport and Infrastructure Trust Fund (Netherlands Ministry of Transport, Public Works, and Water Management) for the enhancement of the Toolkit's content, for which consultants of the Rotterdam Maritime Group (RMG) were contracted.

We wish to give special thanks to Christiaan van Krimpen, John Koppies, and Simme Veldman of the Rotterdam Maritime Group, Kees Marges formerly of ITF, and Marios Meletiou of the ILO for their contributions to this work.

The First Edition of the Port Reform Toolkit was prepared and elaborated thanks to the financing and technical contributions of the following organizations.

The Public-Private Infrastructure Advisory Facility (PPIAF)
PPIAF is a multi-donor technical assistance facility aimed at helping developing countries improve the quality of their infrastructure through private sector involvement. For more information on the facility see the Web site: www.ppiaf.org.

The Netherlands Consultant Trust Fund

The French Ministry of Foreign Affairs

The World Bank

International Maritime Associates (USA)

Mainport Holding Rotterdam Consultancy (formerly known as TEMPO), Rotterdam Municipal Port Management (The Netherlands)

The Rotterdam Maritime Group (The Netherlands)

Holland and Knight LLP (USA)

ISTED (France)

Nathan Associates (USA)

United Nations Economic Commission for Latin America and the Caribbean (Chile)

PA Consulting (USA)

The preparation and publishing of the Port Reform Toolkit was performed under the management of Marc Juhel, Ronald Kopicki, Cornelis "Bert" Kruk, and Bradley Julian of the World Bank Transport Division.

Comments are welcome.
Please send them to the World Bank Transport Help Desk.
Fax: 1.202.522.3223. Internet: Transport@worldbank.org

2 MODULE

The Evolution of Ports in a Competitive World

SECOND EDITION

The port sector has radically changed over the past two centuries. During the 19th century and first half of the 20th century, ports tended to be instruments of state or colonial powers and port access and egress was regarded as a means to control markets. Competition between ports was minimal and port-related costs were relatively insignificant in comparison to the high cost of ocean transport and inland transport. As a result, there was little incentive to improve port efficiency.

How times have changed! Most ports today are competing with one another on a global scale and, with the tremendous gains in productivity in ocean transport achieved over the past several decades, ports are now perceived to be the remaining controllable component in improving the efficiency of ocean transport logistics. This has generated the drive today to improve port efficiency, lower cargo handling costs, and integrate port services with other components of the global distribution network. Because of the capital intensity of such efficiency improvements, these have also generated the drive to unbind ports from the bureaucratic control of public entities and encourage private sector operation of a wide range of port-related activities.

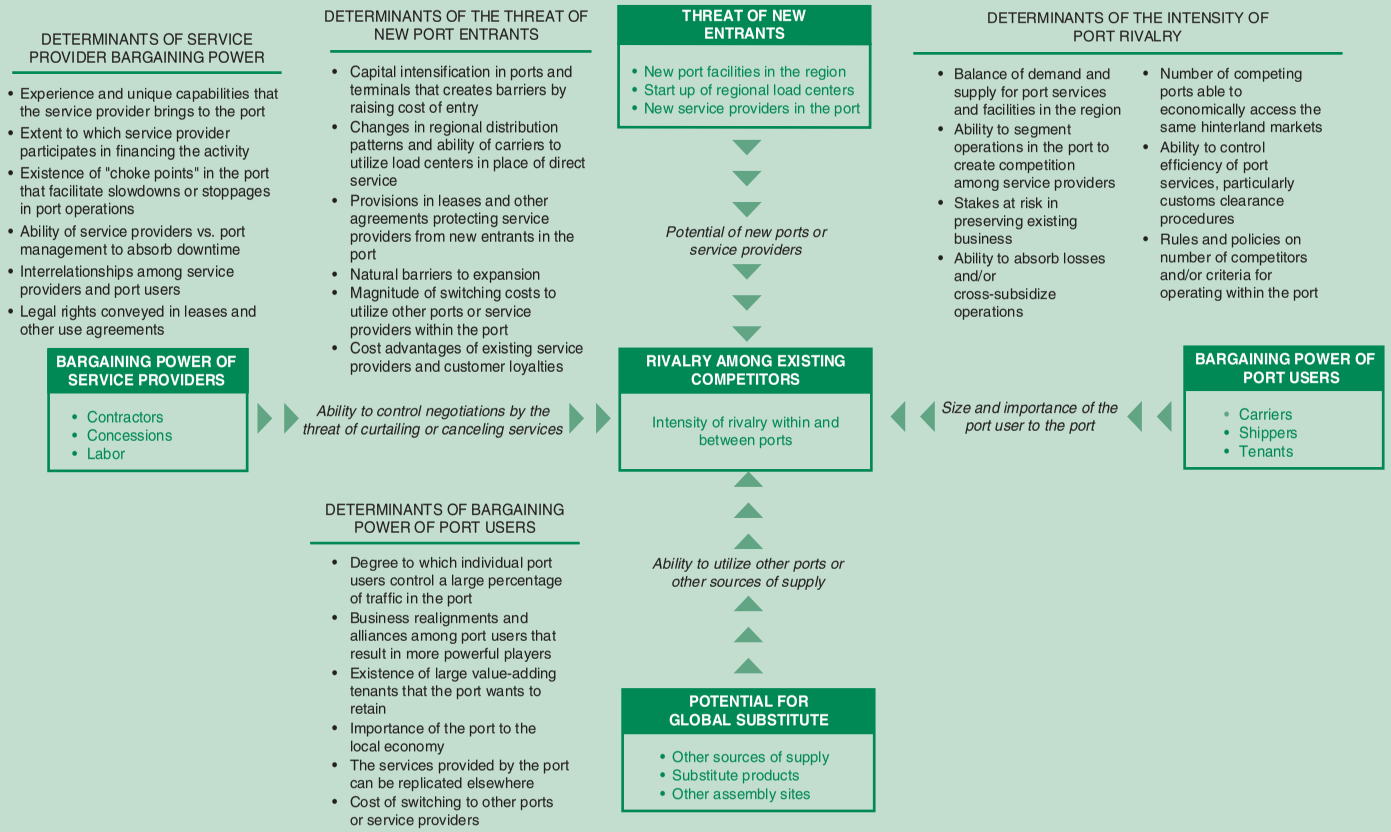
1. OVERVIEW OF THE COMPETITIVE LANDSCAPE

In the 21st century, five forces will interact to shape the competitive landscape facing port authorities and port service providers:

1) The rivalry among existing competitors.
2) The threat of new competitors.
3) The potential for global substitutes.
4) The bargaining power of port users.
5) The bargaining power of port service providers (see Box 1).

These forces will impact ports of all sizes, driving requirements for port expansion, service

Box 1: The Competitive Landscape



Source: Author.

improvement, pricing decisions, and other management actions. Winners and losers will emerge in the global port sector, largely dependent on how port managers strategically position themselves in the evolving competitive landscape (see Box 2).

1.2. Rivalry among Existing Competitors

The intensity of rivalry within the port and between ports is the first of five forces shaping the competitive landscape. In some ports, there will be little if any rivalry given the location of the port, the type of services being provided, the rules on number of companies able to operate within the port, and other factors. In other situations, rivalry among competitors will be intense and often result in pricing that strips the suppliers of profits. There are several factors, discussed in the following sections, that determine the intensity of port rivalry.

Box 2: Checklist of Key Questions for Positioning in the Global Port Market

Here are some key questions that port managers and port service providers should ask when developing long-term strategy for market positioning.

Rivalry among Existing Competitors

Which other ports have access to my hinterland market?

- Is future supply and demand for port services in the region expected to be in balance?
- Are competing ports able to absorb losses through cross-subsidizing services?
- Who has the greatest stakes at risk in maintaining and growing traffic volume?
- Where do we have a comparative advantage over our competitors?
- What actions can we take to attract and lock in customers?

Threat of New Competitors

Are new ports being planned in the region that potentially access my market?

- What is the status of these plans and the likelihood the project will proceed?
- Will changes in distribution patterns create a new form of competitor?
- What actions can we take to minimize the impact on our existing market base?
- Which other companies are potential service competitors in the port?
- Can switching costs and other barriers be created to prevent market entry?

Potential for Global Substitutes

Are there other sources for products being exported through our port?

- Have ultimate users of cargo through our port the ability to use substitute products?
- Can manufacturers and assemblers shipping through the port shift to other sites?
- Are there potential developments that could impact the ability to substitute globally?
- How significant is port cost in determining market competitiveness of port customers?
- What barriers or incentives can prevent port customers from switching products or sites?

Bargaining Power of Port Users

To what degree do individual port users control traffic through the port?

- What is the potential for business realignments or alliances among customers in our port?
- How would these realignments or alliances change their bargaining power?
- To what extent can the services provided by our port be replicated elsewhere?
- What are the bargaining strengths and weaknesses of the port and port users?
- How can the port's bargaining strength be improved?

Bargaining Power of Service Providers

Which service providers are potential choke points in the port?

- What options are available to the port if negotiations with specific service providers fail?
- Has the service provider or port the greater capability to absorb port downtime?
- Does the service provider bring financing capability to negotiations with the port?
- Are there interrelationships between service providers and port users?
- What legal rights have been conveyed to the service provider by the port?

Source: Author.

1.2.1. Hinterland Market Access

In some situations, only one port can logically provide access to hinterland markets. This may result from geographical features, lack of adequate transport infrastructure from all but one port, political issues, or other factors. The port of Djibouti currently has a virtual monopoly on access to the Ethiopian market as a result of the conflict between Ethiopia and Eritrea and the lack of transport infrastructure from neighboring Somalia. Dar es Salaam is the major entry point to Tanzania, as well as the neighboring landlocked countries of Zambia, Burundi, Rwanda, and Malawi. Little general cargo enters Madagascar without passing through Toamasina. There is obviously little, if any, rivalry between ports in such circumstances. In other situations, many ports may be able to provide access to a common hinterland, creating intense rivalry for market share. Numerous ports on the U.S. East, Gulf, and West Coasts compete for traffic to and from the Midwest. Likewise, a number of large ports in Northern Europe and the Mediterranean compete for the European hinterland. In Asia, Hong Kong, Shekou, Yantian, Fuzhou, and other ports compete for access to the Southern China market and numerous ports in Northern Asia are available to service the Japanese and Korean markets.

1.2.2. Ability to Service Transshipment Trade

While rivalry for hinterland market access can sometimes be limited, rivalry for transshipment business is intense, even for ports that have established leading positions as load centers. Singapore established its role as the world's largest transshipment center as a result of an advantageous location on the Asia–Europe trade route and proximity to regional origin and destination centers in Southeast Asia. Algeciras, Malta Freeport and Gioia Tauro established their positions in the Mediterranean transshipment market as a result of their location on the Asia–Europe trade route and proximity to the Southern Europe and Northern Africa markets. Colombo and Dubai have established themselves as regional hubs for traffic to and from the Gulf market and the Indian subcontinent. However, the strategic location of these ports has not precluded rivalry for business. Singapore is in an increasing rivalry with Port Klang, and more recently with Tanjung Pelepas. Several ports in the Mediterranean, such as Port Said East, Tangier, and Damieta, are increasingly competing with Algeciras, Malta Freeport and Gioia Tauro for regional transshipment trade. Salalah and Aden are now serious rivals to Colombo and Dubai for the Gulf and Indian subcontinent transshipment markets. These rivalries are often intense and create substantial pressure on transshipment pricing.

1.2.3. Regional Port Capacity and Demand

An imbalance of port capacity within a region will influence the level of rivalry between ports. Excess capacity will cause rival ports to aggressively compete for market share. Sometimes this can lead to destructive pricing. For example, the rapid growth in load center capacity in the Eastern Mediterranean has produced intense competition between hubs, and as a result ports such as Limassol and Damietta have been forced to aggressively compete to retain customers by pricing services so low that they may not be covering costs. Likewise, the inability within a region to generate sufficient traffic will increase rivalry for available business. The small hinterland of ports in the Caribbean constrains the market available to each port, creating the need to compete for all types of cargo rather than specialize in types of traffic for which the port might have comparative advantage.

1.2.4. Ability to Create Competition within the Port

The ability to segment operations in the port to create competition among service providers will often determine whether rivalry can exist within the port itself. Sometimes it is difficult or impossible to divide facilities in a way that enables more than one contractor to provide certain types of services within the port, particularly container terminal handling services, giving the contractor monopoly status. Much depends on the geographical layout of the port,

the available traffic, and the minimum capacity additions (taking into account the lumpiness of port investments).

In Beirut, a 20-year concession for handling containers in the port has been given to one contractor, as the layout of the port was considered to preclude more than one container terminal operator. In other situations, such as Jeddah, it was possible to segment container terminal facilities in a way that enabled the port to award long-term container handling concessions to two contractors, each operating in a separate location within the port. Even more competition has been created among service providers in Hong Kong, where three container terminal operators compete with each other and a variety of other service providers also compete for business within the port. In Buenos Aires, the geographical layout of the port and available traffic volumes ultimately enable not more than four terminal operators to compete.

1.2.5. Stakes at Risk

Rivalry will be influenced by the stakes at risk in preserving the market share of regional traffic. The greater the stakes, the more intense the rivalry to preserve market share. This takes on particular significance in modern container ports, considering the investment required to establish a new container terminal can easily exceed $100 million. Whoever assumes the risk for this investment will clearly have a big financial stake in ensuring that the new terminal captures and preserves market share. APM Terminals, with sister company Maersk Line, has invested heavily in a new container terminal in Salalah and clearly has a stake in ensuring that the facility is efficiently used as their regional transshipment hub (see Box 3). Stakes at risk also stem from the importance of the port to the local economy. The Port of Rotterdam, for example, is a major contributor to the local economy and preserving market share in regional traffic flows is of vital importance to the local and regional government. This has resulted in an intense rivalry with other Northern European ports and underpins the plan to invest more than $2 billion in a new deepwater container terminal and a new railway connection to Germany to maintain position in the future market.

1.2.6. Ability to Absorb Losses

The ability to absorb losses and cross-subsidize operations within the port impacts the balance and intensity of rivalry. Global terminal operators with strong financial balance sheets and multiple operations worldwide may be willing to absorb losses in a particular region, at least for a limited period of time, to eliminate competition. Ports with multifaceted operations may be able and willing to cross-subsidize services to lower charges on port activities where there is greater rivalry for business. Likewise, port authorities involved in non–seaport-related activities, such as the Port of New York and New Jersey, may be able and willing to cross-subsidize port-related services through higher charges on non–port-related services.

1.2.7. Ability to Control Operations

Rivalry is also impacted by the ability of port authorities and port service providers to control the efficiency of port services. There are situations where entities operating in the port are outside the control of the port manager or service provider, effectively limiting the ability of the port to compete with other ports for market share. In particular, procedures and requirements imposed by customs frequently constrain the port's ability to compete for market share. In Jeddah, for example, clearance procedures have been the primary culprit, limiting the port's ability to grow as a load center for the Red Sea and Middle East markets. In the West African Port of Cotonou, customs processes became such a hindrance that long dwell times for containers were suffocating the port.

1.2.8. Limits on Rivalry within Ports

Limits that ports set on the number of eligible service providers impact the degree of rivalry. Many port authorities have policies limiting the number of stevedores, tug companies, and so

Box 3: Load Centers Competing for the Gulf Market

Several major ports are positioning to be entry and exit points for containers moving to and from the Gulf. It is producing a fierce competition for load center status. The outcome of this competition could significantly change the way ocean carriers service the Arabian Peninsula market.

Dubai

The port has established itself as a world-class transshipment hub serving as a load center for markets in the Gulf. Dubai handled about 6.3 million TEU in 2004, about a quarter of which was transshipment traffic within the Gulf, with Saudi Arabia, Kuwait, and Iran as the major destinations. The port authority clearly plans to retain its role in current transshipment markets, as well as position as the load center for containers to and from Iraq once trade resumes. As part of its strategy to control market position, the port has been acquiring management contracts for other ports and terminals in the region (next to international projects), effectively gaining control over regional logistics networks.

Salalah

The new transshipment hub on the Gulf is clearly designed as a load center for the region. The major advantage is its proximity to the Europe–Asia trade route. Main line ships have to make only a small deviation from their main navigation course, allowing a quick pit stop to pick up and drop containers for the Gulf, East African, and India–Pakistan markets. Six years after its start in 1998, it handled 2.2 million TEU, mainly at the cost of Dubai and Colombo.

Jeddah

This port now largely services the Saudi market and only 22 percent of the containers through the port are for transshipment. However, the proposed rail land bridge to Dammam could enable the port to function as a load center for the Gulf market. The investment in infrastructure is substantial and major hurdles are in the way, particularly establishing a process for allowing transit containers to move freely across the country without regard to contents. But if the rail investment is realized and the hurdles resolved, Jeddah could be a major contender for traffic to and from the Gulf. In 2005, a tender for a build-operate-transfer (BOT) concession of the railway line was being solicited, which could bring the railway project closer to fruition.

Beirut

Then there is the new container terminal in Beirut that started operations in the beginning of 2005 with a capacity of 700,000 TEU. This terminal has the potential to become the major load center for containers moving between the Gulf and Europe/North America. Cross-border issues are hurdles that must be resolved. But the use of Beirut as a load center will avoid passage through the Suez Canal and save 3,400 miles of sea voyage to the western Gulf. The line haul route could be served using two fewer ships in the weekly string, the economics of which could be very attractive to owners.

Source: Author.

forth that can operate in the port. Sometimes these limits are set by entry criteria that effectively limit the number of competitors. In some situations, these limits are not due to port policy, but result from historical precedent limiting competition. Such a situation is difficult to change. Japanese ports, for example, are largely controlled by a number of small- and medium-sized stevedoring companies that have existed for many decades. Entry of new stevedores has been difficult, if not impossible, and the Japanese Minister of Transportation attributes this lack of rivalry to Japan's ports inability to compete with its Asian rivals.

1.2.9. Government Willingness to Subsidize Operations

Rivalry between ports is sometimes influenced by the availability of public funds to offset losses, blurring the role of commercial forces. Governments sometimes subsidize ports on the basis that they are vehicles for economic growth. European ports have for many years been willing to subsidize port access and quays to achieve larger economic goals. At present, the European Commission is taking steps to improve the situation of port competition (see Box 4). The objective of these subsidies is to create artificial forces that

Box 4: Intraport Competition in the European Union

Port competition is high on the agenda of the European Union (EU). One of the conclusions of the Meeting of the European Council in Lisbon March 28, 2000, was that transport is among the areas where the Commission, the Council, and the member states were asked to speed up liberalization. On February 13, 2001, the commission adopted a communication to the European Parliament and to the Council, "Reinforcing Quality Service in Seaports: A Key for European Transport" (the Ports Package). The cornerstone of this communication was a proposal for a directive of the European Parliament and the Council on "Market Access to Port Services." Of the 25 member countries, 21 have seaports through which in 2002, 1.2 billion tons of cargo were traded with non-EU member countries with a total value of 773 billion.

It is envisaged that the cost of handling these cargoes in ports can be reduced through liberalization of port services. The Directive on Market Access to Port Services aims to increase of intraport competition for cargo and ship handling services. The directive includes measures for self-handling of cargo and passenger operations and mandatory authorizations for all service providers. Self-handling means that an undertaking, which normally could buy port services, provides for itself using its ship and land-based personnel and own equipment. Also a wider use of the pilot exemption certificate is envisaged.

The proposals are drawing a great amount of opposition from stakeholders. Port labor unions see their position weakened by the arrival of land-based personnel of the shipping companies. Pilots see their position weakened by a greater use of pilot exemption certificates. Many companies presently in monopoly situations will require an authorization for their activities with a duration corresponding with the economic lifetime of their investments. Generally they find these periods much too short, the compensatory measures with termination of contracts too poorly defined, and see only more bureaucracy coming.

The public-private roles of the ports of EU member states differ greatly for the Hanseatic ports of Northwest Europe with their landlord type model, the Mediterranean ports with the great influence of the central governments, the United Kingdom's (UK) private ports, the ports in the formerly centrally planned states of Eastern Europe, and the ports of the other countries. The impact of the directive therefore will differ strongly too. At one end are the UK private ports arguing that they already have privatized everything and that the measures concerning authorization of port services are a step back, increasing bureaucracy, and at the other end are the ports of some Mediterranean countries where liberalization is still in its initial stages.

The proposal is leading to an extensive debate both within the interinstitutional legislative process and also with and between stakeholders. After three years of discussion, however, the European Parliament in a plenary session rejected the proposal in 2005 something that seldom occurs in the European parliamentary practice. In 2005, the European Commission (EC) was anxiously studying compromises that would be acceptable for both the parliament and the EC.

Interport Competition in the European Union

The amount paid by different European seaports for maritime access, coastal defense, quays, port basins and jetties, and the degree at which such costs are recovered from the ports users vary greatly. For many ports it is not possible to obtain sufficient insight from the official published sources, so it remains unclear to what extent countries are subsidizing their ports. There are also different opinions about the nature of some costs; for example, the provision of maritime access should be considered as a public good, so the related costs don't need to be recovered from specific users.

The EC therefore issued a Directive of Financial Transparency that should apply to all ports covered by its legislative proposal and which are subsequently subject to the State Aid Guidelines (an exclusive EC competence) on the financing of port infrastructure. At present, the issue is highly relevant for the ongoing container port expansion programs, such as the Deurganck Dock of Antwerp in Belgium; the Port 2000 Project of Le Havre in France; the expansion projects of Bremerhaven, Wilhelmshaven, and Hamburg in Germany; and the second Maasvlakte project of Rotterdam in the Netherlands.

Source: Author.

influence the chance of rivals' success. There are indications that government subsidies in the Mediterranean may be affecting the ability of transshipment centers to compete for business.

1.3. Threat of New Competitors

The second of five forces shaping port reform is the possibility of new port facilities or service providers within the port. This would include creation of new regional load centers that change the way cargo to and from a country's hinterland is distributed. The significance of this threat will vary from port to port depending on a number of factors.

1.3.1. Capital Expenditure for New Port Facilities

The capital cost required to build a new port facility frequently provides a barrier to new competitors. Large up-front expenditures are often required for dredging, quay construction, access roads, and port superstructure. These start-up costs provide an entrance barrier that can often deter all but the most aggressive players. But there are instances where new entrants will take the risk of major investments in new ports when they see an opportunity for market positioning. An example of new entrants taking a large risk occurred at the Port of Tanjung Pelepas on the southwest tip of Malaysia, where almost $745 million was invested to build a dedicated container port. The developers saw the opportunity to tap into the large and lucrative container market, which until then had been largely dominated by Singapore and to a smaller extent by Port Klang. Throughput increased from 0.4 million TEU (twenty-foot equivalent unit) in 2000 to 4 million TEU in 2004, and is expected to increase further.

1.3.2. New Distribution Patterns

Changes in distribution patterns can create new port competitors. This is particularly the case in containerized trades, where a newly created regional load center can siphon traffic from traditional ports in the region. In the Gulf, for example, the newly created load center in Salalah siphoned a substantial part of the fast growing transshipment business of the Gulf from ports such as Jeddah, the UAE ports, and Colombo. Since its start in 1998, the throughput increased to 2.2 million TEU in 2004. Based on this success, the investors have ambitious plans for further development of container, general cargo, and bulk handling facilities and also in free trade zone (FTZ) activities. Similar plans started also for the port of Aden. Another example includes the increase in All Water Express Services between Asia and the U.S. East Coast via the Panama Canal. As congestion in the U.S. West Coast ports increases with the strong growth in the Pacific Rim trades, shippers are adjusting supply chains to account for the longer transit time, but realizing the benefits of less delays and lower total costs. The result is creating pressure to develop alternative gateways to the U.S. hinterland market that may open opportunities for neighboring Canada and Mexico. There are also instances where a new port can provide access to a hinterland via overland transit, providing competition to a port more locally sited. The new Port of Ain Sukhna in Egypt at the northwestern end of the Red Sea became operational in 2002, and became, with a throughput volume of 238,000 TEU in 2004, a strong competitor to Egyptian ports in the Mediterranean.

1.3.3. Provisions in Operating Agreements

Provisions in leases, concessions, and other agreements, particularly those involving investment by the operator, will often provide some degree of protection from new competitors starting up business in the port. In other situations, however, the port service provider can be threatened with new entrants. Nowhere is this better evidenced than in Northern Europe, with the success of the Dutch tug company Kotug in expanding its tug assist business in this region's ports, which have traditionally been the realm of long established players. Since Kotug started its towage services in the Port of Rotterdam in 1988, a price war was triggered with prices of towage services being reduced about 25 percent. In 1996, Kotug expanded its services to the Port of Hamburg,

and in 1999 to Bremerhaven. Concurrently, one of the players in Hamburg started operations in 1998 in the Port of Rotterdam.

1.3.4. Natural Barriers

Natural barriers that constrain port capacity can limit the threat of new port entrants, particularly those requiring land or fixed facilities to operate within the port. In many ports there simply isn't space for additional berthing, storage, and other fixed facilities, providing some insulation from the entry of new competitors. However, these barriers can easily be overstated. In the long term, many of these barriers can be overcome by building in adjacent locations or extending out into the sea. There can also be new methods of operation introduced that do not require presence in the port. For example, an inland container depot could substitute for storage and other operations now performed in the port. The Italian port of La Spezia has a chronic lack of space and has constructed the Intermodal Center of San Stefano Magra for this purpose. In Western Europe, intermodal container depots situated along inland waterways are playing an increasing role to relieve congested ports and roads.

1.3.5. Magnitude of Switching Costs

Existence of switching costs will often determine the ability of new entrants to start up competing operations, either within a port or between ports. Switching costs can come in several forms. They could be the capital expenditure required to switch from one port facility to another. In some cases, this can be a very small cost, especially for carriers that have little fixed investment in a facility. A pure transshipment facility for containers, such as Kingston, Jamaica, can be particularly vulnerable to switching as the carriers using the facility may incur little switching cost in shifting to a competing facility. In other cases, this cost can be substantial. Carriers can have a considerable amount of equipment positioned in a port that would need to be shifted to another port if they were to switch operations. Also, some carriers have heavily invested in port and terminal infrastructure. In instances where major bulk handling facilities have been created, switching is almost impossible. Another form of switching cost is the need to establish a service network in the new port, which could entail a considerable amount of learning and experience costs. Then there's the switching cost incurred by the disruption in service during the transition period. Ports, and service providers within a port, can often protect their market position by ensuring that these switching costs are maximized.

1.3.6. Cost Advantages and Customer Loyalties

Cost advantages of existing service providers and customer loyalties will affect the threat of new entrants. There may be economies of scale or experience that enable established players to retain the position of cost leaders if new entrants were to start up business in the port. This could result from a variety of factors, including having the better location in the port, having sunk investment in facilities and equipment, or employing experienced personnel. While customer loyalties can be ephemeral, quality of service (for example, responsiveness to customer needs, handling rates, clearance time, and so forth) can differentiate the service provider and limit the threat of new entrants. Sometimes these customer loyalties can result from the threat of reprisal should the customer shift to another service provider or another port.

1.4. Potential for Global Substitutes

The third force shaping the competitive landscape of port reform is the potential of port users to shift to other global sources, impacting the level of activity in the port. This force takes on greater importance as world trade is opened to competition, sourcing of supply becomes increasingly global, and vertical specialization becomes an increasingly important factor in global logistics chains. Several factors will determine the importance of this force on specific ports.

1.4.1. Other Global Sources for Products Moving through the Port

The extent to which there are other global sources available to customers now shipping through the port will determine the ability to

source elsewhere. Various types of fruits and vegetables provide good examples of substitute global sources. Bananas, for example, can be sourced from West Africa, Central and South America, the Caribbean, or Asia. Manufacture of clothing is also globally footloose, with many potential source locations. The efficiency of port facilities in each of the export locations will impact the success of the product in the export market, which ultimately affects the level of activity moving through the port.

1.4.2. Substitute Products for Exports and Imports

Foreign buyers may be able to substitute other products for the product they are now shipping through the port. For example, a power plant utilizing imported coal as feed may be able to switch to oil or gas as feed if the economics shift in favor of the latter. Port costs to handle coal are one of the factors that impact the economics of utilizing coal as feed, and exports of coal through the port could certainly be affected if the foreign buyer shifts to gas or oil as feed.

1.4.3. Magnitude of Switching Costs for Substitution

There may be significant cost in switching to other sources, products, or assembly sites that will impact the ability of port users to substitute globally. The greater this cost, the greater the port's bargaining power. Ability to shift to other global sources can be limited by the port users' reliance on value-adding services in or near the port, involving integration of imported intermediate goods with domestic produce for final sale to the domestic or export market. These value-adding services can be costly to replicate elsewhere and affect the ability to shift to other global sources. For example, the large free zone in Jebel Ali enables tenants to import and assemble intermediate products into final products, utilizing a large pool of inexpensive expatriate labor for the assembly process. While many of the value-adding activities performed in Jebel Ali can be performed elsewhere, the alternatives may involve significantly higher labor cost and a less friendly government environment. It may also entail walking away from a high sunk cost. Reebok, for example, has established a large final assembly and distribution center in the Port of Rotterdam to service the European market. While this value-adding activity could be shifted to another location, there is a sizable sunk cost associated with the existing facility (see Box 5).

1.4.4. Demand Elasticity of Exports and Imports

Another factor determining the potential for global substitutes is the elasticity of demand for the country's exports and imports. The greater the elasticity, the greater the possibility that buyers can do without the product. Doing without the product is a form of substitution by the buyer that will impact the volume of traffic for that product in the port.

1.4.5. Importance of Port Costs in Total Delivered Price

Cutting through all of the above is the issue of how significant port-related costs are as a percentage of total delivered price. Many shippers consider port costs to be among the more controllable expenditures in the logistics chain. In general, the higher the percentage that port costs are of total delivered price, the more impact port costs will have on buyer behavior. For high value commodities, such as electronics, port costs can be less than 1 percent of the delivered market value. For low value commodities, such as bagged rice, port costs can be more than 15 percent of the delivered market value. Shippers of electronics may be less influenced by port costs in selecting ports than shippers of rice. However, small cost penalties may not be acceptable even when port costs are a small percentage of the total delivered price. These penalties may represent the difference between profit and loss in the marketplace and influence the selection of the port, depending on whether the port user has the option to ship through another port, not buy the product, or find another market.

Maritime transport costs have an important share in the landed price of bulk commodities such as coal, cement, and crude oil. An increase of the

Box 5: Reebok Logistics Center in the Maasvlakte Distripark

Value-adding activities have been created in many ports to enhance trade and generate employment for the local area. The key ingredients are efficient port operation, availability of good transport services, and attractive prices for land, labor, and energy. The Reebok state-of-the-art logistics center in Rotterdam illustrates how one port helped create a value-adding service that generates employment for 300 personnel and contributes $6 million in direct income to the local community.

Reebok Product Lines and Logistics

Reebok has two product lines, footwear and apparel. In 1998, footwear accounted for 57 percent of international sales, apparel 43 percent. Reebok products are actively marketed in 170 countries and territories. The United Kingdom (UK) is the largest market for Reebok products in Europe, representing 30 percent of total European sales. Spain is another big market for Reebok products. Almost all footwear is supplied from plants in the Far East and is transported in containers. Most apparel is supplied from plants in southern Europe, and moved by truck and container from plants in Portugal, Greece, and Turkey.

Restructuring of Logistics Activities

In 1995, as part of a global restructuring of logistics activities, Reebok decided that warehousing and distribution activities in Europe should be consolidated. Instead of having warehousing facilities in each market, a bulk logistics facility would be established in mainland Europe to supply pick-and-pack warehouses in the UK and Spain, as well as directly supply other markets in Europe. Except for some very large accounts (which are serviced direct) and apparel for Southern Europe (which is warehoused in Spain), all product flow to the European market would pass through this logistics center. France, Belgium, and the Netherlands were considered as potential locations. Following assessment of each of these locations, Reebok decided to locate the logistics center in the Netherlands. The site chosen is in the Distripark 3 in Maasvlakte, at the sea edge of the port property. In November 1998, the facility began receiving product.

Why the Port of Rotterdam Was Selected

Reebok had a variety of reasons for choosing this site. It is close to the new deepwater container terminal in the Port of Rotterdam, a facility that is generally regarded as one of the most advanced and capable terminals in Europe. The location is on the coast, which provides easy access to short sea transport to the UK market. There is a good supply of warehousing labor in the Rotterdam area, despite the fact that the general labor market is tight. Most people in the Netherlands understand English, which was considered important by Reebok. Customs in the Netherlands is considered to be efficient and business friendly. While not an advantage, labor costs and regulations concerning labor practices were considered to be similar to those of other countries in Europe. But most importantly, space was available and the port wanted to have a launching customer in the new Distripark. So the port, in combination with the municipal government, proactively pursued Reebok and provided strong incentives to locate the facility in Maasvlakte. Based on a six-year operating lease with a five-year renewal option and substantial residual value guarantees by Reebok, the port funded construction of the state-of-the-art 700,000 square foot logistics facility. The port also created the necessary infrastructure to connect the facility to the adjacent container terminal, facilitated creation of a bus service fitted to the plant shift system, and provided a contact person to deal with problems and issues. Reebok describes its relationship as "a partnership with the port."

Source: Author.

available draft enables the deployment of larger ships, the realization of economies of ship size, and a better access to world markets. The regional government of the state of Zulia in Venezuela has plans to deepen the Port of Maracaibo by shifting to a location nearer to the sea (see Box 6). As a result, shipments of coal and crude oil presently carried in consignments of about 60,000 tons can be shipped in consignments two to three times bigger, reducing shipping costs up to $3 per ton for exports of coal to Western Europe.

Box 6: Enlarging Venezuelan Export Markets of Coal and Crude Oil

The entrance channel of the Port of Maracaibo has a draft limitation ranging from 37–39 feet. This limits the size of the consignments carried by tankers and dry bulk carriers leaving the port. In practice, vessels of more than 100,000 dwt (dead weight tonnage) are calling in partly loaded condition, with consignments of about 60,000 tons. Plans are being considered to enable the port to accommodate ships with a draft of up to 54 feet. This will lead to a reduction in shipping costs of up to $3 per ton for exports to West Europe. As a result, Venezuelan coal and crude oil can be shipped cheaper to its present customers, particularly those in North America and Western Europe.

1.5. Bargaining Power of Port Users

The bargaining power and control over port management exercised by carriers, shippers, and tenants in varying degrees are also significant forces shaping the competitive landscape of port reform. Bargaining power of port users is determined by a number of factors, which are outlined below.

1.5.1. Concentration of Port User Power

The larger percentage of traffic in the port controlled by an individual user, the more bargaining power that user has in negotiations with port management and service providers. In some situations, the port user can be so powerful that the port literally cannot afford to lose its business. Even the largest ports must contend with extremely powerful carriers that have the option to take their business elsewhere. A major container carrier leveraged its size and market share to get concessions from the Port of New York and New Jersey as a condition of using the port as a load center on the U.S. East Coast. The port did not want to lose a carrier that commanded 20 percent of the port's container volume. Given this control over a large port, consider the bargaining power that the carrier has in dealing with a small or midsize port where there are options for using other facilities.

In the Caribbean, large cruise lines such as Carnival, Royal Caribbean, and P&O have great bargaining power with the cruise ports that they serve. These three companies control more than 50 percent of industry capacity and their decisions on which ports to call can have major impact on a local economy. Some years ago, Carnival decided to reduce cruise ship visits to Grenada as a protest to the imposition of cruise taxes by the government, an action that seriously affected the economy of the small nation.

1.5.2. Impact of Changing Business Relationships

Business realignments and agreements among port users can result in powerful players that port managers and port service providers must contend with in contract negotiations. These can take the form of conferences, slot sharing arrangements, strategic alliances, mergers, and others. The result in each case can be greater concentration of port business among a smaller number of port users. When representatives of the Grand Alliance (comprising P&O, Nedlloyd, NYK, OOCL, and MISC) sit down with a port to negotiate future contract terms, the port is dealing with a formidable alliance of carriers that previously had been individual customers. Maersk's acquisition of Royal P&O Nedlloyd in 2005 gave Maersk control of 18 percent of the total world container vessel capacity, which is not excessive in itself. The market share, however, varies per trade route and is around 22 percent on the Europe–Far East, 14 percent on the transpacific, and 19 percent on the transatlantic trade routes. On some North–South trade routes the market shares are higher, such as 26 percent on the Europe–India route and 28 percent on the Europe–East Coast South America trade routes. On the Europe–South Africa and Europe–Australia–New Zealand trade routes, however, the market shares became considerably higher and resulted in mandatory downsizing in these trades.

1.5.3. Presence of Large Value-Adding Tenants

Bargaining power will be influenced by the existence of large value-adding tenants that the port wants to attract and retain. A major port tenant employing a large number of personnel and substantially contributing to the local economy is in a position to extract concessions that would not necessarily be available to smaller players. The Port Authority in Portland, Oregon, has targeted auto imports as a strategic business sector that it wants to retain and grow. Three car manufacturers (Hyundai, Honda, and Toyota) now lease several terminals from the port authority to process and accessorize imported cars. Keeping these three auto manufacturers in the port is a high priority objective, and the port authority provides favorable terms to these large users that may not be available to smaller tenants.

1.5.4. Importance of Port to the Economy

The more important the port to the national economy, the more pressure there will be on port managers to attract and retain valuable customers. Some ports can be extremely valuable players in the national economy and the loss of major customers could have a big ripple effect on employment and local income (see Box 7). For example, the Port of Rotterdam is a key element in the Dutch economy and development projects undertaken by the port over the past decade have created more than 45,000 man-years in temporary employment and 17,500 man-years in permanent employment in the Netherlands.

Current and prospective port users can employ the importance of the port to the local economy as a bargaining chip in negotiations over tariffs, service, or facilities. The larger the contribution of the port user to the local economy, the greater the user's bargaining power with the port.

1.5.5. Ability to Replicate Port Services

Port users will have strong bargaining power if the services provided by the port can be replicated elsewhere. Essentially this comes down to whether there are alternative facilities available to the port user. The more opportunity there is to use other facilities, the less bargaining power the facility owner has over the user. Nowhere is this better illustrated than in Northern Europe, where a number of large container handling ports are available for entry and exit in the European market. Carriers can react to tariff increases, efficiency issues, or problems by shifting or threatening to shift to other ports. Some years ago, the Grand Alliance decided to temporarily shift one of its five Europe–Asia services from Rotterdam to Antwerp on the basis that it was experiencing delays in Rotterdam. This decision shifted, on an annual basis, some 125,000 TEU from Rotterdam to Antwerp, until the delays in Rotterdam were corrected. In the mid Mediterranean, Malta Freeport and Gioia Tauro are equally situated to provide transshipment service to carriers. Each port must consider the potential actions of the others when negotiating with current or prospective customers because customers have the ability to take their business to the other port.

1.5.6. Facility Investments by Port Users

A carrier, shipper, or tenant who has a major investment in facilities in the port, or has structured its operations in a way that prevents easy transfer of operations to another facility, faces switching costs that limit bargaining power. For example, a joint venture of Saudi and U.S. interests began operating a rice processing plant in the port of Jeddah in October 1995. It is the largest rice handling facility of its type in the Middle East and the investment in the facility creates an exit barrier should the operator become dissatisfied with the service received from the port. Another example is the container load center in Salalah, where Maersk Line is a major investor in the terminal along with the government of Oman. It's difficult to pack up and leave this facility if there is unhappiness with port policies. At the same time, sunk costs in facilities do not preclude leaving when things get too bad. International Container Terminal Services, Inc. (ICTSI) of the Philippines decided to pull out of the Port of Rosario in Brazil after

Box 7: Suppliers to Container Terminal

Since opening in 2000, the terminal in Tanjung Pelepas, Malaysia, created businesses for 710 companies that did not exist before the terminal went into operation.

Suppliers to Tanjung Pelepas Container Terminal

Types of services	No. companies	Types of services	No. companies
Warehousing	9	Bunkering and lubricant	11
Manufacturing	2	Port development contractors	15
Parts distribution hub	1	Duty-free shop	1
Vehicle storage	1	Insurance services	1
Haulage/trucking	28	Pest control	1
Container maintenance	1	Health clinic	1
Forwarding agent	12	Cleaning services	3
Freight forwarding	28	Landscaping	1
Logistics	32	Canteen operators	5
Lashing contractors	2	Convenience Store	5
Prime mover contractor	2	Fixed assets supplier	2
Waste collection	2	Sundry suppliers	532
Ship Chandelling	7		

Terminals in Bremerhaven, Germany and Salalah, Oman have more than 350 and 400 suppliers respectively.

Source: APM Terminals International B.V.

having invested $27 million in a failed effort to operate the container terminal. Europe Container Terminals (ECT) left Trieste after a one-and-a-half-year effort to operate the Molo VII container terminal. Both contractors decided that future losses would be greater than the cost of pulling out. State-owned, Singapore-based operator, PSA International (PSA), met difficulties with its Aden terminal in 2002, and was, according to the contract, bought out by YemenInvest.

1.6. Bargaining Power of Service Providers

The final force shaping the competitive landscape of port reform is the bargaining power of port service providers. A variety of operators and groups often have the ability to exercise control over the port by threatening to curtail or cancel services. At present, more than half the world's container terminal capacity is managed by a small number of companies, approximately 15, defined as global terminal operators. These companies have operations in more than one region in the world and handled an estimated 206 million TEU in 2004. It is expected that the market share of these companies will increase to 55–60 percent by 2010. These large players can tilt the scale in negotiations with port authorities. The extent of service provider bargaining power is determined by a number of issues.

1.6.1. Experience and Capabilities of Service Providers

Experience and the unique capabilities that the service provider brings to the port are a factor determining its bargaining position. The greater these capabilities, the more power the service provider has in dealing with the port. A contractor that has operated in a port for many years, has established a cadre of very experienced personnel, and has accumulated a large inventory of equipment needed to perform the job would more likely be able to extract favorable terms from the port than a start-up company.

Likewise, a contractor with unique skills, such as handling hazardous cargo or chemicals, is in a good bargaining position. Large global terminal operators are also in a good bargaining position because they are often perceived as bringing experience and unique capabilities based on their operations elsewhere, loyalties of a customer base, networking possibilities, and access to financing. The contract for Dubai Ports World (DPW) to manage the Port of Djibouti was largely based on the perception that DPW could transfer experience in port operations in Dubai and increase regional market access to Djibouti.

1.6.2. Participation in Facility Financing

A service provider that participates in the financing of an activity is clearly in a better bargaining position than one who does not. Many port services that are privately operated as concessions involve some degree of financing by the operator and, in many cases, the contractor offering the best financing terms is in position to get the concession. The developer of the new container terminal in Aden chose PSA Corporation as the operator partially because PSA was willing to participate in financing the $200+ million infrastructure development.

1.6.3. Choke Points in the Port

Existence of choke points in the port that facilitate slowdowns or stoppages of port operations provides a power that is often employed to extract concessions from port management. Sometimes the choke point can be an activity in the port, without which the port cannot function effectively. Tug service is an example; if tugs are not available for ship assist, the port may continue to function, but not necessarily at the normal level of efficiency. Sometimes the choke points can be personnel in the port; a labor stoppage in cargo handling or other strategic services can shut port operations down. The choke point can also be trucking to and from the port, warehousing operations, or other services where a slowdown for whatever reason can quickly stall operations in the port. Service providers in these types of activities have considerable bargaining power in dealing with port management.

1.6.4. Ability to Absorb Downtime

The ability of service providers compared to port management to absorb downtime also affects the balance of bargaining power. Service providers with deep pockets may be willing to take a loss of revenue for a substantial period to get what they want from the port. Meanwhile, the port can be under substantial government and commercial pressure to resolve the conflict and get the port back into operation. Strikes in the Israeli ports of Ashdod, Haifa, and Eilat in 2005 created a backup of vessels in the ports and generated calls from many sides to reach a resolution as soon as possible. In addition, the management lock-outs in October 2002 during the labor contract negotiations (Pacific Maritime Association versus the International Longshore and Warehouse Union) caused havoc in the U.S. West Coast ports, taking months to process the backlog of vessels.

1.6.5. Interrelationships between Providers and Port Users

The existence of interrelationships between service providers and port users can influence the power structure in the port. These interrelationships can affect decisions regarding port operations, leases, berthing rights, and other issues. Uniglory, for example, is the feeder ship subsidiary of Evergreen, which in turn is one of the major line haul container carriers. A port that wants to attract line haul calls by Evergreen could be willing to extend berthing terms to Uniglory that are more favorable than would be given to a feeder ship operator who is independent. Uniglory can exploit this relationship to strengthen its bargaining position in negotiating terminal concessions.

1.6.6. Rights and Obligations Conveyed by Contractual Agreements

Lease agreements and other contracts to use port facilities include provisions that convey legal rights and obligations to the port service

provider. These contract terms will set boundaries on the port service provider and port in future negotiations. The rights can be extensive, giving the provider exclusive rights to operate in the port for 20 plus years with little if any control by port management. Or they can be very limited, giving the port the right to exercise a great deal of control over the performance of the service provider, including provisions in the contract specifying a minimum investment program that must be fulfilled by the contractor. As the contract between the port and service provider will set the boundaries for future bargaining, the need for a well-planned, careful negotiation to develop the contract can't be overemphasized.

1.7. The Bottom Line

Ports no longer operate in an insulated environment. They face the same competitive forces that companies in other industries experience. There is rivalry among existing competitors, the continuing threat of new entrants, potential for global substitutes, and the presence of powerful customers and powerful suppliers. Dealing with these forces is a continuing challenge for the port manager. It requires that the port manager be keenly aware of port user requirements, know their constraints in the global market, and have a strategy for making the port a partner in business development.

2. PORT DYNAMICS IN THE 21st CENTURY

The 21st century will see radical changes in the business base underlying port operations. Increasingly, intense global competition will force changes in the way all players in the international logistics chain, including ports, conduct business in the future. Innovative systems and new technology will radically change requirements for port infrastructure and increase the degree of specialization, raising the financial stakes of port investments and the need for a highly specialized workforce. Realignments and consolidations among port users and port service providers will continue, creating a fluid base of players with whom ports do business. Changes in distribution patterns and in the structure of the maritime geography will increasingly create a hierarchy of ports and some historical port-related activities will be shifted to inland sites. Environmental, safety, and security concerns will force ports to impose regulations and provide facilities that may have no commercial return on investment.

2.1. Globalization of Production

The world economies are becoming increasingly interrelated as a result of increasing trade and the growing trend toward globalization of production. Over the past half century, most countries have seen an increase in exports as a share of gross domestic product (GDP) and there has been an increase in vertical specialization of world trade. In addition, sourcing of raw materials and finished products has become increasingly globalized, and producers in various, often distant areas of the world are increasingly forced to compete with one another for the same markets. The basic forces that have triggered the greater interrelation and interdependency of the world economies remain active. Thus, there is no reason to think that these trends will not continue.

2.1.1. Vertical Specialization

The increasing vertical specialization of world trade has had significant impact on the global logistics system of many manufacturers. It has added links to global supply chains and increased the transport intensity of production processes. Firms have been increasingly concentrating on exploiting their core competencies and subcontracting out a number of noncore manufacturing and assembly activities to contractors. Tasks traditionally performed at the start or the end of the production line are increasingly moving away from the main plant to be performed by manufacturing subcontractors or distribution centers. Preassembly and sequencing of parts for on-line production chains are activities increasingly outsourced to specialist logistics providers. Customization of products, which can range from labeling or repackaging of goods to reconfiguration of

items, is one of the fastest growing areas of logistics outsourcing.

2.1.2. Focused Manufacturing

Manufacturers have been concentrating production capacity in fewer locations, replacing the traditional system of nationally based production with "focused manufacturing." Instead of a factory manufacturing a broad range of products for a local market, the entire production of a particular product for a continent or, in some cases the world market, is focused at a single location. While this has enabled companies to maximize economies of scale in the production operation, it has often made their logistical system more transport-intensive and transport-dependent.

2.1.3. Expanded Logistics Reach

Companies have steadily expanded the geographical scale, or "logistics reach" of their sourcing and distribution operations. Extension of this reach on a global scale has been one of the dominant trends in international business and logistics over the past 30 years. The emergence of a new generation of high-value manufactured products, particularly in the electronics industry, and a general reduction in the density of consumer products (that is, lesser but better known brands) has contributed to an increase in logistics reach. Hewlett-Packard, for example, estimates that the various parts in a computer workstation in a New York office were moved a total of 96,000 kilometers from their points of production in places such as Singapore, Japan, France, and the Western United States.

2.1.4. Increased Sourcing Alternatives

Producers in one area of the world are increasingly competing with producers in other areas for the same international markets. This is true across the spectrum of primary and intermediate products. Examples of sourcing alternatives are virtually endless. Wholesalers of fruit and juice in Europe can source from Latin America, Southeast Asia, Australasia, Eastern Mediterranean, Southeast United States, and Africa. Textile manufacturers can source in China, Southeast Asia, the Indian subcontinent, Africa, Eastern Europe, and a wide variety of other locations. The sourcing decision ultimately is determined by total delivered cost and quality, which in turn can be greatly dependent on the logistics cost to acquire primary and intermediate products and deliver the finished products to market.

2.1.5. Impact of Globalization on Ports

While ports have always been important nodes in the logistics system, globalization of production has sharpened the need for ports to be value adders, not value subtractors, in the supply chain, and has given ports a unique opportunity to become value-adding entities. A port is the interface between intercontinental transport and a place in the hinterland being considered for production, assembly, or final distribution. Port capability and efficiency can greatly influence the decision for locating a plant or distribution center, and often determine whether a local producer can compete globally or regionally with other producers. The challenge is for ports to relate to the needs of their customers and assist them in improving their competitive positions by providing low-cost, efficient port services.

2.2. Changing Technology

Major technology changes are taking place in the ocean shipping sector that affect requirements for port infrastructure and services. The most obvious is the increasing containerization of global trade, a trend that is widely expected to continue into the future. Containerization of seaborne trade is some 50 years old, and deep-sea containerization some 40 years old. Yet it has dramatically changed requirements for cargo handling and port facilities, raised the financial stakes of investing in these facilities, and radically affected manpower and labor skills required to handle cargo, creating serious labor redundancy issues and retraining needs in many ports. In addition, the ocean transport industry is employing increasingly sophisticated information technology (IT) to manage logistics; and ports, if they

Box 8: Evolution of Containerized Shipping

Container shipping got its start in April 1956 when the tanker Ideal X owned by SeaLand (then known as Pan Atlantic Steamship) made its initial voyage between New York and Houston carrying 58 trailers on deck. The trailers were detached from their chassis and lifted aboard the ship with a dockside gantry crane. This initial voyage was rapidly followed by plans to convert six dry cargo ships to full containerships fitted with onboard cranes. The first of these began operating in October 1957, and had capacity to carry 226 35-foot containers, equivalent to about 480 TEU. By 1963, the company was employing converted tankers between the U.S. East and West Coasts that were able to carry 476 containers (about 830 TEU). Meanwhile in 1960, Matson began containerized service between the West Coast and Hawaii, utilizing cargo ships able to carry 436 24-foot containers on deck (about 520 TEU). There was also an unsuccessful attempt by Grace Line in 1960 to introduce container service between the United States and Central and South America. International service using containerized vessels began in 1966 with the introduction of SeaLand's weekly container service between the U.S. East Coast and Europe.

First Purpose-Built Containerships

Ships built prior to 1969 were converted break-bulk ships or tankers. They generally had capacities in the 750–1,000 TEU range, a draft of about 9 meters, service speeds of 18–21 knots, and were fitted with shipboard cranes to handle containers. In 1969, the first ship specifically designed for containership service was built. This began a new generation of larger and faster containerships with capacities in the 1,000–1,500 TEU range and service speeds of 20–23 knots, and some ships could achieve speeds up to 27 knots. These ships were designed to use quay cranes rather than shipboard cranes. Removing the cranes both increased the cargo handling productivity and allowed more containers to be stowed on deck.

Containerships Reach Panamax Dimensions

Ships built in the early 1970s had capacities in the 1,000–2,500 TEU range, a draft up to 10 meters, and service speeds of 22–26 knots. Built during this period were the first panamax-size containerships, with dimensions just enough to pass through the locks of the Panama Canal, which limits ships to 289.5 meters length and 32.3 meters beam. This generation included a containership design that moved the technology goalpost on service speed. In 1972–73, SeaLand took delivery of eight 33-knot, panamax-size containerships capable of carrying 1,900 TEU. To make this speed, the ships had 120,000 bhp (brake horsepower) installed power. They turned out to be an economic failure when fuel prices went skyward as a result of the Organization of Petroleum Exporting Countries (OPEC) action in the mid 1970s. To date, the speed of these SeaLand ships has not been exceeded. The late 1970s and early 1980s saw further increase in containership size, with capacity moving into the 1,500–3,000 TEU range, including a number of panamax-designed ships. However, the abrupt rise in fuel cost brought about a slower generation of containerships during this period. The design emphasis was on achieving fuel efficiency, and service speed generally fell into the 20–24 knot range and drafts deepened to 10.5 meters.

During the second half of the 1980s, the capacity of panamax containerships grew to more than 4,000 TEU through design improvements. Included among the panamax ships built during this period were 12 4,400 TEU "econoships" designed by U.S. lines to operate on a round-the-world service. These were relatively slow (19 knots) ships with a small power plant designed to maximize fuel efficiency. While these ships were too slow for the intended service, they initiated the concept of a round-the-world service that Evergreen and other carriers followed later.

Postpanamax Ships Enter Service

Even more important during the second half of the 1990s was the introduction of the first postpanamax ships by American President Lines (APL), which ordered five ships at 273 meters long, 39 meters wide, with 4,400 TEU capacity for use in transpacific service. These were the first containerships unable to transit the Panama Canal and paved the way for increasingly larger postpanamax ships over the next decades. According to APL, the principal advantage of the postpanamax ship is virtually unlimited container capacity. Other advantages include the fact that a large panamax ship must carry as much as 12,500 tons of water ballast, whereas an equivalent size, but wider,

Box 8: Evolution of Containerized Shipping (*Continued*)

postpanamax ship requires little or no ballast and consumes less fuel. Also, for the same TEU capacity, the postpanamax ship is 5 percent cheaper to build because length is the most expensive dimension.

In the 1990s, postpanamax containerships were ordered by most of the major line haul carriers, including Maersk, OOCL, Hanjin, Evergreen, Hyundai, COSCO, NYK, MOL, and NOL. The most notable orders were those of Maersk and P&O, who took delivery of a string of ships with a capacity of more than 6,000 TEU, designed for a service speed of 25 knots at maximum draft of 13.5 meters. In addition, through design changes, the capacity of panamax-sized containerships increased to 4,800 TEU. In the late 1990s, Hapag-Lloyd ordered seven 4,800-TEU containerships with a service speed of 25 knots and draft of 13.5 meters, yet designed within the size limits of the Panama Canal.

Source: Ecorys (2005).

are to remain competitive, must be key players in future IT logistics networks.

2.2.1. Containerization of World Trade

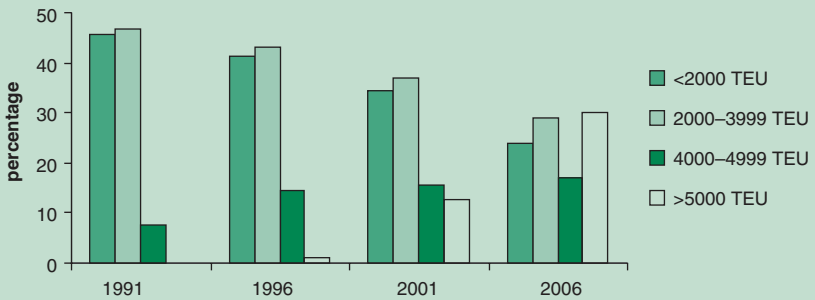
More than 60 percent of the world general cargo trade moved by sea is carried in containers. On trades between highly industrialized countries the percentage approaches more than 90 percent (of the containerizable cargo). This is a remarkable market penetration for a technology that dates only from the mid 1950s, when the first converted ship carrying 58 containers made its initial voyage between New York and Houston. Since then there has been a continual increase in both number and average size of containerships (see Box 8 and 9).

In the beginning of 2005, the world fleet of cellular containerships consisted of 3,362 units with a capacity of 8.3 million TEU. Given the then existing orderbook, the fleet will increase to 4,252 units with a capacity of 10.7 million TEU in 2008. With a resulting rate of 10.7 percent more than the period 1998–2008, the growth is higher than the 9.9 percent as experienced over the previous decade (see Box 10 and 11).

The growth was accompanied with a large increase in the size of ships. The share of ships in excess of 5,000 TEU increased from 1 percent in 1996 to 30 percent in 2006. The share of postpanamax vessels (ships with a beam larger than 32.2 meters) will have increased over the same period from 15.4 percent to 47.1 percent.

In September 2005, the total fleet on order reached 4.3 million TEU. Maersk Line tops the list with a share in the total of 11 percent in terms of TEU and 8 percent in terms of number of vessels. The 10 largest operators together have a share of 48 percent and 31 percent respectively.

Box 9: Development of Container Vessel Sizes as a Percentage of the Global Fleet



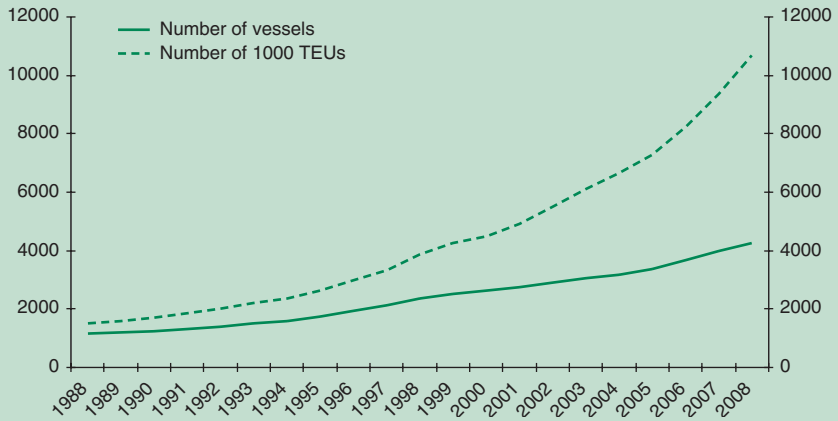
Source: Author.

Box 10: Ships on Order as of September 2005

Company	Rank	On Order TEU	On Order Ships	% of Total
Maersk Line	1	463.961	91	8
Mediterranean Shipping Co. SA	2	293.824	39	3
P&O Nedlloyd Ltd.	3	179.483	29	2
CMA CGM SA	4	356.350	66	6
Evergreen Marine Croporation (Taiwan) Ltd.	5	36.616	6	1
APL Ltd.	6	111.106	30	3
China Shipping Container Lines Co. Ltd.	7	209.413	34	3
COSCO Container Lines Ltd.	8	223.285	27	2
Hanjin Shipping Co. Ltd.	9	74.365	11	1
NYK Line	10	137.300	23	2
World Fleet		**4,348,664**	**1,161**	**100**

Source: Containerisation International.

Box 11: Evolution of Cellular Fleet



Note: Figures are given at 1 January each year. Figures for 2006–2008 are derived from orderbook of 1st 2005, assuming that no ships are deleted.

Source: BRS Alphaliner.

2.2.2. Future Containership Designs

There are no technical reasons preventing containerships from getting larger, so economic and strategic considerations will be the source of any barrier. There is a continuing increase in size of ships being ordered, but owners appear to be reluctant to take large steps. The 10,000 TEU mark has not yet been clearly passed, as was expected some years ago. The largest ships are most effective on the Europe–Far East trade route for which seven to nine ships are needed to operate a weekly schedule. Investment in a service deploying 10,000-TEU ships would therefore require a capacity addition of 80,000 TEU; this is a large capacity addition. The increase in the size of the total market and the increase in the size of the global operators show

that there are parties that have a market allowing them to deploy bigger ships effectively.

2.2.3. Impact on Port Operations

The contrast between container and earlier breakbulk operations is startling. Most significantly, it has greatly reduced the ship's time in port and at berth. Containerization has dramatically reduced personnel requirements for cargo handling, raised berth productivity, and increased the capital intensity of port operations. Prior to containerization, about 200 men, working simultaneously in four gangs, were typically required to load and unload a large general cargo ship, a process that could take a week to 10 days in port. Containerships require only 50 to 60 men to load and unload cargo. Assuming a four gantry crane operation, a containership requires some 30 workers directly allocated to the vessel. This figure, moreover, depends on the type of terminal operation that is used, for example, more for straddle carrier operation, less for rubber-tire gantry (RTG). A typical general cargo berth can handle roughly 130,000 to 150,000 tons per year of cargo throughput. A modern container berth, equipped with four ship-to-shore gantry cranes, will handle 400,000 container moves annually (typically 600,000 million TEU). Assuming three-quarters of the containers are full and the average full load is 10 tons per TEU, the throughput of this berth is some 4 million tons annually. The largest postpanamax container crane with some 57 meters outreach will cost about $8 million. Four to five of these cranes are needed to efficiently handle the largest postpanamax containerships (see Box 12). Overall, the infrastructure improvements and superstructure (cranes, straddle carriers or RTGs, tractors, and trailers, and so forth) needed for a modern two-berth container terminal will easily cost $150 million. In contrast, a typical 3–6 ton quay crane used for general cargo handling in the 1950s would have cost, at today's prices, about $1 million.

2.2.4. Need for Container Port Productivity Improvements

A study concludes that "the economics of containership operation are critically dependent on

Box 12: Future Containerships Require Increasingly Larger Cranes

Panamax—A typical panamax containership is about 290 meters long and has 13 meters draft. The ship is limited in width to 32.2 meters to allow passage through the Panama Canal locks. This width limitation constrains the number of rows to 13 containers. Up to 4,800 TEU can be carried in these vessels. The outreach of the crane must be capable of spanning 13 rows of containers.

Postpanamax—These ships are too wide to transit the Panama Canal. The first postpanamax ships delivered in the late 1980s carried 4,400 TEU. More recent ships entering service for Maersk and P&O were designed to carry 6,000–7,000 TEU. The vessels are almost 43 meters wide and are capable of handling 16 to 17 rows of containers on deck. Draft is 13.5 to 14 meters. The container crane must be capable of spanning 17 rows of containers. Since the containers are stacked up to six high on deck, and an increasing percentage of containers are so-called High Cubes (9 feet, 6 inches high), the air draught of container gantry cranes had to increase considerably as well.

Recent designs are able to carry more than 9,000 TEU, and it is widely expected that orders for 10,000-TEU vessels will be placed in the near future. The width of these vessels will be 44–46 meters and the draft will range from 14–15 meters. They will accommodate 18 to maybe 23 rows of containers on deck. The crane required to handle the containers on this vessel will be a massive structure capable of spanning 18 to 23 rows and higher stacks.

Future Designs

Gustav de Monie launched his concept of the mega containerships. The concept design is a containership able to handle 15,000 TEU. The massive vessels would be between 380–450 meters long, 70–78 meters wide, and have a draft of about 14 meters. Nico Wijnolst launched his design of the Malacca-Max design: 18,000 TEU, 400 meters long, 60 meters wide, and a draft of 21 meters (maximum draft to pass the Strait of Malacca). To handle the containers, it will likely be necessary to use a different type of container crane and special berthing basin for the vessel.

Source: Author.

port productivity . . . (and) continued general worldwide improvements in port productivity will so fundamentally alter the container shipping cost environment that, in the absence of any technological constraint, ship size optimums for all routes will continue to increase as they have done in the past" (see Box 13 and 14). A typical container terminal today has a static capacity of 40–200 TEU per hectare (depending on the yard stacking system in use), crane productivity of 25–30 gross moves per gantry-crane hour, average container dwell time of five to six days, and truck turnaround time of one hour. But future terminal requirements will be considerably more demanding. To accommodate the mega containerships coming into service, new terminals will require a static capacity density of 400–800 TEU per hectare, crane productivity of 200 moves per ship-hour at berth, maximum three days average dwell time, and truck turnaround of less than 30 minutes. Water depth at the future terminal will need to be at least 15 to 16 meters and increasingly larger cranes will be required to accommodate ships with a deck stack of up to 23 rows across.

2.2.5. Growing Role of Information Technology

Equally important in the future is the need for ports to expand the use of IT to support port user requirements, particularly relating to containerized traffic, although not exclusively. IT is increasingly employed throughout the ocean transport sector and has revolutionized the way intermodal traffic is handled. IT systems electronically link port administration, terminal operators, truckers, customs, freight forwarders, carriers, ship agents, and other members of the port community (see Box 15). The technology provides port users with real time data on the status of cargo, paperwork, and availability of port facilities, and enables ships and terminals to be part of an integrated office infrastructure. IT reduces time for delivering cargo; provides more accurate transfer and recording of information; reduces manpower for port operation paperwork; offers advance information on ship, barge, truck, wagon, container, and cargo movements; and improves planning and coordination of berths, handling equipment, and storage facilities (see Box 16). Ports unable or unwilling to keep pace with information technology will be left behind in the competitive ocean transport market.

2.2.6. Port Requirements for Large Cruise Ships

The cruise industry is producing requirements for more ports and enhanced facilities in existing ports to accommodate the growing number and size of cruise ships. During the decade before the attack of September 11, 2001, the industry had tremendous growth. Particularly significant was the growth in number of mega cruise ships, that is those more than 70,000 and up to 150,000 gross tons that carry 2,000–3,000 passengers or more. Since 2004, the market has recovered, new ships are being ordered and the share of mega cruise ships is increasing again.

With the growth in numbers of ships, the cruise lines need more ports to vary their itinerary. In selecting a cruise port, cruise ship operators look at:

1) Location of the port and cruising distance relative to other ports on a particular itinerary.
2) "Marquee" value and activities available for passengers.
3) Visitor safety and comfort.
4) Existence of head taxes.
5) Physical capabilities of the port to accept cruise ships (see Box 17).

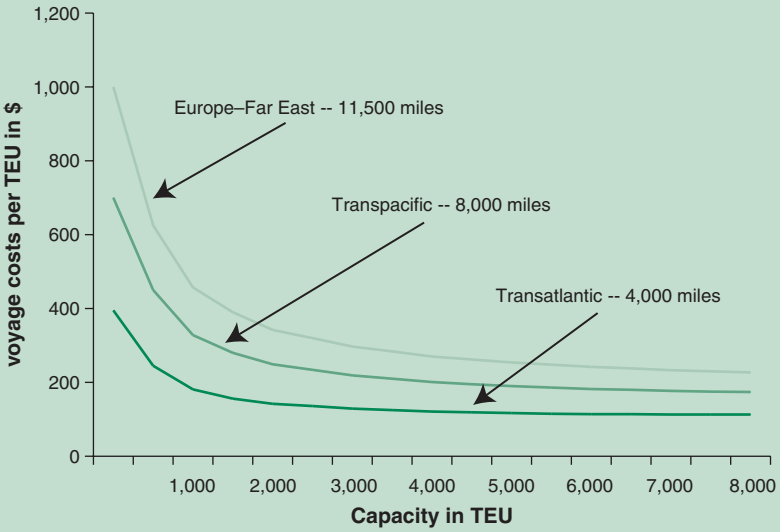
Ports wanting to be cruise destinations must develop a strategy jointly with tourism officials to maintain tourism product quality and maximize visitor spending. For ports able to satisfy cruise operator needs, the operator may be willing to establish long-term agreements to bring its ships to the port on a regular basis for periods of up to 25 years. Such an agreement could be the basis for arranging financing by a developer to acquire the physical facilities and services in the port needed to accommodate cruise ships. The

Box 13: Impact on Port Productivity of Unit Voyage Cost of Large Containerships

A study of economies of scale in large containerships gives an indication of the unit cost benefits that can be obtained by the use of increasingly larger containerships—and the benefits that can be achieved by increased cargo handling productivity that reduces port time. The study prepared by Cullinane and Khanna and published in the *Journal of Transport Economics and Policy* models the impact of using containerships with nominal capacity to 8,000 TEU, assuming current cargo handling rates and rates that would be 100 percent higher.

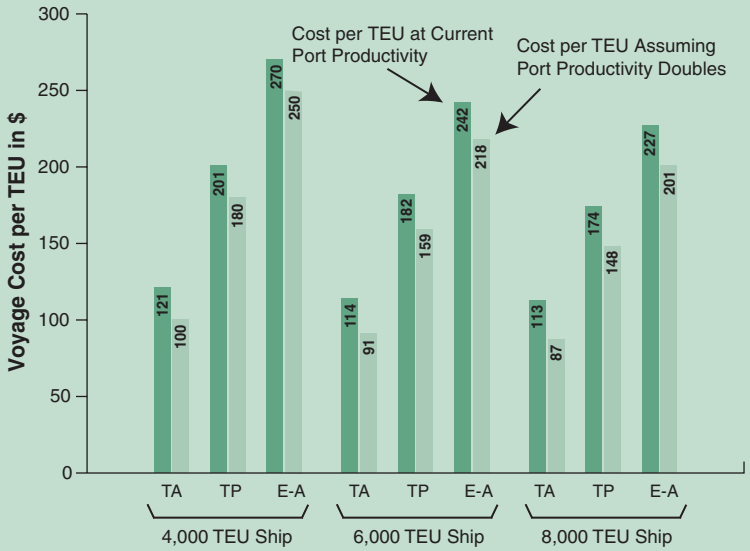
Declining Unit Cost with Larger Ships

Box Figure 13.1 is from the Cullinane and Khanna study and shows the relationship between voyage cost per TEU, ship capacity, and route distance on three major line haul routes. Unit cost declines as ship capacity increases. In deriving these unit costs, the authors assume that port time for various size ships reflects current cargo handling productivity, which in turn is a function of the number of cranes assigned to a ship and the handling rate per crane. Based on a questionnaire by the authors, current practice is to typically employ one to two cranes on ships under 1,000 TEU capacity, three to four cranes on ships 3,000–4,000 TEU capacity, and five cranes on ships of 6,000 TEU capacity. Crane productivity under current practices is assumed to average about 22 moves per hour. On this basis, five cranes working a 6,000 TEU containership can load and discharge 2,000 20-foot boxes and 2,000 40-foot boxes at a rate of 110 moves per hour, and the ship can be fully discharged and loaded in 72 hours.



Total voyage cost per TEU as a Function of Ship Capacity and Route Distance (assuming current cargo handling productivity)

Source: K. Cullinane and M. Khanna, "Economies of Scale in Large Containerships," *Journal of Transport* Vol. 33, p. 201.



Impact of Increasing Port Productivity on Voyage Cost Per TEU

Source: K. Cullinane and M. Khanna, "Economies of Scale in Large Containerships," *Journal of Transport* Vol. 33, p. 202.

(Box continues on the following page.)

Box 13: Impact on Port Productivity of Unit Voyage Cost of Large Containerships (*Contined*)

Increasing Port Productivity

The authors then examine the sensitivity of reducing port time through increased cargo handling rates. They show that a cargo handling rate double that of the current rate will significantly reduce the unit cost, as the ship will be able to carry more containers in a given time period. For example, doubling the cargo handling rate will reduce the unit cost of a 6,000 TEU ship from $114 to $91 per TEU on a transatlantic voyage. The unit cost of a similar ship on a transpacific voyage would drop from $182 to $159 per TEU, and on a Europe–Far East voyage from $242 to $218.

Box 14: Ceres Paragon Terminal in Amsterdam, the Netherlands

The Ceres Paragon Terminal in Amsterdam is the first container terminal in the world capable of loading and unloading containers from both sides of the ship, and has a capacity to handle some 600,000 containers annually. In 2002, the port became operational and remained quiet (106 million investment).

It proved difficult to start a new terminal located behind a lock, lacking tested multimodal hinterland connections with rail and inland waterway. In 2005, things appeared to change; NYK bought a 50 percent share of the terminal and was planning to have two strings of the Grand Alliance Europe–Far East trade route calling at the terminal.

Source: Author.

key issue here remains what guarantees a port has if the cruise operator stops port calls before the end of the agreed-on period.

2.2.7. Other Technology Affecting Port Services

Introducing podded drive propulsion systems can potentially reduce requirements for harbor tug services in port. These high power azimuthing systems significantly improve ship maneuverability, possibly eliminating the need for tug assist services for berthing. While podded drive to date has largely been limited to cruise ship and ferry propulsion, there are indications that use of the technology may spread to other types of ships, particularly where maneuverability is especially important (see Box 18).

Another new technology, self-unloading bulk carriers, is popular on the U.S. Great Lakes, and their use is spreading to other trades. These bulk carriers have the capability to discharge without the use of shore-based equipment, reducing the need for special facilities to unload bulk cargo.

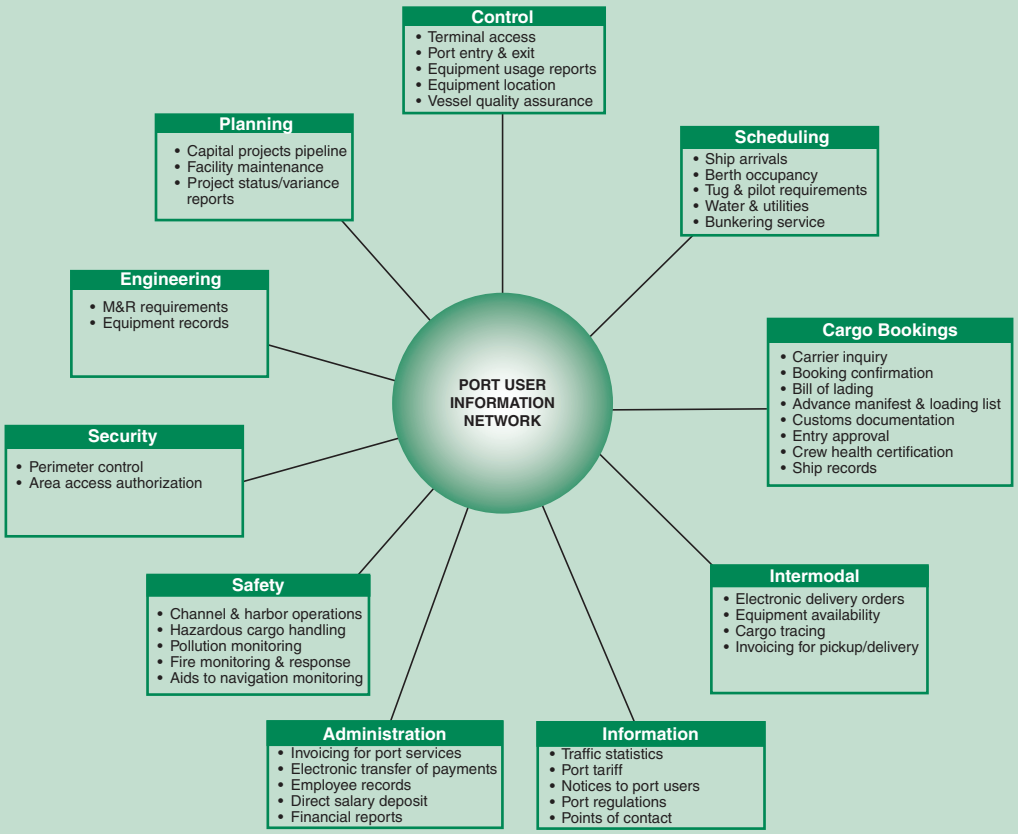
2.3. Shifting Bargaining Power

Bargaining power results from the relative strength of the parties involved in a negotiation. The stronger the bargaining power, the more likely the party will get the greater gain in a transaction. In the port sector, the major parties to a negotiation are port users and port service providers. Current events are reshaping the relative strength of each of these parties; on the one hand, consolidation occurring among ocean carriers is producing increasingly stronger, more formidable customers that port authorities, terminal operators, and other port service providers must contend with in pricing and service negotiations. On the other hand, a relatively small number of companies have been acquiring terminals in ports in all areas of the world, creating terminal operators with global coverage that have the financial depth and negotiating strength to withstand demands of terminal users. Adding to this situation is the growing role of global logistics service providers who have considerable strength in dealing with both shipping companies and terminal operators. Finally, there is the unmistakable trend of carriers wanting to own and manage their own port and inland terminals. These changes are creating a shifting playing field for negotiations among port users and port service providers.

2.3.1. Consolidation among Ocean Carriers

Over the past decade there has been substantial consolidation in the ocean shipping sector

Box 15: Port User Information Network



Source: Author.

(see Box 19). While this has been occurring in all sectors of the industry, it is most apparent in container shipping where it is estimated that in 2005, 25 carriers out of more than 400 now control more than 80 percent of container fleet capacity. This sector has witnessed a significant number of major mergers and acquisitions over the past 10 years, a trend that appears to have room to run.

The consolidation movement in the container shipping sector began with slot sharing arrangements, where carriers purchased slots in other carriers' ships to provide service flexibility and more extensive geographical coverage. This expanded into multitrade alliances among carriers that focused on achieving efficiencies and better service by sharing vessels, utilizing common terminals, joint feeder service, and joint purchase of containers. The current activity in mergers and acquisitions is a third step in this pattern of cooperation. It simply takes the alliance concept to its ultimate stage—full ownership and control under one corporate umbrella.

The three largest container carriers illustrate the patterns of growth in the container shipping sector. Maersk Line, the largest player in container shipping with more than 500 ships and 1.5 million TEU capacity at mid 2005 with the completion of the Royal P&O Nedlloyd acquisition, illustrates a progression from global alliance to single corporate ownership. Until 1990, both Maersk and SeaLand operated as separate entities, each a major player in its own right. In 1991, they formed a global alliance to improve service and generate operating efficiencies.

Box 16: Felixstowe Cargo Processing System (FCPS)

The Port of Felixstowe handled container throughput of more than 2.5 million TEU in 2003 and has installed a sophisticated information technology system to electronically link members of the port community. The system, managed by Maritime Cargo Processing, covers more than 70 percent of containers passing through British ports, supporting 630 corporate organizations with more than 2,500 users in more than 18 geographical locations within the United Kingdom. It is an interactive Microsoft-based system and over the past year handled 32.5 million transactions and 22.5 million electronic data interchange (EDI) messages.

The system electronically provides:

- Manifests and associated amendments.
- Customs release notes.
- Bonded removal documents.
- Ship's out-turn and discharge reports and amendments.
- Local transshipment documentation.
- Lines' commercial release.
- Acceptance of rent and storage charges.
- Delivery instructions to transport operators (road and rail).
- Export delivery advice.
- Export arrivals.
- Export loadlist.
- Loading reports.
- Export customs declarations.
- Customs examination and sealing requirements.
- Port health, customs preventive and other government departments' activities.
- Requests to out-turn in sheds and warehouses.
- Shed and warehouse out-turn reports and amendments.
- Customs declarations for exports.
- Ship planning notifications and amendments.
- Hazardous goods reporting.

Port operator benefits include:

- Information for preplanning physical operations.
- Single gateway via FCPS to port users' systems.
- Automatic writing off of manifest and customs entries.
- Paperless releasing of import cargo.
- Paperless notification of customs status.
- Paperless transshipment notification and approval.
- Paperless export load lists.
- Enhanced facilities for late runners.
- EDI Dangerous Goods notifications.
- EDI status messages to customers.
- Local messaging facility.
- Full audit facilities.

According to the system operator, plans call for expanding FCPS to a global Internet-based real time system within five years.

Source: Author.

Continuing the progression, in mid 1999 Maersk purchased the ocean transport assets of SeaLand for $800 million.

The combined Maersk Line company is almost than twice the size of its nearest competitor, Mediterranean Shipping Company (MSC), a Geneva-based company that traces its origins to 1970, and more than three times the size of Evergreen, a Taiwan-based company that traces its origins to 1968. MSC has more than 290 ships with a capacity of close to 900,000 TEU, and showed a spectacular growth through acquisition of second-hand, new, and chartered tonnage rather than through acquisition or merger. Evergreen has more than 190 ships with a total capacity of 5,300,000 TEU, and acquired most of its capacity through internal expansion (although the company did acquire Lloyd Triestino).

A report by Drewry Shipping Consultants Ltd. (2006) includes a comprehensive analysis of the capacities, roles, and market shares of the global terminal operators. A group of more than 20 companies is analyzed, including global stevedores, global carriers primarily involved in liner shipping operations, and global hybrids (business units under global carriers). In 2005, these companies together controlled 178 million TEU or 44.5 percent of the world's estimated container port throughput of approximately 400

Box 17: Physical Requirements to Accept Cruise Ships

The handling of large cruise ships with large numbers of passengers in a very short turnaround time is a huge logistics problem. The newer cruise ships entering the market today are vessels with capacities of 2,000–3,500 passengers. Cruise ships spend an average of 7–9 hours in port, during which passengers debark and embark and various services are provided to the vessel. The combination of large ships and demand for quick turnaround places significant strain on port facilities and services. According to Gee & Jenson, a designer of cruise facilities, to accept modern cruise ships a port must be able to provide:

- A minimum 500-foot entrance channel width; 34-foot navigational depth; 32-foot berth depth; 500-foot service apron length; 50-foot apron width; 50–100-ton design load range for bollards, cleats, and dolphins; and 1,300–1,500-foot minimum turning basin diameter.
- Protected passageway between ship and terminal capable of embarking all passengers within 2–3 hours, disembarking all passengers within 1–2 hours, and ability to stay connected to the cruise ship over the full tidal range.
- Staging area for three to five 40-foot containers; adequate bus and taxi queues to support passenger embarkation and debarkation; facilities to collect and dispose of waste; potable water; and other services to support the ship in port.

Cruise ships are a $300–$500 million capital investment. Their successful operation is highly dependent on maintaining a tight schedule with no disruptions. A standard in the industry is that cruise ships can never be denied or have access delayed to and from a berth. This is a very real challenge that ports wanting to be cruise ship destinations must be able to meet.

Source: Author.

Box 18: Podded Electric Drive Impact on Requirements for Ship Assist in Port

Podded electric drive technology uses a sealed "pod" encapsulating an electric motor directly coupled to a propeller. Electricity from the ship's power plant to the fully submerged watertight pod is provided via cable. The pod is steerable and provides side as well as fore and aft thrust. Use of the pod eliminates the requirement for a rudder, shaft, and stern thruster and frees up space inside the ship that would be otherwise occupied by a conventional propulsion engine.

Currently, the technology is largely limited to cruise ship and large ferry propulsion. However, a survey of shipowners and shipbuilders indicated that podded electric drive has potential use in a variety of ship types.

Generally, the results indicate that the technology has greatest possibility on ships where maneuverability is particularly important, space and weight savings have substantial value, or current propulsion systems interfere with efficient layout.

Because the ship is more maneuverable, tug assist in harbors may not be necessary, which could affect future requirements for harbor tug services. In addition, the sideways thrust of podded drive could affect the underwater structure of piers during vessel docking and undocking, and accepting vessels with this propulsion device may require some beefing up of the berth.

Source: Author.

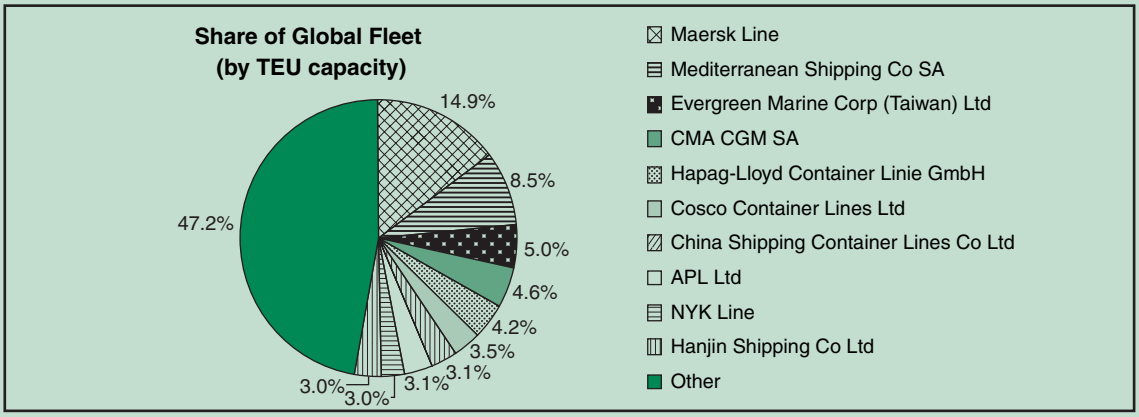
million TEU (see Box 20 and 21). The remainder is practically equally divided over state-owned and private operators.

The league table is led by Hutchison Port Holdings (HPH) controlling 33.2 million TEU, 8.3 percent of the world's port throughput capacity. In 2005, the five largest operators, HPH, PSA, APM Terminals, P&O Ports and DP World, controlled 112.7 million TEU, that is, 28 percent of the world's port throughput. When considering the top 10 operators, these figures become 168 million TEU and 36 percent respectively. The top 10 global terminal operators are discussed in more detail below.

Hutchison Port Holdings launched its global expansion in 1991, using the experience and capabilities it developed operating container

Box 19: Top 10 Container Carriers as of June 2006

Rank	Carrier	Current TEU Capacity	% of Global Fleet	Current Operating Vessels	Vessels Under Construction/Contract
1	Maersk Line	1,566,352	14.9	519	102
2	Mediterranean Shipping Co SA	892,548	8.5	297	24
3	Evergreen Marine Corp (Taiwan) Ltd	530,172	5.0	193	24
4	CMA CGM SA	486,453	4.6	189	56
5	Hapag-Lloyd Container Linie GmbH	437,954	4.2	136	10
6	Cosco Container Lines Ltd	369,531	3.5	128	20
7	China Shipping Container Lines Co Ltd	328,245	3.1	95	19
8	APL Ltd	325,919	3.1	104	27
9	NYK Line	315,865	3.0	117	25
10	Hanjin Shipping Co Ltd	313,698	3.0	78	17
	Other	4,980,735	47.2		
	Total Global Fleet	10,547,472		8,024	1,108



Source: Author.

terminals in Hong Kong. Early in 2004, it operated container terminals in more than 30 ports, with a reported throughput of 33.2 million TEU in 2005 (see Box 22).

PSA Corporation embarked on a similar major effort to enlarge its global presence in container terminal operations in the mid 1990s, drawing on its experience in Singapore. The company reported a throughput of 28.7 million TEU in 2003 and 32.4 million TEU in 2005, of which more than 10 million were realized at its terminal operations outside Singapore. These terminals were also the main driver for PSA's growth, as its home terminal continues to feel the strong competitive pressure from the cheaper Malaysian ports.

APM Terminals is still strongly linked to Maersk Line, especially in the provision of transshipment hubs such as Tanjung Pelepas, Algeciras, and Salalah, which accounted for 35 percent of its total throughput in 2003. The company, however, has shown a commitment toward serving the common user market, and Maersk Line's share of the company's total volume has declined from 75 percent in 2002 to less than 70 percent in 2004. APM Terminals has a strong presence on all U.S. coasts, a heritage from the SeaLand acquisition. In 2005, its throughput was 24.1 million TEU, a share of 6.0 of global throughput. Projections show a strong growth of nearly 12 percent per annum on average in capacity for the rest of the decade.

P&O Ports' throughput amounted to 13.1 million TEU in 2005, pushing the United Kingdom-based company's global share from to 3.3 percent. This growth was realized by a combination of new

Box 20: Worldwide Container Traffic

	World Port Throughput		Transshipment		Container Traffic	
	Mil TEU	Annual Growth	Mil TEU	Share (%)	Mil TEU	Growth (%)
1990	879		16	18.2%	287	
1995	1,451	10.5%	323	22.3%	46	9.9%
2000	2,356	10.2%	622	26.4%	683	8.2%
2003	317	10.4%	865	27.3%	909	10.0%

Regional Share of Transshipment Container Traffic

		1990 (%)	1995 (%)	2000 (%)	2003 (%)
North America		6.5	7.3	7.5	7.5
West Europe				27.2	28.9
North Europe		21.3	24.7	22.7	23.8
South Europe		25.5	28.5	34.5	36.5
Far East		19.0	24.2	25.1	25.6
South East Asia		40.3	44.8	47.6	47.0
Middle East		27.3	33.0	41.4	43.8
Latin America				22.7	26.2
Caribbean/Central America		6.9	16.0	32.9	40.1
South America		0.0	2.4	9.9	9.9
Oceania		1.9	2.4	2.9	3.7
South Asia		23.1	21.9	21.6	20.7
Africa		8.4	26.4	22.7	21.9
Eastern Europe		0.0	0.0	0.0	0.0
World		18.5	22.3	26.4	27.3

Source: Various Drewry Shipping Consultants Reports.

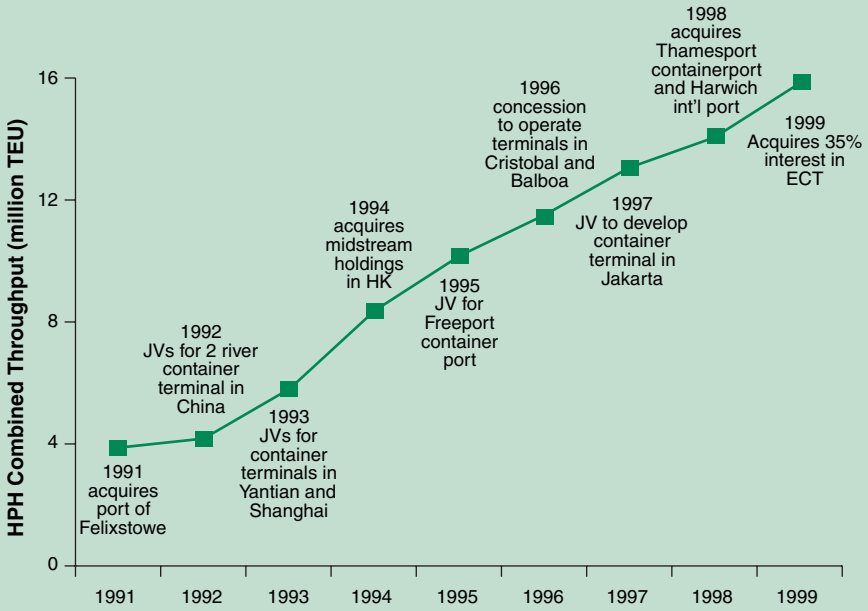
Source: Author.

Box 21: Global Terminal Operators 2005 Throughput League Table

Ranking	Operator	Million TEU	(%) Share
1	Hutchison Port Holdings (HPH)	33.2	8.3
2	PSA - Singapore Port Authority	32.4	8.1
3	APM Terminals	24.1	6.0
4	P&O Ports	21.9	3.3
5	DP World	13.3	2.5
6	Evergreen	11.5	1.7
7	Eurogate	11.4	1.6
8	Cosco	8.1	1.5
9	SSA Marine	6.7	1.4
10	HHLA	5.7	1.3

Source: Drewry Shipping Consultants, Annual Review of Global Terminal Operators, 2006

Box 22: Key Milestones of Hutchison Port Holdings in the 1990s



Source: Hutchison Port Holdings Web site.

developments that became operational and autonomous growth at existing facilities.

Dubai Ports World (DPW) is a relatively new player in the international global terminal race, but has quite an aggressive growth and acquisition strategy. In 2005, its combined throughput was 9.9 million TEU compared to 6.5 million TEU for 2003. Much of this throughput was realized at its home base terminals in Jebel Ali and Port Rashid. From its successes at its home base, DPA (Dubai Port Authority), through its international vehicle DPW (formerly Dubai Ports International), started its expansion in and around the Middle East with terminals in Jeddah and Djibouti. It then had some successes in India (Visakhapatnam, Cochin, and Gangavaram), and in December 2004 took over CSX World Terminals (CSXWT), causing its total capacity to rise to 14.6 million TEU. DPW subsequently purchased P&O Ports in 2006 in a bidding war with PSA. The combined volumes of DPW and P&O Ports puts DPA/DPW in hot pursuit of the top three global terminal operators.

Evergreen's terminal throughput was up 6.6 million TEU in 2005. The Taiwanese company's strategy originally aimed at operating terminals in support of its liner operations, but increasingly the company is looking to attract third-party business.

Eurogate, originating from Bremen, has the narrowest geographic spread of the top 10 container terminal operators because it is only active in Europe, mainly in Germany and Italy. Its throughput in 2005 was 6.3 million TEU with its global share decreasing slightly as international operators expand their portfolios. The company is looking for growth from intermodal transport and feeder traffic, the latter mainly through increased transshipment at its German hub ports and investment in terminal development in Russia.

China Ocean Shipping Company (COSCO) operates its terminals through COSCO Pacific and COSCO Container Lines Company, both wholly owned subsidiaries of COSCO. The company's shown enormous growth between 2002 and 2004. In 2005, there were even higher increases, up to 5.9 million TEU, mainly caused by the strong growth in the Chinese market, and to a lesser extent also by the COSCO's

willingness to enter into partnerships with other major global operators.

SSA Marine, based in Seattle, USA, traditionally has a strong presence on the U.S. East and West Coasts. It also has established a number of successful overseas operations, mainly in Central and South America, and more recently sought to invest in South East Asia. Its throughput in 2005 was 5.4 million TEU.

Mediterranean Shipping Company (MSC) has also significantly increased its presence in the terminal operation market with a strategy mainly focused on securing capacity for the carrier in home markets and transshipment facilities to support the carrier's network. MSC's terminal holdings are usually on a joint venture basis where the company is often partnering with local or regional operators and taking an equal or minority ownership.

With global container volumes still on the rise, partly due to the boost in Chinese volumes, virtually all global port operators show impressive growth rates. Moreover, many of them realized a great deal of their expansion by developing new terminals in China, and there is more capacity being planned to become available in the coming years. Global terminal operators that spawned from stevedores (as opposed to those owned by major container carriers) saw throughput at their homeports becoming increasingly less important as their overseas activities grew.

The top 25 of global terminal operators remains relatively volatile, with more consolidation through merger and acquisition yet to be expected. The larger players are in a race to develop new capacity and buy existing capacity, where the smaller players are prey. APM Terminals is expected to close in on PSA during the coming years. DPA/DPW, with its recent acquisition of CSXWT and P&O Ports, is now also knocking at the entrance of the top three with a very aggressive expansion strategy. COSCO showed quite an impressive growth, largely due to the Chinese market. Outside the top 10, MSC has steamed up the ranks moving it to 14th place in 2005. This growth has mainly been achieved by forming partnerships at its key Northern European ports to ensure long-term access to scarce capacity.

2.3.2. Emergence of Global Logistics Service Providers

Contributing to the realignment in bargaining power is the emergence of companies that offer full service logistics solutions to major shippers. These logistics service providers have substantial strength in dealing with shipping companies, terminal operators, and other port service suppliers, adding to the growing complexity in achieving a balance in port service negotiations. They make decisions that affect all parties involved in the supply chain, including port service providers. Logistics service providers manage the combined logistics requirements of the many large shippers they represent, giving them considerable strength in dealing with shipping companies, terminal operators, and others in the logistics channel. In response to market demand, some substantial players have targeted this activity, including Federal Express, which recently announced that it would enter the global logistics market for ocean freight.

These developments are changing the way port services are bought and sold. Alliances and consolidation among carriers result in the carriers having more business volume on the negotiating table, placing ports and terminal operators in an increasingly awkward position when it comes to negotiating strength. In some situations, the stakes are so high that the port or terminal can hardly afford to lose the carrier's business. This can often result in the port having to make concessions to retain the traffic. For example, the Grand Alliance notified the Port of Rotterdam that for operational reasons it was temporarily switching one of its five Europe–Asia services to the rival Port of Antwerp. This service represented 125,000 TEU per year to the port. It may only be coincidental, but a month after the announcement, the Rotterdam Municipal Council decided not to increase harbor dues for the year 2000, citing growing competition between ports in general and tariff developments in directly competing ports in particular.

At the same time, the emergence of global terminal operators can result in pricing schemes that may not always favor the small volume or regional carrier. These global terminal operators may offer incentives to high volume customers and there is at least the possibility that the terminal operator could cross-subsidize international operations as necessary to compete for a major carrier's business. Another possibility is that a truly global terminal operator could offer a package deal to a carrier that would provide a lower price or give concessions if the carrier uses only its terminals wherever available in the world.

2.4. Changing Distribution Patterns

As containerization has spread in ocean shipping, distribution patterns have increasingly evolved into a hub and spoke network. Facilities for devanning, clearing, staging, and storing containers are increasingly shifting inland, thereby becoming more decentralized. These developments are creating a hierarchy of ports and changing traditional port operations.

Ocean carriers have been increasingly using regional hubs for transshipment of containers. This is a worldwide trend that is accelerating as larger containerships come into service and the advantages of hub and spoke operations become more apparent. The hub and spoke concept is intended to maximize use of large containerships while providing market coverage to a maximum number of ports. This is accomplished via a network of regional and subregional hubs with onward service to outlying locations. Large line haul ships provide service between regional hubs. Progressively smaller ships are used to pick up and distribute containers within the region (see Box 23).

2.4.1. Becoming a Hub

The most important attribute carriers look for is the strategic location of the hub relative to the primary origins and final destinations of container traffic. Beyond location, other attributes include the ability to safely accept large ships, extent of terminal facilities, efficiency of container handling operations, availability of frequent feeder services with an appropriate geographical coverage, and attractive cargo handling charges. Most carriers believe 15 meters depth is adequate to accept the largest containerships in service in the foreseeable future, although some carriers have recently specified 16 meters depth for entrance channels. Containership draft has not been increasing in proportion to the growth of TEU capacity, with most of the capacity growth in postpanamax ships the result of increasing the beam of the ship. A depth of 15 meters should accommodate all but the largest containerships now in service. It is nevertheless possible that potential hub ports will need depths in excess of 16 meters in the likely event that container vessels in excess of 10,000 TEU are ordered in future.

A transshipment hub should have terminal facilities that enable quick ship turnarounds. This includes adequate numbers of cranes, sufficient container handling and storage areas, and a first-rate computer system to run the entire terminal. As discussed in an earlier section, container cranes capable of spanning *at least* 18 rows and 6 tiers of containers on deck will be required to handle the 8,000+ TEU ships now in service. There is already a demand from carriers to install ship-to-shore container cranes with a capability of handling 22, and even 23, rows of containers across. Capability should be provided to berth one or more feeder ships in front of or behind the mother ship along the same quay—requiring quay lengths of typically 1,000 meters for a terminal designed to receive two main line vessels and their feeder vessels, and container yard depth behind the quay should be not less than 400–500 meters, and preferably deeper. The latter factor much depends on the container dwell time, the selected stacking and retrieval system, and the stacking rules, among many others.

Container handling productivity is of obvious importance to a carrier in selecting the transshipment hub. Carriers measure productivity in terms of how long it takes to turn around the ship, that is, enter port, discharge containers, load containers, and leave the port. Much of

Box 23: Hub and Spoke Container Distribution

Global distribution of containers is increasingly accomplished via a network of regional and local hubs with onward service to outlying locations. Using a transshipment hub, a carrier can service marginal markets that do not justify a direct call with large line haul ships, interchange containers between liner strings at strategic crossing points, and realize economies from improved port asset utilization. All of these advantages ultimately result in greater profit to the ocean carrier.

Hierarchy of Ports to Maximize System Efficiency

The hub and spoke network involves a hierarchy of ports, some of which serve as regional or local hubs connected by feeder loops to outlying ports. Large line haul ships, often with 4,000+ TEU capacity, provide service between regional hubs and progressively smaller ships (or barges) are used to pick up and distribute containers within the region.

Very Large Containerships Drive Need for Regional Hubs

Line haul ships of 6,000+ TEU are now common, 8,000+ TEU ships have already been introduced on major routes, 9,000+ TEU ships are being built, and 10,000+ TEU ships are under consideration. The bigger the ship, the more time required in port for loading and discharge. Assuming a handling rate of 165 TEU per hour, each capacity increment of 1,000 TEU requires an additional half day in port to load and discharge containers on the round trip voyage. To offset this additional port time, the operator has the choice of increasing the service speed of the ship, adding another ship to the service string, offering less frequent service, or reducing the number of port calls.

The large containerships are now being designed with service speeds of 24–26 knots; higher speeds for the largest size ships are economically impractical. The capital cost of an additional containership is $80–120 million, which makes adding a ship to the string an expensive proposition. Customers now expect same day of the week sailing, ruling out reduced service frequency. This leaves minimizing the number of port calls as the viable option, which then creates the need for regional hubs and feeder loops. Essentially, the operator offsets the additional time to load and unload containers by reducing the number of ports the ship enters and leaves.

Future Role of Multiporting

Hub and spoke operations have a clear advantage if they include hub ports located close to the main navigation course of main liners, if these ports can accommodate main liners effectively, and if the ports that have to be feedered do not have these advantages. If they have a hinterland with captive cargoes, this will further strengthen their position. Examples of hub ports with clear location advantages are Kingston and the Panamanian ports in the Caribbean, Marsaxlokk and Gioia Tauro in the Mediterranean, Salalah and Colombo in the Gulf area, and Tanjung Pelepas in Southeast Asia. If the hub ports have, on top of the location advantage, a strong home base of captive cargo, their position can be enormous. Examples are, for instance, the ports of Hong Kong, Singapore, and Rotterdam. A strong home base to some extent may even compensate for location disadvantages. See for instance the ports of the United Arab Emirates, such as Jebel Ali, where ships on the Europe–Far East route have to make a deviation of some 1,300 nautical miles against 163 nautical miles for Salalah, 34 for Colombo, and 7 for Aden.

In practice, the distinction between hub and spoke and multiporting operations is a gradual one, where some main lines make more calls than the other, so that they apply more multiporting and have to feeder less cargo than the other. As main lines cannot call at all ports in a region, they practically always have to transship cargoes to and from other ports. As to future developments, one can state in general that:

1. The further increase in ship size, say to 12,000 TEU and larger, will lead to more transshipment.
2. The increase in container trade will lead to more routes or strings per trade route and thereby to more direct port-to-port connections and thereby to less transshipment.
3. The increase in trade per port will lead to port development, which will increase the ability to accommodate larger ships and the possibility for calls by main line ships, and lead to less transshipment.
4. The increase in trade per maritime region will make the region more attractive for end-to-end routes, increase the number calls by main lines, and lead to less transshipment. Examples of such regions are the Mediterranean and the Gulf areas,

Box 23: Hub and Spoke Container Distribution (*Continued*)

which in the past were only served by passing routes calling at a few way ports. For these regions, end-to-end routes are on the rise, leading to a reduction in transshipment.

It may be clear that it is difficult to predict the increase of transshipment. The data in Box 20 seem to suggest that for most parts of the world some saturation has been reached. If no further increases in ship size are to be expected, one may even expect a decrease in relative terms for some regions.

Source: Author.

this is dependent on the availability of adequate facilities and suitable systems and the absence of administrative barriers. However, the capability to provide trained personnel on a 7-day-week, 24-hour-per-day basis to operate cranes, position containers, and handle documentation has a major influence over the productivity of the terminal. And ultimately, productivity determines the cost of using the hub.

It is essential to have adequate feeder services to and from the transshipment hub. This in turn requires a flow of traffic that will make it attractive for common carriers to serve the hub. In effect, there is a chicken and egg situation. For the hub to be attractive to line haul carriers, there must be an established network of common feeder service that can be used to pick up and distribute containers. For feeder service companies to call regularly at the hub, there must be at least one, and preferably several, major line haul carriers whose containers need to be picked up and distributed.

2.4.2. Benefits of Hub Status

The most obvious benefit is the income generated from operations of a transshipment hub because of the double handling of containers. Consequently, container throughput in hub ports can be greatly boosted, particularly when expressed in TEUs. More importantly, transshipment hubs provide local importers and exporters direct access to line haul service, reducing transportation time (and possibly freight rates) to and from overseas markets. Reduced transport time directly affects the competitiveness of exporters and the cost of imports, in turn creating jobs and income throughout the economy. Many developing countries have created free trade zones in combination with the hub port as engines for economic growth. Jebel Ali illustrates how a hub port in conjunction with an associated free trade zone can create significant economic activity. The port, which began operating in 1979, now has 72 berths and is serviced by more than 100 shipping lines. About 1,125 companies from 72 countries have been attracted to start up operations in the free trade zone.

2.4.3. Hub Problems

Hubs compete in a highly competitive market segment where customers have options to use other facilities and pricing. An issue confronting the developer of a transshipment hub is how to prevent "hub hopping," a situation where the number of competing hub facilities is growing rapidly and carriers have the ability to take their business elsewhere (see Box 24). In such a situation, a carrier that represents a significant portion of the terminal's business can assert considerable pressure on the terminal owner or port to increase the service level offered and at the same time reduce charges and make concessions by threatening to vacate the hub. The owner of the facility would be faced with the dilemma of a $100–$200 million investment lying idle if the customer departs. This pressure could force the handling rates below the full cost of providing the transshipment facility. A long-term commitment from a carrier to use the facility before making major investment would be one way to minimize the possibility of hub hopping, although this does not constitute a solid guarantee. Another and possibly better way to retain hub traffic is to involve one or several carriers in the equity structure of the new facility.

Another consideration is that there are fewer terminal services on which to impose charges on transshipment traffic than on local traffic and, in

Box 24: Hub Options on the Asia–Europe Route

More than two dozen transshipment hubs lie along the line haul route between Asia and Europe, about half are east of Suez. This large number of hubs provides plenty of opportunity for "hub hopping."

Northern Europe: Major container terminal facilities in Northern Europe are located in Rotterdam, Hamburg, Felixstowe, Antwerp, and Le Havre. All five ports are involved in both transshipment and local container traffic. Rotterdam is the largest port in Europe, handling about 8.2 million TEU in 2004, and boasting regular connections with more than 1,000 ports worldwide. Hamburg, the second largest port, handles about two-thirds of the number of containers that Rotterdam handles. Antwerp and Felixstowe are smaller in throughput.

Mediterranean: There are a number of transshipment hubs in the Mediterranean and several more under development. Algeciras serves as a transshipment hub for the Western Mediterranean, West Africa, and Northern Europe; it handled about 2.9 million TEU in 2004. Gioia Tauro, Marsaxlokk, and Cagliari are transshipment hubs in the mid Mediterranean and Damietta, Limassol, Piraeus, and Port Said (East and West) serve as hubs in the Eastern Mediterranean. Other transshipment hubs are being built or planned, including new container terminals in Tangier, Sines, and Ashod.

Gulf: UAE ports in Dubai, Khor Fakkan, and Fujairah have developed a strong presence in container transshipment. These three ports handled about 8 million TEU in 2004, most of which was transshipment traffic. Containers passing through Dubai mainly originate or terminate in the Gulf. Containers through Khor Fakkan and Fujairah are mostly transshipped to and from Pakistan, Western India, the Gulf, and East Africa. A three-day diversion from the East–West line haul route is required to call at ports in the UAE, which has placed them at a disadvantage to the new transshipment hubs in Oman and Yemen.

Indian Ocean and the Red Sea: Centrally located along the East–West line haul route are Colombo, Jeddah, Salalah, and Aden. Calls can be made at any of these ports with virtually no diversion from the line haul route. Colombo is a major transshipment hub for Southern India and handled 2 million TEU in 2004. Jeddah is principally an import and export channel for Saudi Arabia, but about 10 percent of traffic through Jeddah has traditionally been transshipped to other points in the Red Sea. Both Salalah and Aden are new facilities that have begun operating within the past two years. These new hubs had a combined throughput of about 2.2 million TEU in 2004 and plans call for significant future growth in transshipment traffic, much of which will be attracted from the UAE ports Colombo and Jeddah.

Asia: At the eastern end of the route are Hong Kong, Singapore, Shanghai, Shenzhen, Busan, Kaoshung, and Yokohama. Hong Kong lays claim to having the world's largest overall container volume (22.4 million TEU in 2005), the majority of which originates in or is destined for China. Singapore, which has the world's second largest container volume (22.3 million TEU in 2005), is the major transshipment hub for Southeast Asia and the Indian Ocean, which competes with Pelepas, Malaysia (4.1 million TEU in 2005). Busan is a transshipment hub for containers into and out of Northern China (11.8 million TEU in 2008), and Kaohsiung is a transshipment center for Central Asia. Japanese ports such as Yokohama, Kobe, Tokyo, and Nagoya are major centers for container activity, but the majority of containers are distributed inland by rail or highway. A variety of other ports such as Manila, Port Klang, and Vung Tau function as local hubs for their respective areas.

Source: Author.

general, the larger the percentage that transshipment traffic is to total volume, the smaller the additional revenue potential of the terminal. In addition, ports with a mixture of local and transshipment traffic frequently set transshipment charges low to attract mother ships to the port to improve throughput levels, achieve economies of scale, and lower handling cost. Service for import and export traffic can thereby be improved. A port highly specialized in transshipment business is at a distinct disadvantage competing with ports that have a mix of local and transshipment business, where revenue from the former is frequently used to cross-subsidize the latter. This is only acceptable because transshipment generates additional economic value.

2.4.4. Inland Container Terminals Shifting Activities from the Port

To maximize intermodal efficiency and free up valuable real estate in the port area, inland container terminals are increasingly displacing activity traditionally performed in the port. While there are many advantages to inland container terminals, from a port's viewpoint there can be serious drawbacks as they divert economic activity away from the local area and open the possibility of competition from other ports (see Box 25).

2.5. Environmental and Safety Concerns

Given the growing concerns about protecting the environment, ports are now faced with the need to implement regulations that will affect the freedom of port users and must make a significant investment in environmental and safety facilities as well. These investments will have limited commercial value and often produce only indirect social payback. How to implement these regulations and finance related facilities is an important issue.

2.5.1. Growing Environmental Concerns

Eliminating oily ballast water discharge from ships is a major environmental concern. This issue is well recognized internationally and provision of adequate reception facilities in port is required under the International Maritime Organisation (IMO) International Convention for the Prevention of Pollution from Ships (MARPOL) Convention 1973/78. Regulation 10/7 and 12 of the pollution convention require each state to ensure that sufficient oily ballast water reception facilities are available at oil-loading terminals, ports with ship repair facilities, and in those ports in which ships have oily residues to discharge to shore. To meet these requirements, states need to offer reception facilities for tank washings (slops), contaminated ballast water, oily water from engine room bilges, and for residues from fuel oil purification, particularly heavy fuel oil. Providing such a reception facility entails a significant capital expense that produces little, if any, financial return. How to pay for this facility is a major issue confronting port authorities.

But environmental concerns relating to ships in port go beyond the issue of oily water discharge. They involve the entire range of environmental issues from water pollution, air pollution, aesthetics, noise, transfer of foreign marine species and more. Ports will need to find suitable solutions for disposing of dredged materials and implement regulations and operating procedures for terminals and anchorages to address these types of issues (see Box 26).

2.5.2. Recent Environmental Article

LA-Long Beach Cuts Emissions
JoC Online
Wednesday, August 24, 2005

A program that calls for ships to reduce their speed to 12 knots or less within a 20-mile radius of the ports of Los Angeles and Long Beach saved 100 tons of harmful emissions in the first quarter of the year.

The Vessel Speed Reduction Program translates into an average daily savings of 1.1 tons of nitrogen oxide (NOx), according to Port of Los Angeles.

"We are very pleased with the amount of NOx being eliminated with the Vessel Speed Reduction Program," said Port Interim Executive Director Bruce E. Seaton. "But we can do better. We want the compliance zone increased to 40 nautical miles, which is the influence area used by the Southern California Air Quality Management District to determine basin emissions."

LA-Long Beach implemented the voluntary antipollution program in 2001 as a measure contributing to the ozone reduction goals in the 2003 State Implementation Plan for Marine Vessel Emissions Control Strategies. Currently, nearly 70 percent of shipping lines calling at the ports participate in the voluntary program.

Reported by Stephanie Nall, *Pacific Shipper,* in Seattle

2.5.3. Issue of Substandard Ships

Despite the fact that many ships have valid certificates issued by their flag states and

Box 25: Duisburg Inland Container Terminals

The first inland container terminals (ICTs) appeared along the Rhine during the late 1960s. The Rhine, which is the main inland waterway connection in Western Europe, has the largest container traffic in Europe and is for a significant part navigable with containers stacked up to five high. The Port of Duisburg, which is situated along the Rhine, is the largest inland port of Europe. It serves as a main inland hub for all larger ports from Antwerp to Hamburg. The larger volume, however, goes through the Port of Rotterdam. Main terminal facilities in Duisburg at this moment are the DeCeTe (Duisburg Container Terminal) terminals and the Rhein-Ruhr Terminal. Currently Europe Container Terminals (ECT) is building a trimodal terminal in Duisburg.

As do most of the European river container terminals, Duisburg offers trimodal facilities, including direct access to rail transport and container stuffing and stripping facilities on the terminal. Rail plays a very important role, especially in the further distribution of cargo from Duisburg to destinations deeper inland in Germany and Eastern and Southeastern Europe.

Currently Duisburg offers a wide range of intermodal services. These include:

- Services to and from most of the barge terminals along the Rhine, including those in the Port of Rotterdam.
- Services to and from the ports of Hamburg, Bremen, Rotterdam, and Antwerp by rail.
- Services to several destinations in Germany by rail (for example, Germersheim, Donauwörth, Nürnberg, Augsburg, and München).
- Services to several destinations in Eastern and Southeastern Europe by rail (for example, Northern Italy, Switzerland, Austria, Hungary, the Czech Republic, the Slovak Republic, Poland, and Russia).

The presence of an ICT at Duisburg is characteristic of a partial shift of the collection and distribution function away from the seaports. In addition, these terminals help to relieve the seaport areas of potential congestion as they will function as satellites for these seaports.

Within Europe, the Rhine plays a central role in this context. The Rhine area presently consists of some 35 barge terminals for handling boxes. Most of these ICTs offer trimodal facilities because direct access to rail transport and container stuffing and stripping facilities improve their competitiveness. An important issue in this context is the key role ICTs play in the emerging door-to-door services of a large number of container barge operators desirous of extending their logistics services.

From a seaport's point of view, ICTs attract economic activity away from the port area. Other ports might profit by competing to be the point of entry and exit for the ICTs. Smaller ports may benefit from the tendency of emerging ICTs by effectively competing with the larger ports. This may lead to a certain degree of deconcentration.

In the recent past, container transport by inland waterway has increased strongly and several new ports have been established at even less than 50 kilometers from the main ports of Rotterdam and Antwerp. In 2004, the terminal of Duisburg had a container throughput of 610,000 TEU, making it the biggest inland port, followed by Wörth and Germersheim with about 300,000 TEU each, and Strasbourg in France with 156,000 TEU.

The impact of inland terminal network development on the concentration pattern and competitive advantages of seaport areas remains uncertain. The actual tendency (concentration or deconcentration) will primarily be determined by the success of the port authorities and port companies in developing strong functional ties with the nodes in the hinterland network. Also, the ability to attract and retain some of the mega carriers that are active in door-to-door transport logistics will be an important factor. A final important factor is the extent to which the load centers are able to benefit from public-private involvement in decision making on and the financing of port infrastructure projects and cross-border hinterland network connections.

Source: Author.

classification societies, a number of ships do not comply with international standards for safety, pollution prevention, and shipboard living and working conditions recognized in international conventions. Political and social pressures have been placed on governments to

Box 26: How a Major Transshipment Terminal and Pretty Bay Beach Coexist

Malta Freeport illustrates how a container terminal can live in harmony with its neighbors. The terminal is one of the largest transshipment facilities in the Mediterranean, receiving more than 1,700 ship calls annually. It is situated in the southeast corner of the island, in Marsaxlokk Bay. This area is one of the tourist spots in Malta, and maintaining the integrity of the environment was a great concern to the terminal developer.

In the 1990s, a decision was made to dredge the bay to accommodate deep draft ships calling at the terminal. This entailed removal of about 250,000 cubic meters (m^3) of silt from the bay to deepen the channel, turning basin, and water depth along the quays. Six valleys drain into Marsaxlokk Bay and vibrocore testing revealed that a few bottom layers contained discrete sand that could be used to create a beach. These layers were located in the middle of the bay where the turning basin was to be created. It was decided that some of the dredged material could be used to improve and expand the beach called Pretty Bay near the terminal site that had eroded due to wave action on the retaining wall of the coastal road. Expanding the beach would prevent waves from hitting the retaining wall, minimizing further erosion, and provide a considerably larger beach area.

To create the beach, about 20,000 m^3 of sand dredged from the turning basin was pumped to shore and sprayed. This saved 10 percent in the contract dredging costs, as the alternative was to transport the sand five kilometers outside the harbor to a disposal site. More importantly, the new beach has attracted economic development in the neighboring village of Birzebbuga. New holiday flats have sprung up, a new restaurant has opened and there has been a general increase in tourist activity. The deeper beach also allowed the coastal road to be widened, reducing congestion in the peak tourist periods.

Recognizing its role as a good neighbor, the terminal has instituted strict standards on ships calling at the terminal. The first sign of unsanitary discharge from any ship at the terminal will cause immediate stoppage of cargo handling on the offending ship, followed by investigation of the cause of the incident. Contributing to harmony of beach and terminal is the natural flushing that occurs in the bay, which is self-cleansing as a result of circulation and has remained consistent even after the terminal and breakwater developments.

Source: Author.

implement policies to reduce the amount of substandard shipping in their waters. At an international level, the Paris Memorandum of Understanding (MOU) on Port State Control, which came into effect in 1982 and includes 18 signatory countries, requires each maritime authority to inspect a total of 25 percent of the individual foreign merchant ships entering the port state during a year. If ships do not meet a set of standard criteria, port states may detain the ships until proper measures are taken by the shipowner. The Paris MOU has led to more than 18,681 inspections of ships in member states in 2001 which resulted in 1,699 detentions. In 2000, the number of inspections was only 11,358 with a detention rate of 1,764. Since inception the number of detentions have decreased, suggesting either a positive impact of the measures or less rigorous inspection norms (possibly illustrated by the "Erika" disaster).

While enforcement of policies to eliminate substandard ships has a commendable objective, the enforcement practice can affect the competitive position of individual ports. For example, if a situation exists where the strictness or accuracy of inspections varies among port states, substandard ships may alter their routes and choose more accessible ports of call in a same range. Ports with lax inspection procedures would therefore have an unfair competitive advantage. One approach to offset this negative competitive impact is to focus on rewarding good behavior, rather than penalizing bad behavior. An example of an innovative approach that rewards good behavior is the Green Award, initiated by the Port of Rotterdam (see Box 27).

Box 27: The Green Award Initiative

The Green Award initiated by the Port of Rotterdam has the objective of stimulating good behavior rather than punishing bad behavior, by offering discounts on port tariffs for extra clean and extra safe ships. Ships and crews meeting standards above the required minimum can apply for a Green Award certificate provided by the Bureau Green Award. Certified ships and crews can apply for tariff reductions by port service providers, including the major ports in the Netherlands, Portugal, South Africa, Spain, and Sullom Voe in the United Kingdom, as well as providers of towage and pilot services. The reductions amount to up to 7.5 percent of port fees.

Source: Author.

2.6. Impact of Changing Dynamics on Ports

Developments taking place in international logistics, shipping technology, industry consolidation, and environmental regulations are driving major changes in the way ports will operate in the 21st century. As the world economies become more intertwined, ports are being increasingly cast as partners in assisting customers to compete for business share in the global market. Technology in the shipping sector, particularly relating to containerization and information exchange, is changing at a rapid rate, creating the need for major financial commitments to stay ahead of the technology wave. Mergers and acquisitions in the shipping sector, along with the growth of a relatively small number of global terminal operators, are creating a small number of powerful players that change the way port services are bought and sold. Distribution patterns are increasingly evolving into hub and spoke networks, creating winners and losers among ports that achieve hub status. All through this is the increasing concern about the environment and safety, which affects the way ports deal with their customer bases.

3. CHALLENGES AND OPPORTUNITIES

Changes taking place in the port sector present difficult challenges to port administrators, terminal operators, and other port service providers. But these changes also present opportunities for new ways of doing business and open the door to entry of new players throughout the range of port activities. In short, it's a brand new era for everyone involved in the port sector and the opportunities, as well as the challenges, are substantial.

3.1. Transferring Port Operations to the Private Sector

The traditional closed fraternity of entrenched players with widespread involvement of public entities in the ownership and ports operation is no longer acceptable. Port authorities worldwide are under increasing pressure to turn over operations in the port to the private sector. They are being forced by competitive pressures to step into a landlord and regulatory role, focusing on administrative activities that public entities do best.

3.1.1. The Need for Change

Traditional ways of doing business in ports are being challenged worldwide by demands for gains in port efficiency, increased customer responsiveness, and lower costs to move cargo through the port. It has been widely demonstrated that use of private sector companies throughout the range of port operations provides an opportunity to eliminate traditional, bureaucratic operating procedures and controls and modernize facilities and equipment through new financing channels. It is also widely accepted that service providers with operating and administrative experience in other ports can transfer this experience and bring to a port best practices and appropriate modern technologies employed elsewhere. But even more important, by passing the reins of port operations from the public to the private sector, port reform offers the ability to shift the financial burden of port expansion and development to the beneficiaries of the expenditures.

3.1.2. Impact of Privatizing Operations

There are numerous success stories where port authorities have transferred to the private

sector operations previously performed by public employees. A classic example is Buenos Aires, where the award of terminal concessions to four competing companies in 1994 has brought down handling charges significantly through improved labor productivity. In another example, after transferring major port facilities to the private sector between 1995 and 1998, Panama attracted more than $380 million in investments for modernization and expansion. When management of the Kipevu container terminal in Mombasa was transferred to a commercial terminal operator, outdated equipment was temporarily replaced, bureaucratic procedures streamlined, and productivity of the terminal improved. In the big picture, 220 privatizations from 1992 to 2004 have generated private investments exceeding $21 billion to rehabilitate terminals and renew superstructure in the ports that were privatized.

This is not to say that port privatizations have been without problems. There have been a number of cases of privatizations involving ports that have not worked out. In Indonesia, the Koja container terminal under private management ran into difficulties and the public port company took back the facilities. The City of Rostock (Germany) demanded return of the terminal it contracted to a private group for operation, citing lack of compliance with the original contract. Following a dispute with the Port Authority of Trieste (Italy), the commercial terminal operator (Europe Combined Terminals, ECT) selected to operate the container terminal in the port under a 30-year contract withdrew from the contract after 18 months. The terminal operator awarded the concession to operate the container terminal in the Port of Rosario (Brazil) is reported to have lost more than $40 million under the contract as a result of work disputes and has cancelled the contract. And unfortunately, the success story in Kipevu (Kenya) was reversed when the commercial terminal operator terminated its contract with the port as a result of breakdown of equipment that the government failed to refurbish or replace.

3.1.3. Lessons Learned from Past Privatizations

A major lesson learned in port privatizations is the need for transparency and open competition through a structured international tendering process. Many examples can be given of attempted port privatizations that have bogged down due to legal challenges to the selection of the company to be awarded a concession contract. Montevideo is a prominent example of how things can go wrong in a privatization process. Attempts at privatizing services in the port had failed four times due to court challenges before a successful round was completed. At a later stage, the government announced plans to auction off the terminal on the stock market.

Conflicts and legal challenges can be minimized by clearly presenting the bidding rules and selection process in the bid documents. Criteria to be used for selecting the successful bidder should be stated and a pro forma contract provided with the bid documents so that everyone is competing for the same contract. The role of the port administration after the privatization and any limits on the contractor's ability to operate should be stated in the bid package. Bidders should be requested to provide a business plan that will become part of the final contract. In the plan, bidders should state how they will address labor issues that may arise as a result of any downsizing of port operating personnel or changes in work practice rules. They should be asked to give references of how these issues were dealt with at other ports in which they operate. The bidders should be requested to state quantifiable targets for productivity gains and market development. This business plan should be accorded significant weighting in the selection process. Incentives and penalties should be provided in the contract should there be a significant deviation from targets in the business plan.

It is important to develop beforehand a well-reasoned plan for transitioning to private operation and have a clear understanding of how the port will function after the various port services are privatized. A number of important questions should

be addressed: What changes in laws and regulations are needed to allow the private sector operation in the port? How much management and operational autonomy will be granted to the private operators? What will be the role of the port authority in regulating the rates and practices of private operators in the port? Who will be responsible for common area maintenance and upgrades, and how will the cost of these activities be recovered from port users? Will the port continue to have a marketing and planning function after privatization, or will this be left to the individual service providers? What resources will be required to carry out the functions that remain with the port authority? What type of retraining program and severance package will be created to address the issue of redundant personnel?

3.1.4. Contingency Plan

The best and tightest contract will still not ensure that there will be no problems in the operation of port services under a private contractor. There should be a contingency plan for default by port service contractors to prevent work stoppage that could affect port operations. This plan should include defined penalties to compensate the port or government when resources made available by the operator are inadequate.

3.2. Opportunities for the Private Sector

The worldwide market for port services is estimated to generate available revenues of $50–55 billion annually. While these numbers are very rough, they indicate the size of the available market to companies active in the port sector. This is a large available market that should be of interest to a wide variety of global, regional, and local port service providers (see Box 28). See Box 29, which illustrates the use of private sector capital for expansion to cope with growing demand at the Port of Hong Kong, currently the world's largest port.

3.2.1. Terminal Operations

This area is the most advanced in terms of private operation of port services. Of the 220 port privatizations captured in the World Bank Private Participation in Infrastructure (PPI) database, 124 have been concessions or management contracts involving existing terminal operations. But there are many more opportunities. There are more than 2,800 ports worldwide, many of which still have publicly operated terminals that are candidates for private takeover involvement in management and operations under concession agreements or management contracts. We roughly estimate that the available revenue from container terminal operation is on the order of $38–40 billion annually.

Box 28: Estimated Available Market in the Port Sector

	Estimated Annual Revenues (billions of $)
Container Terminal Operations	30 to 40
Tug Assist Services	4 to 5
Maintenance Dredging	4 to 5
Information Technology	2 to 3
Environmental and Ship Safety Services	1 to 2
Other Port Services	4 to 5

Source: Author.

3.2.2. Towage Services

Port authorities often own and operate the harbor tugs used for ship assistance. This activity is ripe for privatization and is relatively easy for the private sector to provide. It has, for instance, attracted the attention of Smit Internationale of the Netherlands, which has been actively pursuing this market internationally and now operates tug services in the Netherlands, Belgium, Germany, Panama, Nigeria, Mexico, Argentina, República Bolivariana de Venezuela, Gabon, Singapore, Malaysia, Indonesia, Netherlands Antilles, and The Bahamas. Other global, regional, or local tug operators are certainly also finding this market interesting, if they can break the existing public or private monopolies. A rough estimate is that the harbor tug service market represents available revenues of up to $3 billion annually.

Box 29: The Port of Hong Kong—Why is it so Successful?

By any standard, Hong Kong has established an enviable presence in the world port sector. The port annually receives about 42,000 seagoing vessels and 190,000 river trade vessels. In 1999, Hong Kong handled more than 16.1 million TEU, making it the largest port in the world in terms of container throughput. To accommodate traffic through the port, there are eight major container terminals, with a ninth now under construction and two more planned. Looking outward, container traffic is projected to grow to 24 million TEU in 2006 and 33 million TEU in 2016. The port has the ability to provide shippers with a full network of competitive services and frequent sailings to all areas of the world. Hong Kong's cargo handling productivity ranks among the world's highest. One of the container terminals in Kwai Chung handles more than 1 million TEU annually at a single berth—more than twice the world standard. This terminal is capable of loading and discharging 1,200 TEUs in 10 hours with three gantries that average 40 moves per hour. The success of Hong Kong is based on a number of factors, including the port's location relative to major markets, a natural harbor and, perhaps more than anything else, a business-friendly environment with heavy reliance on the private sector.

Reliance on the Private Sector

Virtually all activities in the port are performed by the private sector. Three private firms operate the eight container terminals in Kwai Chung container port. HIT, the largest of these companies, controls four of the terminals and handles 60 percent of the containers passing through Kwai Chung. The remaining traffic is shared among Modern Container Terminals and SeaLand Orient Terminals. Four private operators provide mid-stream operations and more than 100 private operators offer warehousing services. Three firms provide tug service in the port, the largest of which is Hong Kong Salvage and Towage. Seven companies provide stevedoring services and six companies provide ship repair. Hong Kong Pilots Association Ltd., which is owned by the member pilots, provides pilot service in the port.

The government's operational function in the port is limited to collecting refuse, preventing and cleaning up oil discharge, providing vessel traffic services, managing a ferry terminal, maintaining 61 harbor moorings, and coordinating search and rescue in the South China Sea. The Marine Department performs these functions as part of its responsibility to facilitate safe and expeditious movement of ships, cargoes, and passengers within Hong Kong waters. A Port and Maritime Board has been established to set overall policy for the maritime sector in Hong Kong, but this board does not generally become involved in oversight of commercial operations in the port. Overall, the government has a hands-off approach to port operations, relying on competition within the private sector to shape and control activities.

Expansion and improvement of facilities in the port is entirely funded through the private sector. While the government develops long-term strategic land use plans for the port, it relies on the private sector to finance, build, own, and operate new facilities in response to market demand. For example, since 1972 the private sector has built eight modern container terminals in the port and a ninth is now under construction. In awarding such terminal contracts, the government earmarks an area of water to be put out for tender, defines the responsibilities of the developer, and selects the bidder who offers the highest price for the development site. Once awarded, the contractor is responsible for making the entire investment in infrastructure and superstructure on the site. The government's role is limited to providing the agreed water depth in the approach channel to the terminal.

Implications for Other Ports

A general reliance on the private sector to provide the necessary port services and infrastructure, with the government providing the minimum oversight needed to protect the public interest, has obviously worked very well in Hong Kong. While other factors have contributed to the success of the port, a business-friendly environment, reliance on market forces, and the government's hands-off approach to managing port services have greatly contributed to Hong Kong's leading position as an international shipping center. This model is worth considering, particularly in ports that have sufficient traffic volume to enable competition among service providers to thrive.

Source: Author.

3.2.3. Maintenance Dredging

This activity has traditionally been performed by commercial dredging contractors under contract to port authorities or by port authority personnel using publicly owned dredgers. It is estimated that maintenance dredging is a $4–5 billion available annual market that can be completely turned over to the private sector. Port authorities that own and operate their own dredging equipment could corporatize the dredging function and sell the business along with its assets to the private sector. But more innovative concepts for privatizing maintenance dredging might be considered. For example, maintenance dredging could be outsourced on a concession basis similar to the concession awarded for channel dredging and maintenance in the Rio Parana, where a portion of the project revenues will come from direct charges by the concessionaire to future channel users and the port authority receives a concession fee. A more radical concept could be a contract between a dredging company and a container shipping company or consortium of companies to maintain specified water depths at the carrier's terminals on a worldwide basis. Much depends, however, on the volumes to be dredged and the timing of the dredging.

3.2.4. Information Technology

Increasingly sophisticated IT is spreading throughout the port sector as users demand more timely information to support their logistics systems. This is producing a variety of opportunities to design, install, and operate IT systems in ports throughout the world. IT services can be totally outsourced by port authorities and terminal operators and the market is estimated to represent $2–3 billion in annual available revenues. Among options that can be considered for structuring IT service contracts are joint ventures between the port authority and the IT provider, an arms length concession for IT services, or a concession based on in-kind service compensation.

3.2.5. Environmental Facilities and Ship Safety

This is an area ripe for innovative privatization concepts, as many of these functions can be performed by the private sector. For example, a private company could be given the concession to operate a ballast water treatment plant in the port, with revenues derived from receiving charges and resale of recovered oil (see Box 30). A private company could install and operate the vessel management system in the port under a concession agreement. The functions of port state control could be contracted under a management agreement to a competent inspection company or classification society, assuming the latter properly apply the inspection rules. A company could be contracted to maintain and operate aids to navigation on a local or regional basis, such as now performed by the Middle East Navigation Aids Service (MENAS) in the Gulf area (see Box 31). Altogether, it is estimated that the available market from environmental and ship safety activities is $1 to 2 billion annually.

3.2.6. Other Port Services

Warehousing and storage, container freight station operation, port security, pilotage, and equipment maintenance are all activities that can be operated by the private sector. It is estimated that worldwide these activities represent an available market of some $4–5 billion annually.

See Box 32, which can be used as a general checklist when planning a terminal privatization or reform process.

Box 30: Ballast Water Treatment Plant in the Port of Portland

In the late 1970s, the Port of Portland (Oregon) made a major investment in a ship repair facility designed primarily to accommodate large tankers operating in the Alaskan trade. Included in the project was construction of a water treatment facility to receive oily ballast tanker wash water. The plant is available to ships loading or discharging cargo in the port, as well as ships entering the shipyard for repair.

Box 30: Ballast Water Treatment Plant in the Port of Portland (*Continued*)

The Plant

The complete system includes eight connection stations, receiving lines, holding tanks, a heating plant, decant tanks, separators, processed water storage, oil storage, and a water quality testing laboratory. Storage capability is provided for 157,000 barrels of slops, 11,500 barrels of recyclable oil, and 30,000 barrels of disposable water. Ballast water can be received from a ship at the rate of 3,000 barrels per hour. Most of the recovery process is achieved through tank settling over time. Received ballast is typically kept in the tank for 30 days and skimmed each day. After 30 days, the tank is heated with internal steam coils to finish the separation process. Recovered oil is sold and disposable water is either pumped through the city sewer system or directly into the river depending on the water quality. The port sets standards for acceptability of wastewater.

Economics of the Facility

The facility cost $5.2 million to construct in the late 1970s. Revenues are generated by the facility from a charge against the ship for receiving ballast water ($4–5 per barrel) and sale of recovered oil on the open market. Recovered oil is sold to remarketers for blending and resale for use as boiler fuel. The selling price of the oil has typically been $1.50–2.00 per barrel, but prices as high as $20 per barrel have been realized in periods of extreme demand. Up to 400,000 barrels of recovered oil have been generated by the plant in a year.

Potential to Employ Elsewhere

This type of plant could be considered for use in other ports, but there are factors that affect the attractiveness of the concept. Supplying steam to the plant is the principal operating cost and it would greatly help the economics to have access to a cheap source of steam. It is important to have proximity to a market that can use the recovered oil, which is not suitable for all applications.

Source: Author.

Box 31: Middle East Navigation Aids Service

The Middle East Navigation Aids Service (MENAS), a registered nonprofit organization based in London, maintains the lighthouses, light buoys, racons (maritime radar beacons) and other navigation aids in the Gulf that are outside port limits. More than 500 navigation aids are installed and maintained in this area. MENAS extends from Kuwait down the side of the Gulf to Didamar Island in the Strait of Hormuz, and then south to Masirah Island and Channel in the western Gulf off the coast of Oman.

MENAS operates the lighthouse tender and buoy lifting vessel *Relume* to provide the maintenance services required for the lights and buoys in the Gulf, and receives its income from charges (light dues) levied on vessels entering the Gulf. These charges, at £l.70 per 100 net registered tonnage (NRT) for each visit a vessel makes, have remained constant for 10 years. Income has risen from the increasing numbers of vessels entering the Gulf in recent years, particularly from the higher numbers of containerships calling at Dubai and Jebel Ali.

In addition to fixed navigation aids, MENAS broadcasts navigational information to shipping in the Gulf area as NAVTEX (primary means for transmitting coastal urgent marine safety information to ships worldwide) warnings. These are also copied to Muscat Radio in Oman, which retransmits them as NAVTEX warnings, and to the Area IX office, where they are included in the Area IX weekly Notices to Mariners. Permanent changes to channels and pipelines and other alterations are then notified to mariners via a printed MENAS Notice to Mariners, distributed free of charge to vessels by all shipping agents in the Gulf area. The MENAS warnings are withdrawn after the British Admiralty publishes its Notices to Mariners covering the same changes.

Source: Author.

Box 32: Checklist for Negotiating a Terminal Privatization

1. The Proposed Transaction

- What are the government's primary and secondary objectives in privatizing the terminal: generating proceeds to the government from the transaction, increasing efficiency of port services, attracting foreign investment to improve port infrastructure, rationalizing the public labor force, reducing the government's fiscal burden, or some other goal?
- What area and specific activities in the port are to be privatized in the transaction—and what is not included in the transaction?
- What modality is best suited to the transaction—outright sale of assets and land, long-term lease of the facility under concession arrangement, management agreement to operate the facility, or a different model?
- How will the negotiations with the proposed contractor be conducted and who will be assigned to the government's negotiating team to complete the transaction?
- Who will prepare the term sheet to be presented to the proposed contractor and what schedule will be set for completing the transaction?

2. Structure of Payment to the Government

- How is the compensation to be structured—is there an initial cash payment to the government, or is the proposed compensation to the government based on some form of rent, revenue sharing, royalty, or other deferred payment arrangement?
- Is a portion of the initial payment for the terminal rights noncash compensation based on providing equipment and services? If so, how does the contractor propose to establish the fair value of the equipment and services?
- What is the discounted present value of the initial payment and flow of deferred payments from the proposed contract?
- How does this discounted present value compare with the discounted present value of the projected profits or surpluses of the terminal as currently operated?

3. Risk Being Assumed by the Government

- In the event of losses being incurred by the contractor under the proposed agreement, will in any circumstances the government be liable for these losses?
- Under what circumstances can the proposed contractor hold the port authority or government responsible for terminal disruptions, missed performance targets, unexpected operating costs, or other event?
- Is there any possibility that the government could directly incur losses under the agreement?

4. Performance Targets

- What throughput does the proposed contractor project for the terminal over the next 10 years from local traffic, transit traffic, and transshipment traffic?
- How does the proposed contractor plan to reach these throughput projections?
- Does the proposal state targets for increasing minimum productivity standards (for example, minimum average crane moves per hour) in the terminal?
- How does the proposed contractor plan to reach these minimum productivity targets?
- Is there a provision for penalties and incentives in the proposal for meeting the planned throughput and productivity targets?
- What assumptions has the proposed contractor made, or conditions has it set, for the role of the port authority and government in achieving these targets?

5. Operational Issues

- What services are to be provided by the port authority to the terminal after takeover by the proposed contractor, and how will these services be paid for?
- Who will be responsible for maintaining the civil structures and water depth alongside the quay?
- Will the proposed contractor provide new management and senior operating personnel? If so, who will they be and what will be their qualifications?
- How many personnel does the proposed contractor plan to employ in the terminal?
- Will existing personnel in the terminal have priority for future job positions in the terminal after takeover by the proposed contractor?
- Will the proposed contractor use the salary level and structure currently in effect for personnel employed in the container terminal? If not, what will be the changes?
- What interaction does the proposed contractor foresee with other service providers operating in the port, and how does it plan to cooperate with the other providers?

Box 32: Checklist for Negotiating a Terminal Privatization (*Continued*)

- Under a concession or management agreement, will the port authority have full and unfettered rights at all times to enter and inspect the terminal after transfer to the contractor?
- Will the proposed contractor carry all-risk and liability insurance on the container terminal? If so, what specific risks will be covered, what will be the limits on liability coverage, and will insurance cover the actual cost of equipment replacement?

6. Terminal Handling Charges

- What structure and level of terminal handling charges does the proposed contractor plan to impose on containers and other cargo through the terminal?
- How much profit is built into these charges?
- Are these charges competitive with other ports in the region?
- What role will the government have in reviewing and approving any changes in the structure or level of container handling charges?
- If the contract provides for revenue sharing, what portion of terminal handling revenue is to be paid to the government?
- What process is to be employed to ensure that the government receives all of the compensation it is due?

7. Potential Contractual Conflicts

- What is the provision for dispute resolution, that is, the process, venue, applicable rules, and laws?
- What language will be paramount in event of any ambiguity in the contract?
- Will the proposed contractor agree to be subject to all prevailing local laws?
- Are there provisions for terminating the contract with the proposed contractor should terminal throughput or productivity targets not be met? If so, what is the process for terminating the contract?
- Is the terminology in the force majeure provision acceptable to the government? If not, what changes are required to make it acceptable?
- What provisions has the proposed contractor included in the proposal concerning its obligation for payment of taxes to the government?
- Will the proposed contractor provide a bank guarantee as security from the time the government accepts its proposal until the hand-over is complete?
- What performance guarantee will the contractor provide as security for complying with the obligations taken on in the proposed contract?

8. Hand-Over of the Terminal

- What is the proposed timing of the hand-over of the terminal to the proposed contractor?
- What specific steps will be taken by the contractor to plan for and implement the hand-over?
- Will the proposed contractor have transition personnel in the terminal for a time period preceding the hand-over to organize the process, and how will these personnel interact with the current staff?
- What is the role of the port authority in the hand-over process?
- What responsibilities will the port authority and government continue to have after the transaction?

9. Terminal Development

- What commitments are being made by the proposed contractor to improve and expand the terminal?
- What type of training program will be provided by the proposed contractor for terminal personnel?
- Will the proposed contractor install a first-rate computerized information system, and in what other ports is this system now used?
- When will this system be installed?
- Will provision be made to connect this computer system to the current or future computer system operated by the port authority, and to what extent will the port authority have access to data in the terminal system?
- What role does the proposed contractor envisage for the port in competing for transshipment business with other ports in the region, and are there any potential conflicts of interest as a result of the proposed contractor operating terminals in one or several of these other ports?

Source: Author.

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