Chapter 3: The port industry

3.1 Challenges and emerging issues in port development

A port is essentially a point where goods are transferred from one mode of transport to another. In an era of economic globalization ports are evolving rapidly from being traditional land/sea interfaces to providers of complete logistics networks. This means that ports have had to face many challenges due to unpredictable environmental changes and trends in the shipping, port and logistics industries.

Most ports in the world have paid (or should pay) attention to these challenges and emerging issues, such as:

- globalization of manufacturing and outsourcing
- global trends of logistics network restructuring and reposition of regional and/or local distribution centre
- rapid growth in volume of world seaborne freight, especially container
- emerging hub and spoke system in global shipping service
- increase of transhipment cargo and competition among ports and terminal operators
- introduction of the super mega size containership
- increasing competition towards hub ports
- emerging global terminal operators and their growing market share
- one stop shopping concept and intermodal transport linking strategically between ocean, railway, road and inland waterway
- increasing role of ports in global supply chain management and logistics network structures
- increase of productivity and efficiency in ports
- high cost and constraints for developing port facilities.

To cope with these challenges and emerging issues ports across the world have been trying to develop their physical infrastructures, especially container terminals and related facilities, and to expand their port hinterland through introducing free trade zones with a hope of developing hub ports and international logistics centres. In addition, many ports have been carrying out port reforms such as port governance restructuring and deregulations, private and public partnership.

3.2 Development of container ports

There are close to 600 container ports across the world with an estimated combined handling capacity of 380 million TEU. The largest ports, those that can handle in excess of 1 million TEU per annum, account for nearly two thirds of global capacity (Drewry, 2001).

By 2010 Shanghai container throughput is expected to have surpassed Hong Kong, currently the world’s largest port, but by 2020 Shanghai is expected to be overtaken by Shenzhen to become the world’s largest container port. Shanghai and Shenzhen are expected by 2020 to be moving 56.2 million and 57.9 million TEU respectively. In 2004 Shanghai moved 14.6 million TEU and Shenzhen 13.7 million TEU (Fairplay, 2005). From 2003 Shanghai container throughput increased by 53.5 per cent yet wharf length increased by only 14.3 per cent (Ports and Harbours, 2005).
Ports can be broadly classified into three types of ownership. In 2002 the global container terminal operators controlled close to 55 per cent of total capacity, the other private sector operators 22 per cent and the public sector operators 24 per cent.

With the introduction of 8,000+ TEU vessels there will be a need for dredging, investment in handling equipment, extra feeder costs and landside congestion and distribution. In terms of ports and terminals, most of the leading container ports currently accommodating the largest ships in service are designed to berth ships of up to 300-400 metres in overall length and have approach channels and berths dredged to 15-15.5 metres, sufficient to accept ships up to 14.5 metres draught (Matthews, 2003).

Vertical integration is a viable alternative for key clients. Several large shipping lines such as Maersk Sealand and China Ocean Shipping Company (COSCO) have integrated vertically and developed into formidable container terminal operators. Shipping lines accounted for 25 per cent of the container terminal market in 2002. This option is only economic for shipping lines with sufficient volumes (in a region) and strong balance sheets. As a result, carriers focus on certain areas and rarely operate a global network of either dedicated (for their own business) or public terminals. However, the ability for shipping lines to operate their own terminals acts as a regulator on container terminal operators and keeps a check on pricing.

Drewry (2001) has forecast that investments in new berths and quays will increase throughput capacity to 442 million TEUs by 2008 or growth of around 4 per cent per year. At that pace of expansion, capacity utilization should increase from around 72 per cent in 2002 to around 88 per cent by 2008. Drewry (2001) expects that if current port utilization levels of 73 per cent in 2002 were to be maintained then an additional US$ 14 billion would be needed to be invested in quays, cranes and container yards.

8,000 TEU vessels is not the limit. There are predictions of building new containerships as big as 18,000 TEU (Malacca-max), which will be calling at fewer and fewer hub ports (informare, online). However, it may take a long time before this type of vessel is built. There are plans to design an ultra large containership (ULCS) of 12,500 TEU capacity, which maintains the 14.5 metres loaded draught, but assumes a 361 metres length and much wider beam of 57 metres, allowing for 22 rows of boxes on deck (Matthews 2003). Economic forces appear to be favouring the emergence of super-hubs and a changing pattern of port calls (Trace, 1997). By limiting port calls to regional hub ports, shipping companies can reduce costs. It has been suggested that ports must have throughput of 5 million TEU and logistics facilities to support the efficient flow of cargo (Lloyd’s List, 2002).

Drewry (2001) forecasts container throughput to grow at 8.3 per cent per year from 2002 to 2008 to a total of 442 million handlings. This includes growth in transhipments estimated at 9.3 per cent per year (see Table 3.1).

### 3.3 Hub and spoke network in liner service

In last two decades, the hub and spoke system in liner service has been introduced as larger containerships have been adopted in major sea transport routes such as Europe-Far East-American West coast. The emergence of this new system has allowed load centres along the East-West shipping lanes. This hub-feeder system allows shipping lines to provide a global grid of east/west, north/south and regional services. The large ships on the east/west routes will call mainly at transhipment hubs where containers will be shifted to multi-layered feeder subsystem serving north/south, diagonal and regional routes (Notteboom, 2004).

Liner service network design depends on the balance of power between carriers and shippers (Notteboom, 2004). From the carrier’s perspective economies of scale are a critical element in order to reduce costs, which can be achieved by operating larger ships and having fewer ports of call. However, from the shipper’s perspective total freight rates, time and service quality, including frequency and
flexibility, are more critical elements. There are clearly different views existing between carriers and shippers with respect to the hub and spoke system.

According to Notteboom (2004) liner service network design has tended to move from a pure cost-driven exercise to a more customer-oriented differentiation exercise, as the optimal network design is not only a function of carrier-specific operational factors, but more and more of shippers’ needs (for transit time and other service elements) and of shippers’ willingness to pay for a better service. The hub and spoke system could be interesting from a pure liner network cost perspective. Hence, the more cost efficient the network becomes from a carrier’s perspective, the less convenient that network could be for the shippers’ needs in terms of frequency and flexibility. The multi-loop system of the alliances with smaller vessels bears less risk and could therefore turn out to be a cheaper option than running very large vessels on only a few loops. The higher the bargaining power of shippers, the more pressure for direct calls, which will shift the ‘cargo follows ship’ principle to the ‘ship follows cargo’ principle. In this regard, as liner service network design becomes a more customer-oriented differentiation exercise, there could be an increased tendency towards less transhipment and more direct port of calls. The networks operated by large vessels will continue to be based on end-to-end services. Hub and spoke systems are just a part of the overall scene (Notteboom, 2004).

Overall, then, logistics systems cannot be explained simply in terms of the customer’s needs, such as transit time and better services. The hub and spoke system are also related to the regional or local characteristics of the final destination, such as the existence of major ports in the vicinity of the final destination, land transport networks and land transport cost from nearby major ports around the destination to the final delivery place, the existence of another hub port with lower total logistics costs close to the final destination, the amount of cargo volume available and so on.

In addition, freight forwarders will arrange the most economic transport routes that will satisfy the shippers’ needs after considering whole transport networks. Some shippers may prefer a lower transport cost with relatively long transport times, while some other shippers may be in favour of quick transport times with relatively higher payment.

Table 3.1 Capacity utilization global ports by region

<table>
<thead>
<tr>
<th>(million TEUs)</th>
<th>2002 S</th>
<th>D</th>
<th>U (%)</th>
<th>2008 S</th>
<th>D</th>
<th>U (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>47.9</td>
<td>34.2</td>
<td>71.40</td>
<td>58.6</td>
<td>45.9</td>
<td>78.33</td>
</tr>
<tr>
<td>North Europe</td>
<td>50.2</td>
<td>34.7</td>
<td>69.12</td>
<td>64.3</td>
<td>49.2</td>
<td>76.52</td>
</tr>
<tr>
<td>South Europe</td>
<td>34</td>
<td>22.9</td>
<td>67.35</td>
<td>49.4</td>
<td>34.7</td>
<td>70.24</td>
</tr>
<tr>
<td>Far East</td>
<td>109.4</td>
<td>86.6</td>
<td>79.16</td>
<td>154.3</td>
<td>154.3</td>
<td>100</td>
</tr>
<tr>
<td>South East Asia</td>
<td>55.3</td>
<td>40.8</td>
<td>73.78</td>
<td>67.9</td>
<td>69.5</td>
<td>102.36</td>
</tr>
<tr>
<td>Middle East</td>
<td>19.3</td>
<td>13.5</td>
<td>69.95</td>
<td>26.8</td>
<td>22</td>
<td>82.09</td>
</tr>
<tr>
<td>Central America</td>
<td>15.2</td>
<td>10.6</td>
<td>69.74</td>
<td>18.9</td>
<td>16.1</td>
<td>85.19</td>
</tr>
<tr>
<td>South Africa</td>
<td>14.4</td>
<td>8.4</td>
<td>58.33</td>
<td>16.5</td>
<td>14.6</td>
<td>88.48</td>
</tr>
<tr>
<td>Oceania</td>
<td>9</td>
<td>5.9</td>
<td>65.56</td>
<td>9.6</td>
<td>8</td>
<td>83.33</td>
</tr>
<tr>
<td>South Asia</td>
<td>8.1</td>
<td>6.8</td>
<td>83.95</td>
<td>14.2</td>
<td>12.8</td>
<td>90.14</td>
</tr>
<tr>
<td>Africa</td>
<td>11.4</td>
<td>8.3</td>
<td>72.81</td>
<td>14.6</td>
<td>11.5</td>
<td>78.77</td>
</tr>
<tr>
<td>East Europe</td>
<td>3.9</td>
<td>1.7</td>
<td>43.59</td>
<td>6.2</td>
<td>3.4</td>
<td>54.84</td>
</tr>
<tr>
<td>Global</td>
<td>378.1</td>
<td>274.4</td>
<td>72.57</td>
<td>501.3</td>
<td>442</td>
<td>88.17</td>
</tr>
</tbody>
</table>

S = Supply (Capacity in TEU million)
D = Demand (Throughput in TEU million)
U = Utilization (Throughput/Capacity)
Logistics costs are, therefore, one of the major elements influencing competitiveness and productivity in the globalization of manufacturing and material outsourcing. The ability to source finished or partially manufactured goods and intermediate goods in areas of low cost has been at the centre of the globalization of industries. The total logistics costs are estimated to reach up 20 per cent of total production costs in OECD countries. Transport usually accounts for a quarter of total logistics costs in OECD countries, storage for a fifth and inventories for a sixth.

In other words, low transport costs along with information technology development have made it possible for companies to globalize their manufacturing, outsourcing and logistics systems, and logistics costs already occupy a major portion of total product cost. Taking into account this current situation in terms of the globalization of world industry and increasing pressure on current logistics costs, shippers and shipping lines cannot disregard cost aspects.

Shipping lines, which are a capital intensive and risk high industry, have suffered low profitability over past decades even though they are making good profits due to the increases of recent freight rates and significant world container volume increase during the period of 2003-2004. This means that shipping lines must try to reduce the fixed cost incurred because the recent boom will not continue, and the efforts for better profitability may not be negotiable due to strong resistance to freight rate increases among shippers. Shippers have already shown strong resistance to freight rate increases on the part of some liner conferences in recent years.

Recently most ports have introduced incentives to transhipment such as longer free storage periods, lower terminal handling charges and the reduction of port tariffs for shipping lines handling more than certain freight volume, which could contribute significantly to reducing the cost of shipping companies and/or shippers. Moreover, most shipping lines have been introducing vertical integration by transforming their role from shipping carriers to global logistics providers covering logistics supply management, logistics distribution and global logistics and value-added services. Hence, the role of shipping lines will not be just as carriers but as total logistics service providers with additional service activities increasing customer’s value. These total services may need more sophisticated services around ports with well developed and related logistics clusters.

In addition, there has been a strong trend towards mega size containerships. The service pattern of these mega size containerships may depend on the cargo volume available. If there is enough volume to fill the space, well developed ports and good land transport facilities with reasonable cost, and a direct call system may be a better service pattern. On the other hand, there is a strong possibility of ports adopting a hub and spoke service pattern with an appropriate number of ports of call.

### Case Study 3.1 CMA CGM case

The ideal service is a weekly shuttle service between two ports (easy schedule to maintain, clear for the shipper, no logistics headache), for example CMA CGM has succeeded in launching just two: Marseille – Algiers, Marseille – Oran.

The 65 others services CMA CGM operate incorporate complicated rotations with several ports of calls of which many are hub ports. Many of CMA CGM lines intersect each other and its fleet includes a large numbers of feeders.

Starting from a base in the Mediterranean by 1986, CMA CGM went as far as the Middle East with vessels entering the Persian Gulf up to Kuwait and then returning to Europe. The markets started to be depressed and a Europe/Middle East line, being very much one way traffic, was no longer viable. CMA CGM had no other solution than to continue its Eastbound progression towards the Far East. This is when transhipment, a relatively new idea at that time, came into the equation at CMA CGM.
To go all the way to Japan from Europe, CMA CGM has to cut its voyage time. One way to do that was to stop entering the Gulf area and to call at a port outside the area. Mina Qaboos in Oman was chosen. CMA CGM then developed its own dedicated feeder to deliver the cargo to all ports in the Gulf up to Kuwait. At the time this was rather innovative and customers did not like the idea. CMA CGM has been working with this same pattern for last 16 years and is still amongst the three leading carriers in this trade.

Today taking Asia-Europe, as an example, CMA CGM, currently offers about 80 different places of origin and about 100 different destinations in Middle East, Mediterranean and Northern Europe. This means about 8,000 port pairs in each direction. It is difficult to imagine if there were no hub ports and no transhipment.

Based upon current port coverage on a Far East – Europe vice versa Voyage, the voyage duration would be 180 days and thus each vessel would be able to perform only two round trips a year. Furthermore, the approximate slot cost of such a voyage would be about 2,250 USD per TEU on a round trip basis. Transit time to Hamburg would then be about 90 days.

If CMA CGM received a tender from a global company comprising of 992 entries, corresponding to as many port pairs, volumes would vary from the odd container to hundreds. To satisfy such global customers, it is necessary to have a global network which can only be provided if major trunk lines cross regional lines in well selected hubs. The clever use of networking allows a multiplication of opportunities for shippers.

For the main ports in Asia, Europe and the United States of America, there are competitive direct services available, and these will stay. However, customers in smaller ports – normally in less developed countries – will rely on hubs and transhipment services to reach the markets.

Particularly on certain North-South routes, the transhipment line can be in a position to offer a faster and more frequent service trade than the direct end to end specialists who cannot afford to be weekly. Aggregated volumes from multiple origins may sustain a weekly service operated from the regional hub to a specific destination whereas on a single trade basis the end to end operator cannot get enough volumes to justify weekly calls or even weekly frequency. For example, in the case of a North-South destination such as Port Sudan, the options to choose between a fortnightly direct service and twice weekly departures for Northern Europe using Jeddah as a hub with a weekly fixed day relay. In addition, the Sudanese consignee will receive on the same weekly basis his imports from Asia.

Transhipment is now a full part of the carrier’s strategy. The global customers are expecting their global service providers to deliver their containers from anywhere in the world to any destination. The small third world customer also wants – and is entitled to – good access to the world’s markets.

(Whitelaw, 2002)

3.4 Port reforms, privatization, new roles

In most economies in this 21st century, public/private partnerships to finance port investments and manage port facilities have been commonplace for many years. The first port privatization occurred in the United Kingdom in 1983 when the government sold a 49 per cent stake in Associated British Ports. In the following year the remaining 51 per cent was also sold. Between 1990 and 1998 some 112 port projects with private participation reached financial closure in 28 developing countries with investment totalling more than US$ 9 billion (Sommer, 1999). Many governments have accelerated deregulation of economic activities and decentralization of decision making, with the objective of reducing demands on the public sector budget, increasing financial viability and improving productivity and efficiency in the port industry. The United Kingdom alone has raised some US$ 121 billion through its privatization programme whilst globally the figure stands at well over US$ 1 trillion (Baird & Valentine, 2006).

According to the World Bank (2001), there are four types of port management models which are:

- service port
- tool port
landlord port
private service port.

Except for small ports with small portion of commercial activities, most port management or port authorities\(^6\) in the world are categorized into landlord port with a few exceptions as a result of recent privatization process or participation of private sector in the port sector (Table 3.2).

**Table 3.2 Basic port management models (World Bank)**

<table>
<thead>
<tr>
<th>Type</th>
<th>Infrastructure</th>
<th>Superstructure</th>
<th>Port labour</th>
<th>Other functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public service port</td>
<td>Public</td>
<td>Public</td>
<td>Public</td>
<td>Majority public</td>
</tr>
<tr>
<td>Tool port</td>
<td>Public</td>
<td>Public</td>
<td>Private</td>
<td>Public/Private</td>
</tr>
<tr>
<td>Landlord port</td>
<td>Public</td>
<td>Private</td>
<td>Private</td>
<td>Public/Private</td>
</tr>
<tr>
<td>Private service port</td>
<td>Private</td>
<td>Private</td>
<td>Private</td>
<td>Majority private</td>
</tr>
</tbody>
</table>

For privatization basically there are three distinct and essential elements of a port which should be carefully considered:

- port regulator
- port landowner
- port operator.

Firstly, regulatory activities within a port will generally be related to duties and responsibilities such as enforcing regulations and providing pilotage services and vessel traffic management, most of which will have been established by statute. This function traditionally is conducted by a government body. A port authority may also be expected to monitor the performance of the port, coordinate policy making with local and national government bodies, plan for future expansion, and market and promote the entire port and its facilities to users.

The second element is **port land**. The key tasks a port landowner will need to undertake include:

- managing and developing the port estate
- conceiving and implementing port policies and development strategies
- supervising major civil engineering works
- providing and maintaining channels, breakwaters, locks, turning basins, berths, piers and wharves

The third element is **operations**, which may include a range of value-added activities and free trade zone related activities within the port estate. Most private participation takes place in this element.

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\(^6\) Ports usually have a governing body referred to as the Port Authority, Port Management or Port Administration. ‘Port Authority’ is used widely to indicate any of these three terms. The term ‘Port Authority’ has been defined in various ways. In 1977 a Commission of the European Union defined a Port Authority as a ‘State, Municipal, public or private body, which is largely responsible for the tasks of construction, administration and sometimes the operation of port facilities and, in certain circumstances, for security’ (World Bank, 2001).
Table 3.3 shows all three of key port elements of privatization options. In this framework most world ports are considered as PRIVATE/I in which only port operations are carried out by the private sector. This PRIVATE/I type is a similar concept to the landlord port of the World Bank model. In the top 100 containers port as of 1999, 88 ports were PRIVATE/I and seven ports were PUBLIC. The reason that most ports have adopted the PRIVATE/I model may be that this model allow the state to leverage private sector investment in its ports without losing either control of its port industry or ultimate property rights with respect to port land. This model in practice has shown a reasonably positive outcome for private port operators, for the state and for port users (Baird, 1999). However, some countries, such as Hong Kong, China and South Africa, have adopted ‘corporatization’ models which are essentially private style companies but under the control of government [sic]. Other countries such as Poland have adopted a mixture of public, at both a state and municipal level, together with private interest (Valentine and Gray, 2000).

Table 3.3  Key port elements: Privatization options (Baird, 1999)

<table>
<thead>
<tr>
<th>Port Models</th>
<th>Regulator</th>
<th>Landowner</th>
<th>Operator</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC</td>
<td>Public</td>
<td>Public</td>
<td>Public</td>
</tr>
<tr>
<td>PRIVATE/I</td>
<td>Public</td>
<td>Public</td>
<td>Private</td>
</tr>
<tr>
<td>PRIVATE/II</td>
<td>Public</td>
<td>Private</td>
<td>Private</td>
</tr>
<tr>
<td>PRIVATE/III</td>
<td>Private</td>
<td>Private</td>
<td>Private</td>
</tr>
</tbody>
</table>

According to another study, when considering port reform there are three institutional issues which must be examined:

- the role of the national port authority
- the role of the local port authority
- the role of the private sector. (Lethbridge and Ra’anán, 1991)

The role of a national port authority should be reduced to a few major tasks and the staff kept to a minimum. Appropriate tasks are:

- to coordinate port investments so as to avoid wasting scarce resources to ensure that sufficient capacity exists to meet the country’s trade needs
- to guarantee an adequate quality of service
- to exert some control over pricing of port services (to ensure government receives a return on its investments and port profit levels are not excessive)
- to act as the body representing the ports industry in discussions with government, port users and the public.

At the local port authority level, the first major step in reform is to establish the port as if it were a commercial enterprise. Essential elements are the freedom to recruit staff at competitive salaries and the existence of responsible financial management and accounting practices. The second step is to divide port functions into a number of areas – safety, security and environment, investment and maintenance of major infrastructure, superstructure investment and maintenance, port operations and pricing – and to retain in the public sector only those areas necessary to ensure the safe functioning of the port.
Since most ports are monopolies, simply transferring their activities to private enterprise without carefully designed and appropriate regulations could easily be against public interest. The role of the private sector may be for stevedoring, the provision of floating craft (tugs, mooring boats, work boats, pilot boats), certain aspects of port maintenance and electronic data processing systems, and for container and bulk terminal management and operation. Eventually, with growing participation by private sector companies, the port will retain only certain key activities – a good example is the role of the harbour master and his office (responsible for the safety of navigation, hazardous vessels, traffic control, and other important tasks); another example is the responsibility for maintaining dredged depths and channels (not doing the actual dredging, but managing the task and its implementation).

China began reform of their port management system in 2001. The management of ports by the central government was transferred to the responsibility of municipal government. They separated government function (or regulation) and enterprise management (or operation). The government function was assigned to municipal governments while the enterprise function was granted to state-owned enterprise from early 2003. For example, at Dalian Port, port operation related matters are under the authority of the Dalian Port Corporation Limited, which is a state-owned enterprise with the function of the former port authority. Free trade zone related matters are controlled by the Administration of Dalian FTZ, and government related regulation matters are controlled by the Port Bureau of Dalian Municipal Government.

In the case of the Republic of Korea, Busan Port Authority as a state-owned enterprise was established in January 2004, and Incheon Port Authority will be established in 2005. These reforms in the Republic of Korea and China are aimed mainly at improvement of efficiency and productivity through overcoming the limits of the former port authority which was the government or state.

In port reform, especially the introduction of a container terminal privatization system, one thing must be carefully considered, which is to introduce a competition system within a port in order to maintain the competitive position and national strategic role of the port. During the economic boom of 2003 and 2004 many ports suffered from terminal congestion due to the rapid increase in the number of containers, and some monopolistic terminal operators introduced terminal congestion charges. This may mean the loss of competitiveness of national export and import production.

To increase terminal productivity modern quayside handling equipment has to be introduced. However, the existing labour union system, which is usually monopolistic in terms of the supply of labour, often refuses to accept reductions in the labour force and ignores the need to upgrade skills. Many countries have faced or continue to face such unions which act as barriers to productivity improvement.

Governments must pay careful attention to the need for port management organizations to change in order to meet national objectives and economic strategies, customer’s needs and to cope with rapidly the changing maritime environment. Ports must look outside their immediate jurisdiction as a focus of their future development. Such strategies fall within a perspective of port regionalization where a port seeks a closer integration with the supply chains of its hinterland. Major factors to be considered in port management roles are as follows:

- increase of private sector participation in the port development and operation
- often conflicts between port sector and city sector
- port sector role moving beyond the physical port boundary, expanding to the outside of its boundary as the importance of intermodalism grows
- growing competition toward hub port and logistics centre and user’s demand for competitive services
- needs of coordination and cooperation among a variety of government organizations (such as customs, labour and security related public offices), private operators and users interrelated in port activities
strong leadership and initiatives to meet its long and short term strategies by persuading and negotiating national and local level of stakeholders

needs of industry cluster approach to ports as a whole including shipping industry and logistics industry

needs of promotion of port competitiveness and marketing strategy as a whole.

On the first of January 2004, the Port of Rotterdam (Havendrijf Rotterdam N.V.) became a government corporation. The part of Articles of Association of the Port of Rotterdam in Case Study 3.2 will be useful to understand its roles.

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**Case Study 3.2 Articles of Association of the Port of Rotterdam (Havenbedrijf Rotterdam N.V.)**

**Article 2**

2.1 The objects of the company are: to operate the port installations and in such context to strengthen the position of the Rotterdam port and industrial zone within a European perspective, on the short and long term.

2.2 Part of the objects of the company are:

   a. to monitor effective, safe and efficient management of shipping traffic and to provide conditions of nautical and maritime order and safety, as well to operate as the competent port authority for the Rotterdam port area;
   
   b. to develop, install, manage and utilize the port and industrial zone in Rotterdam, in the broadest sense; and
   
   c. to contribute to the urban development, to develop the city ports, and to improve the housing conditions and the working and living climate of the city and area of Rotterdam, even in the situation wherein such activities might (initially) incur losses.

2.3 The company seeks to accomplish its objects inter alia by performing the following:

   a. to enter into a (port) agreement with the municipality of Rotterdam and agreements pursuant thereto, including a long lease agreement;
   
   b. to acquire, dispose, encumber, found or make found, develop, operate, manage and administer real estate;
   
   c. to enter into joint ventures and to otherwise participate in and to conduct the management of other business enterprises and companies;
   
   d. to render services in the management, technology, financial economic or administrative field;
   
   e. to make loans, to finance and to provide security for debts for its account as well as that of others;
   
   f. to perform port activities outside the region of Rotterdam, and furthermore all activities which are incidental to or which may be conducive to any of the foregoing, all in the broadest sense.

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3.5 **Emergences of global container terminal operators**

Increase of world trade volume and introduction of larger container ships require quality services and productivity in the stevedoring industry, and have increased the importance of the role of the industry. The privatization of port activities throughout the world has also increased the participation of global terminal operators, especially in container port operations.
Recently, global terminal operators have penetrated the global container stevedoring market more aggressively in order to increase their competitiveness through the establishment of global networks. Active horizontal integration of terminal operators has appeared in forms of mergers and acquisitions\(^7\), investments for container terminal development in other countries through joint ventures with local companies, other global terminal operators or shipping lines. Examples are Hutchison Port’s acquisitions of concessions at ports in China, Indonesia, the Republic of Korea, Thailand and Myanmar, and PSA’s acquisitions in China and Brunei.

The leading terminal operators have developed diverging strategies towards the control of larger parts of the supply chain with clear understandings that the transport chain is viewed as a totally integrated system. The door-to-door concept has transformed a number of terminal operators into logistics organizations. The services offered include warehousing, distribution and value-added logistical services such as customizing products for the local markets. Many terminal operators have been involved in intermodal transport to create a landbridge between ports and inlands, for example, by operating rail terminas, setting up road haulage companies or operating their own feeder services (Notteboom, 2004). Such vertical expansion includes the downstream diversification of shipping lines into terminal management, for example by AP Moller (Maersk Sealand) at the Port of Tanjung Pelepas.

Owing to these horizontal and vertical expansions, the top ten global terminal operators handled around 150 million TEU in 2003. For example, Hutchison Port Holdings (HPH) operates 219 berths in 39 ports in 17 countries along with a number of transportation related service companies. In 2003, the HPH Group handled 41.5 million TEU (HPH online). In 2003, the top five terminal operators in the world handled 118.4 million TEU, representing 52 per cent of world total throughput. Table 3.4 shows the container throughput of the top ten global terminal operators and their capacity expansion.

Table 3.4 Container throughput by global terminal operators, 2004 (Various sources)

<table>
<thead>
<tr>
<th>Handling volume (million TEU)</th>
<th>Capacity (million TEU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hutchison Port</td>
<td>36.7</td>
</tr>
<tr>
<td>PSA Corp.</td>
<td>26.2</td>
</tr>
<tr>
<td>APM Terminals</td>
<td>17.2</td>
</tr>
<tr>
<td>P&amp;O Ports</td>
<td>12.8</td>
</tr>
<tr>
<td>Eurogate</td>
<td>9.5</td>
</tr>
<tr>
<td>Cosco</td>
<td>4.7</td>
</tr>
<tr>
<td>Evergreen</td>
<td>5.7</td>
</tr>
<tr>
<td>Dubai Port International</td>
<td>5.3</td>
</tr>
<tr>
<td>SSA Marine</td>
<td>4.4</td>
</tr>
<tr>
<td>APL</td>
<td>4.3</td>
</tr>
<tr>
<td>Total</td>
<td>126.8</td>
</tr>
<tr>
<td>World Total Throughput</td>
<td>266</td>
</tr>
</tbody>
</table>

* The number includes only container volume handled at container terminal.

** The numbers in ‘World Total Throughput’ are adopted from Ocean Shipping Consultants, ‘World Containerport Outlook to 2015’, and these are preliminary.

---

\(^7\) For example, Eurogate in 1999 (Eurokai, BLG), Hutchison Port Holdings in 2001 (increase of share in ECT terminal from 35 to 75.5 per cent, ICTSI’s overseas division), PSA Corp. in 2001 (purchase of 80 per cent shares of Hesse Noord Natie, Belgium terminal operator), Dubai Port International in 2004 (purchase of CSX World Terminals).
In recent years shipping lines have opted for their own dedicated terminals, which mean that traditional definition for stevedoring and carriers sectors is getting vague. As vessel size increase, the control available by integrating stevedoring with vessel scheduling becomes increasingly attractive. It is far from clear that dedicated terminals are cheaper – rather they represent an integration of the service to the customer. Figure 3.1 shows the recent trends of terminal ownership changes.

3.6 Hub ports and logistics centres

3.6.1 Hub ports

Increasing competition among hub ports has been growing as previously less developed ports in countries undergoing national economic growth have been developing port infrastructures to compete with the existing hub ports. As competition among ports has been increased, shipping alliances and major shipping lines have been taking advantage of their growing power in negotiating concessions for dedicated terminals and/or in deciding ports of call. Ports are losing their bargaining power and have been forced to provide deep water, quality services, productivity, efficiencies, infrastructures including rails and roads, all of which are frequently demanded by shipping lines with bargaining power created by great amounts of container volume. When a port fails to meet the shipping line's demand, it may lose its major clients. Ports and container terminal operators are under strong pressure from their clients, which means they are forced to take part in the competition among ports by actively enhancing productivity and investing a great amount of money in order to stay in the game.

The demands of shipping lines (customers of ports) exercising their growing bargaining power for lower port tariffs, quick turnaround times, accommodation of super large ships and many other quality services, and industry trends towards containerization, super larger ships, consolidated port operations, and concessions to global operators allow for a straightforward definition of the conditions for success as hub port:

- location (proximity to major world routes)
- quick turnaround time
- quality services with efficiencies and productivity
- reasonable costs
- ability to accommodate super larger ships – deep water, advanced equipment

Figure 3.1 Terminal ownership structure (1991-2001) (Drewry Shipping Consultants Ltd., 2001)
excellent networks covering neighbouring feeder ports
- existence of logistic cluster supporting value-added logistics activities
- no red tapes and no burdensome paper works
- advanced information technology
- intermodal infrastructures- access to rail, air and road distribution networks
- local markets producing freight volume.

Table 3.5 outlines the measuring tools for hub port quality through which ports can measure or evaluate their position and identify which sectors have priority when implementing related policies.

### Table 3.5 Port characteristics (Song, 2002)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Factors</th>
<th>Measuring tools/Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port Location</td>
<td>Distance to the industrial agglomeration region</td>
<td>Referencing geographical information</td>
</tr>
<tr>
<td></td>
<td>Distance to the main lines</td>
<td>Surveying carriers and LLPs*</td>
</tr>
<tr>
<td></td>
<td>Strategic location in the global network</td>
<td></td>
</tr>
<tr>
<td>Port Infrastructure</td>
<td>Berth number</td>
<td>The requirements of accommodating the latest generation container ship</td>
</tr>
<tr>
<td>and Superstructure</td>
<td>Berth depth</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crane type</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yard area</td>
<td></td>
</tr>
<tr>
<td>Port Service</td>
<td>Load and discharge speed</td>
<td>Referencing to the international benchmarks</td>
</tr>
<tr>
<td></td>
<td>Pick up and delivery service</td>
<td>Surveying shippers and forwarders</td>
</tr>
<tr>
<td></td>
<td>Information availability</td>
<td>Surveying carriers</td>
</tr>
<tr>
<td></td>
<td>Provide customized service</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ancillary service</td>
<td></td>
</tr>
<tr>
<td>Port Charge and Cost</td>
<td>Port charge of cargo</td>
<td>Referencing to the international benchmarks</td>
</tr>
<tr>
<td></td>
<td>Port charge of ship</td>
<td></td>
</tr>
<tr>
<td>Carrier’s Service in</td>
<td>The calling frequency</td>
<td>Referencing the published data</td>
</tr>
<tr>
<td>Port Connectivity</td>
<td>The freight rate</td>
<td></td>
</tr>
<tr>
<td>Hinterland Accessibility</td>
<td>Intermodal operation time consume</td>
<td>Referencing to the international benchmarks</td>
</tr>
<tr>
<td></td>
<td>Intermodal operation cost</td>
<td>Surveying carriers and LLPs</td>
</tr>
<tr>
<td></td>
<td>Custom clearance procedure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cargo tracing serve</td>
<td></td>
</tr>
<tr>
<td>Distribution Centre</td>
<td>Total operation area of DC</td>
<td>Referencing statistics data</td>
</tr>
<tr>
<td>(DC)</td>
<td>The equipment and information system of DC</td>
<td>Requirements of the advanced supply chain management</td>
</tr>
<tr>
<td></td>
<td>Service scope</td>
<td>(Surveying LLPs)</td>
</tr>
<tr>
<td>Info-structure</td>
<td>Port community system</td>
<td>Requirements of the advanced supply chain management</td>
</tr>
<tr>
<td></td>
<td>Information interchange with customs</td>
<td>(Surveying LLPs)</td>
</tr>
<tr>
<td></td>
<td>Information exchange between the intermodal organizations</td>
<td></td>
</tr>
</tbody>
</table>

* LLPs: Lead Logistics Providers who are responsible for managing the primary interface between the customer and other logistics providers.
Case Study 3.3 shows an example of shipping line’s perspective in selecting hub ports.

**Case Study 3.3 A shipping line’s perspective of how to select a hub port**

- No or little deviation from the main routes
- Central location in the area to allow feeder network to serve in a respectable time
- Modern and large port infrastructure allowing competitive productivity and immediate availability of berths/cranes
- Limited paperwork requirements from local authorities
- Competitive costs
- Hub port with local markets is of course a plus
- Regional hinterland via intermodalism is an extra plus.

(Whitelaw, 2002)

Most major ports in the world have tried to meet these above mentioned requirements for hub ports through exploring many new policies on the port organization, port facilities, regulation etc. Policy guidelines for ports and governments can be outlined as follows:

- redefine port governance and organizations to tackle emerging issues
- privatization and promotion of partnership between public and private sectors in order to enhance efficiencies and productivity
- launching port development projects such as expanding container terminals, deepening approach channel and depth alongside quay, purchasing advanced quayside equipment, assigning more number of quayside cranes to a vessel.
- deregulation for shipping, logistics, private sector involvement
- establishing port cluster by:
  - exploring free port system
  - introducing free trade zones for international logistics industry,
  - developing industry complexes around ports
  - and concentrating logistics related industry including shipbuilding, ship-equipment, ship-spare parts, maritime training centre, exhibition and conference centre, research institutes etc.
- developing intermodal infrastructures such as railway, roads, inland waterways, inland container depots
- strengthening marketing strategy
- introduction of information technology such as edi and e-commerce
- increase of partnership with local community and other government organizations such as customs organization.

However, many ports are faced with impediments to implementing their ambitious policies. For example, port development projects generally require a huge budget. In 1998, more than 20 billion dollars were earmarked around the world for port development projects. Forty per cent of this, that is, 8 billion dollars,
was in Asia alone, and this is a rather conservative estimate (Drewry, 1999; Haralambides, 2000). To secure a port development budget, many ports have tried to attract private sector participants such as stevedoring companies or ocean carriers through deregulation and preferential incentives. This policy to attract private sector in port development is also aimed at improving efficiencies and productivity by utilizing the expertise of the private sector. Even if ports are successful in attracting private sector participation in their development projects, they are still under pressure when attempting to secure their development budget because in many cases involvement of private companies is through a joint venture with the port authority (or other private sector organizations), or investment for part of whole structures.

The space for port expansion is usually scarce because port location is traditionally near the commercial centre of a city. Many ports have suffered from this problem when they try to establish an ambitious port development project. In this regard ports should reserve enough land space for future development. Some ports have also been threatened by the local community's demand for commercializing the port area, introducing housing, waterfront parks and other commercial developments. All this mean that the land price in the port area may be too expensive to maintain logistics activities.

In case of developing intermodal facilities, there are many government bodies involved, which means there are likely to be difficulties in coordination among government organizations involved. This may act as a barrier to the promotion of multimodal logistics because of the lack of consensus and the different priorities among the organizations.

Ports also face a plethora of environmental legislation, which makes the procedure for obtaining consents more complex and more time consuming. It is, of course, important that there is legislation in place to provide adequate safeguards to protect the environment. Ports, by definition, have to be at the sea-land interface and the coastal zone tends to be an area where environmental sensitivities are high.

Decision makers should consider all these potential impediments together with policy guidelines already outlined when they are planning port development projects in order to minimize the cost and time of implementing relevant projects. Otherwise there is the strong possibility that their vision for a hub port cannot be achieved.

Case Study 3.4  Algeciras, Spain

Algeciras, located near Gibraltar at the entrance to the Mediterranean, was established as a pure transhipment facility by both Maersk and Sealand in the 1970s. In 1999, it ranked 22nd in the world, having handled two million TEUs, an increase of 9.1 per cent from 1998 and almost 25 per cent from 1997. Maersk Sealand will consolidate the two companies’ facilities into one that has a capacity of close to three million TEUs. During the period 1998-2002, the terminal is being expanded by the Algeciras Port Authority at a cost of US$ 200 million, while Maersk has ordered three post-panamax cranes and six rubber-tired yard gantries, a total investment valued at over US$ 30 million. Algeciras has no hinterland; it exists merely as a pivot point for the convergence of Maersk-Sealand’s east-west and North-South services. ‘Algeciras fits the role of a North-South and east-west transhipment port to perfection, and the potential of calling at Algeciras is unmet’ (Richardson 1998). Algeciras has benefited from the full commitment of both Maersk and its former rival and now fully merged partner, Sea-Land, which developed the port into a major transhipment hub.

(Source: Cirtwill et al., 2001)

Case Study 3.5  Freeport, Bahamas

Located 65 nautical miles from the coast of Florida, Freeport, Bahamas, was built by the largest container-terminal operator in the world, Hutchison Port Holdings, to exploit Freeport’s location astride several north-south and east-west trade lanes. Three years ago, Freeport handled less than 11,000 TEU; in 1999, it was expected to handle over 750,000.
The terminal was designed to handle the largest vessels afloat, transiting the major east-west trade lanes, and transhipping cargo for the Caribbean and South America. In the words of one of HPH’s executives, ‘The first thing that struck me was Freeport’s position – a lot of trade lanes merge here’ (Adams, 1998). As a Maersk executive has observed, ‘Any combination is possible from here because you can reach any point in the world’.

Freeport Container Port is a joint venture between HPH and Grand Bahama Development Company, of which HPH owns 50 per cent. Phase I of this development cost US$ 78.3 million. The facility’s initial capacity was 560,000 TEU, and it boasted four post-panamax gantry cranes. Expected additional improvements will include 366 metres of new quay, three additional post-panamax cranes, and 12 straddle carriers. The whole complex will comprise three berths of 915 metres, seven super post-panamax cranes, and 22 straddle carriers, with total capacity of 950,000 TEU. The port’s owners also plan to explore the feasibility of linking the transhipment terminal’s operations to the nearby Freeport International Airport.

Florida’s ports fear Freeport’s impact, and many of them are gearing up with feeder services. Freeport’s 47-foot-deep channel ‘beckons large vessels to transload containers to and from large ships that might ignore the largest American ports entirely and tie up where non-union port gangs and shortline railroads congregate’ (Wilner 1999). Freeport is meant to be a deeper, cheaper rival to Miami, Jacksonville, and perhaps even Savannah. Its costs are significantly lower with lift rates reportedly one-half what they are in Miami. There are no unions and few government restrictions, and HPH pays no taxes on its Freeport earnings. Present customers include Mediterranean Shipping Co. and Maersk-Sealand, which, combined, account for 85 per cent of the port’s throughput. Only four per cent is destined for the local market.

(Source: Cirtwill et al., 2001)

**Case Study 3.6 Gioia Tauro, Italy**

Medicenter Container Terminal (MCT) in Gioia Tauro, located in southern Italy, started its operation in 1995. In 1997 its container throughput reached 1.45 million TEU and 3.15 million TEU in 2003. Occupying 185 acres, it has eight berths, 14 post-panamax cranes, 2,450 metres of quay length, with up to 15 metres of water alongside, and 3,000 metres of on-dock rail.

MCT is owned by Contship Italia, formerly an Italian container line (now owned by CP Ships), in partnership with Ecklemann-Eurokai of Hamburg. It is a classic transhipment hub, located virtually in the centre of the Mediterranean. Recently Maersk Sealand was granted a dedicated terminal area within the port, in return for taking a 10 per cent stake in the terminal operating company.

The port is facing increased competition from several other Italian ports – both older ones, such as Naples and Genoa, and newer ones, like Taranto and Caligari. The port is now beginning to look beyond transhipment, which represents an estimated 65 per cent of its traffic base, to expanding its role as a gateway for Italy and southern Europe.

(Source: Cirtwill et al., 2001)

**Case Study 3.7 The Port of Los Angeles**

A recent deal signed between the Port of Los Angeles and Maersk Line raises the bar for North American ports and is probably a portent of future developments. In November 1999, Maersk Sealand reached an agreement with the Port of Los Angeles to build an US$ 800 million, 484-acre container terminal, the largest in the United States and one of the largest in the world. The port’s revenue from the lease will reportedly total more than US$ 2 billion over the 25-year life of the contract. The contract commits the carrier to a minimum annual throughput that will generate sufficient revenue to amortize the port’s investment. Revenue in excess of the minimum will be shared with Maersk Sealand. The greater the volume of containers the carrier puts through its facility once the guarantee is met, the greater its share of revenue.

(Source: Cirtwill et al., 2001)
3.6.2 Logistics centres

Globalization has been the most influential phenomenon among the major trends in the world economy over the last two decades. It has been recognized as an inevitable technologically driven process that has dramatically increasing commercial and political relations between people in different countries. Unlike most of the 20th century, during which production remained national, industrial production has become increasingly international over the last 20 years increasing competition among businesses the world over.

This globalization has created a real-time global marketplace and a business focus and concentration on maximizing comparative advantage when sourcing and supplying product. In terms of the global supply chain, global companies have been forced to work simultaneously within two different systems while enhancing efficiency and effectiveness — centralized and decentralized maritime activities — even as international supply chains have become complex and logistics models continuously evolve. Business structures must be made after considering both intercontinental and regional or local aspects.

Many factors such as standardization in production components, low transportation cost and the revolution of information and communication technology make it possible for companies to source raw materials and product components all over the world. Raw materials, parts, and semi-finished products can be brought together at a single or, a few locations, to significantly reduce overall costs without any local interference to product quality. Thus, centralization of business structure for economies of scale is a useful strategy in enhancing global competitiveness.

At the same time, cultural differences in the marketplace or the importance of response time demand global companies to customize or localize their products in accordance with local consumers tastes. Decentralization of business structure or postponement of final assembly must, therefore, be considered, too.

Many companies have experienced significant cost savings through integrating existing logistics places into a few integrated logistics centres, and some other companies have achieved success in penetration of specific markets by thorough localization strategies such as quick response times or different design and functions. In this way, ports have a great chance to play an important role as the centre of global logistics activities. However, because business structures of supply chain networks are decided wholly by a company’s specific strategy, ports dreaming to become a hub have been struggling to meet and provide the global standard in terms of hardware and software by investing for world class infrastructures and by experimenting with several policies.

One of the major trends in port industry is to develop logistics related zones such as free trade zones or international logistics zones to accommodate value-added logistics activities and to attract global logistics companies. The advantage of special logistics-oriented zones (whether or not they are designated as free trade zones providing tax related incentives) is that they attract foreign investment and create new employment. In addition, successful logistics zones are able to secure freight volume which may be generated by established logistics companies, and to develop their ports as hub ports. Many ports have been trying to develop their ports towards hub ports to take advantage of these benefits through developing the necessary infrastructures and marketing a variety of advantages and incentives. Thus, competition among ports towards global logistics centres or global load centres is getting severer.

Considering this growing competition among global logistics centres, most ports have been actively trying to attract regional distribution centres of multinational logistics and manufacturing companies. In this regard, ports and governments are placing great emphasis on establishing strong support from governments, which may guarantee a reliable business environment and quality administrative support. Case Study 3.8 below shows why Reebok selected the Port of Rotterdam as its logistics centre, and this case is useful in understanding what policies are prerequisites for ports to develop as global load centres and attract global companies. Case Study 3.9 highlights the Distripark in the Port of Rotterdam.
Case Study 3.8 Reebok Logistics centre 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, labour and energy. The newly opened Reebok state-of-the-art logistics centre 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 line and logistics

Reebok has two product lines, footwear and apparel. In 1998, footwear accounted for 57 per cent of international sales, apparel 43 per cent. Reebok products are actively marketed in 170 countries or territories. The U.K. is the largest market for Reebok products in Europe, representing 30 per cent of total European sales. Spain is another big market for Reebok products. Almost all footwear is supplied from plants in the Far East. Most apparel is supplied from plants in Southern Europe. Footwear moves in containers from the Far East. Apparel moves by truck and container from plants in Portugal, Greece, Turkey, etc.

Restructuring of logistics activities

As part of a global restructuring of logistics activities, Reebok in 1995 decided that warehousing and distribution activities in Europe should be consolidated. In place 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 U.K. 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 centre. France, Belgium and the Netherlands were considered as potential locations. Following assessment of each of these locations, Reebok decided to locate the logistics centre in the Netherlands. The site chosen is in the newly created Distripark 3 in Maasvlakte at the ocean 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 terminal in the port of Rotterdam, a container handling 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 U.K. market. There is a good supply of warehousing labour in the Rotterdam area, despite the fact that the general labour market is tight. Most people in the Netherlands understand English, which was considered by Reebok to be important. Customs in the Netherlands is considered to be efficient and business friendly. While not an advantage, labour costs and regulations concerning labour 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 sq. ft. logistics facility. The port also created the necessary infrastructure to connect the facility to the adjacent container terminal, facilitated creation of 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.

(World Bank, 2001)
Case Study 3.9 Value added development efforts in the Port of Rotterdam

Distriparks

Distriparks are the Port of Rotterdam’s response to the growing demands on shippers and transport firms for just-in-time delivery at lower costs. Distriparks are advanced logistics parks with comprehensive facilities for distribution operations at a single location close to the cargo terminals and multimodal transport facilities for transit shipment.

They employ the latest information and communications technology. Distriparks provide space for warehousing and forwarding facilities including the storage and handling of cargo and the stuffing and stripping of containers. They also offer a comprehensive range of value added services. In Distriparks, companies can, either on their own or in partnership with local specialist firms, process their goods according to specific customer and country-of-destination requirements. These value-added services include packing and re-packing, labeling and assembly, sorting and invoicing. The Distripark’s on-site customs service promptly handles import and export documentation. To date, three Distripaks have been established within the area of the Port of Rotterdam.

<table>
<thead>
<tr>
<th>Distriparks</th>
<th>Starting date of Operations</th>
<th>Size (1,000 m²)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eemhaven Distripark</td>
<td>1989</td>
<td>237</td>
<td>Close to the home terminal of ECT</td>
</tr>
<tr>
<td>Botlek Distripark</td>
<td>1990</td>
<td>165</td>
<td>Close to the Botlek Port area</td>
</tr>
<tr>
<td>Maasvlakte Distripark</td>
<td>1st phase: 1998</td>
<td>848</td>
<td>Close to the ECT Delta terminal</td>
</tr>
<tr>
<td></td>
<td>2nd phase: construction</td>
<td>1 017</td>
<td>Most companies constructing their warehouses</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>2 267</strong></td>
<td></td>
</tr>
</tbody>
</table>

TDMCs in Rotterdam are specialized centres where traders and manufacturers from non-European countries meet and trade with their European counterparts and with each other. The TDMCs are concentrated in Rotterdam’s Euro Trade Park. The TMDCs enable participating manufacturers to tune into local markets and requirements. Each TMDC represents a concentration of know-how, products, markets, professionals, financial resources, technologies, government agencies and other institutions. Each Centre is specialized in different areas of industry, geographic areas and particular expertise.

(World Bank, 2001; ESCAP, 2002)