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2. The port-city interface: planning and managing port and city challenges

3. Public private partnerships in container terminal financing
1. Introduction

1. PhD in ‘performance conditions for container terminals’

2. Work experience: Free University Amsterdam, KPMG, Utrecht University, TU Delft Research Institute OTB, TU Delft Faculty of Civil Engineering

3. Coaching PhDs and MSC theses

4. Written over 50 papers and several books, edited books and journal special issues, reviewer for several transport and geography journals

5. Always new technologies in freight transport and modelling cost and efficiency impacts
2. Port-city interface; intro

- In the past, port areas expanded
- Changing relationship between the port and the city and the port-city interface, redevelopment of older port areas for urban uses
- In ports extension of the port area is more difficult than before
- This paper focuses on the research question: Are we entering a new phase in port development in a geographical and morphological sense? And, will this influence the relationship between city and port?
2. Port-city interface; science

- Bird (1963): Anyport-model, port as direct relationship between port form and function (port space seen as chronological distinct development phases)

- Six phases (Bird calls them ‘eras’), each involving an addition to, or change in, the physical layout of the port
- each era marked by growth of shipping volume or technical advancements in the carriage of goods by sea or of the handling in ports
- in each era, the new port facilities were built further downstream than the facilities in the former ‘era’, resulting in a growing geographical separation of port and city

- this latter phenomenon was also observed in the development of Asian ports by Robinson (1984)
2. Port-city interface

- Charlier (1992) developed a life-cycle concept of port areas:
  - **Growth**, resulting from investment to create and expand the facility;
  - **Maturity**, in which the full potential of the facility is obtained;
  - **Obsolescence**, which sets in as more modern, higher-capacity facilities at better locations take over business;
  - **Dereliction**, after the berths are abandoned by shipping; and
  - **Redevelopment** which signals the start of a new and non-port economic cycle.
2. Port-city interface

- Robinson (2002): port economics in a value-driven chain system forms the cornerstone
- Olivier and Slack (2006): interdisciplinary dialogue between transport and economic geography (attention to a behavioural approach)
- Hoyle and Norcliffe et al. present an evolution of the port-city interface (spatial separation between port and city land use)
- Hayuth (1982) analysed changing relationship between port and city (ecological and spatial system, 1988 also economics)
- Daamen’s (2007): local authorities (re)develop city areas geographically very close to the port

- Port form, port function and port regulations
2. Port-city interface

<table>
<thead>
<tr>
<th>STAGE</th>
<th>SYMBOL</th>
<th>PERIOD</th>
<th>CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Primitive port/city</td>
<td><img src="circle.png" alt="City" /> <img src="circle.png" alt="Port" /></td>
<td>Ancient/medieval to 19th century</td>
<td>Close spatial and functional association between city and port.</td>
</tr>
<tr>
<td>II Expanding port/city</td>
<td><img src="circle.png" alt="City" /> <img src="circle.png" alt="Port" /></td>
<td>19th - early 20th century</td>
<td>Rapid commercial/industrial growth forces port to develop beyond city confines, with linear quays and break-bulk industries.</td>
</tr>
<tr>
<td>III Modern industrial port/city</td>
<td><img src="circle.png" alt="City" /> <img src="circle.png" alt="Port" /></td>
<td>mid - 20th century</td>
<td>Industrial growth (especially oil refining) and introduction of containers/ro-ro require separation/space.</td>
</tr>
<tr>
<td>IV Retreat from the waterfront</td>
<td><img src="circle.png" alt="City" /> <img src="circle.png" alt="Port" /></td>
<td>1960 s - 1980 s</td>
<td>Changes in maritime technology induce growth of separate maritime industrial development areas.</td>
</tr>
<tr>
<td>V Redevelopment of waterfront</td>
<td><img src="circle.png" alt="City" /> <img src="circle.png" alt="Port" /></td>
<td>1970 s - 1990 s</td>
<td>Large-scale modern port consumes large areas of land/water space; urban renewal of original core.</td>
</tr>
<tr>
<td>VI Renewal of port/city links</td>
<td><img src="circle.png" alt="City" /> <img src="circle.png" alt="Port" /></td>
<td>1980 s - 2000+</td>
<td>Globalization and intermodalism transform port roles; port-city associations renewed; urban redevelopment enhances port-city integration.</td>
</tr>
</tbody>
</table>

Stages in the evolution of the port-city relationships according to Hoyle (2000: 405)
2. Port-city interface
2. Port-city interface
3. the port of Amsterdam

- Port of Amsterdam is part of ‘Seaports Amsterdam’ which includes smaller ports of Beverwijk, Velsen/IJmuiden and Zaanstad
- In Europe, many ports are identified as either gateway ports or hub ports (Ferrari et al., 2006; Notteboom, 1997)
- Port of Amsterdam neither a hub nor a gateway port, more a ‘kind of’ commodity port (manufacturing of the handled goods important)
- The port also important location of inland waterway transport
3. the port of Amsterdam

• spatial development in Amsterdam: the Anyport-model and the evolution in the port-city relations according to Hoyle (2000) can be observed for the port of Amsterdam (see: Zoest, 2005; Gilijamse, et al., 2009)

• 1st: port and city integrated at the current city center
• Later, (17th century) purpose-built harbors were developed to the East of the city center
• After completion of the Noordzeekanaal in 1876, development to the West of the city center
• 1980s: transformation of former Eastern Docklands to new residential uses
• 1990s, transformation of the area called the IJ-banks (the waterfront of the city center) began
3. the port of Amsterdam

- Port of Amsterdam grows rapidly. Total Amsterdam port area is about 2,600 hectares, of which 1,600 hectares is for companies and 1,000 for the harbors and other infrastructure.

- Supply of vacant business sites has decreased sharply from 426 hectares in 2003 to 270 in 2009 (Gemeente Amsterdam, 2003, 2009). Still low!

- Port of Amsterdam belongs to the top five in Europe.

- In 2016, the transhipment was 95 million tonnes, of which crude oil and oil products formed more than one-third.
Table 1  Current and future handling in the Amsterdam port area in million tonnes

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil products</td>
<td>8,177</td>
<td>11,595</td>
<td>24,866</td>
<td>30,566</td>
<td>45,000</td>
<td>48,000</td>
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<tr>
<td>Coal</td>
<td>4,760</td>
<td>11,289</td>
<td>14,734</td>
<td>17,383</td>
<td>24,000</td>
<td>36,000</td>
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<tr>
<td>Agribulk</td>
<td>7,529</td>
<td>10,044</td>
<td>8,326</td>
<td>9,004</td>
<td>11,000</td>
<td>16,000</td>
</tr>
<tr>
<td>Other dry bulk</td>
<td>3,952</td>
<td>4,623</td>
<td>6,641</td>
<td>7,310</td>
<td>8,000</td>
<td>12,000</td>
</tr>
<tr>
<td>Containers</td>
<td>1,111</td>
<td>782</td>
<td>3,442</td>
<td>3,905</td>
<td>26,000</td>
<td>69,000</td>
</tr>
<tr>
<td>Other</td>
<td>5,695</td>
<td>6,282</td>
<td>7,344</td>
<td>7,587</td>
<td>10,000</td>
<td>13,000</td>
</tr>
<tr>
<td>Total</td>
<td>31,225</td>
<td>44,614</td>
<td>65,353</td>
<td>75,755</td>
<td>124,000</td>
<td>194,000</td>
</tr>
</tbody>
</table>

Source: Haven Amsterdam, 2009.
3. the port of Amsterdam

- Due to rapid growth, the Port of Amsterdam is faced with (in its own words) ‘challenges’
- in the fields of land supply,
- the environment
- and the accessibility of the port area.
3. the port of Amsterdam

- Spatial policy: a limited supply of land

- In the port area: public Port Authority main supplier of land, and the municipality is the planning authority

- According to the new policy up to 2020, the transhipment growth of the Port of Amsterdam has to be realised within the existing area

- to accommodate the growth in handling, several measures have been proposed:
3. the port of Amsterdam

1. Redevelopment of existing business sites: (not a new policy) Between 1990 and 2007: municipality acquired 307 hectares and it released 560 hectares

2. Intensifying land use: developing multi-storage buildings, connecting currently dry business sites with quays that have deep water access, or reducing harbours in order to develop new business sites and/or quays (this requires larger investments)

3. Higher rents and additional land lease conditions: conditions and the rents will be linked to the intensity of the land use, also shorter lease periods have been announced
3. the port of Amsterdam

- In addition, development of ‘transition zone’ between the port and the city proposed

- In this zone, economic activities change from port to city activities (in particular the creative industries)

- area small (7 hectares) and remains business area, no longer be available to port companies, which reduces the port area

- Port also confronted with the spatial policies of the Municipality itself: ‘compact city policy’ which implies that (new) residential development should preferably take place within, or adjacent to, existing built-up area
3. the port of Amsterdam

- since 1980s: 10,000 houses built in former port areas such as the Eastern Docklands and the IJ-Banks

- plans for 5,000 houses in the parts of the port close to the city (Houthaven and the former NDSM-wharf) developed

- De Roo (2003) analysed conflict the Houthaven, concluded that planning process ended in a “stalemate”, because most dwellings planned in a zone in which residential development restricted because of noise levels

- 2008, municipality and 3 companies agreed that, under certain conditions, residential development in the Houthaven and NDSM-wharf area is possible, but that in the coming 20 years, the Municipality will not start new residential developments
3. the port of Amsterdam

- Transformation Minervahaven: 100,000 m² small business accommodation
- Houthaven: 1800 houses before 2015
- NDSM-wharf: 3500 houses after 2015
3. the port of Amsterdam

• Environmental policy: more strict environmental regulations

• increasing regulations at European level

• Dutch state and regional, local authorities obliged to implement these regulations and to enforce them

• environmental regulations and protection of rare species are putting pressure on port activities

• regulations will limit the growth opportunities for the Port of Amsterdam
3. the port of Amsterdam

- Port Authority, in cooperation with the port companies, is looking for sustainable innovations in order to become more environmentally-friendly and to create extra ‘environmental space’ for the growth of port activities

- Examples: cleaner ships, cleaner energy production and use, the improvement of air and water quality, noise control, the creation of ecozones, and the careful handling of dangerous goods
3. the port of Amsterdam

- Transport Policy: improving accessibility

- accessibility of the Port of Amsterdam, and in a broader sense also that of the Amsterdam area, increasingly problematic. Road freight transport in particular is experiencing considerable congestion, but current investments in new roads will ease this

- Both rail capacity and inland waterway capacity are enough for the near future
3. the port of Amsterdam

- Sea transport experiencing accessibility problems due to IJmuiden locks (plus tunnels under the Noordzeekanaal)
- The plan is to have a second lock ready in 2016...
- modal split for the port of Amsterdam is quite good: road 53 per cent, inland waterway transport 43 per cent and rail 4 per cent
4. Research structure literature
4. Research port form; business view

- Operations at their current sites could grow (3-5 years)
- Several companies have land in reserve
- Some companies see possibilities to intensify land use on their current site, but this would require large investments
- Also (intensified) quay usage and price increases for sites can contribute to more efficiency in land use
- Storage in the hinterland at the user’s site might create extra ‘land’ in the Amsterdam port area for new port activities
- Worried by the planned housing near the port area
- Firms increasingly look for alternatives
- Other companies are willing to expand in Amsterdam, but they are not allowed to do so
- Accessibility of the port is generally good
4. port function; business view

- Positive points are a flexible, fast and focussed service of the Port Authority and its good location close to European customers

- Amsterdam should focus on peer ports in Europe rather than on mainports, be more stable in priorities, and rely less on bulk flows, sea lock IJmuiden; political lobbying of the regional and national authorities could be improved; and the maintenance of the inland waterway infrastructure could be better

- Some companies complain about the implemented rental policy. Local authority (the mayor and the Board of Aldermen of the City of Amsterdam) show only a modest interest in the port
4. port regulation; business view

- Different government layers (European, national, regional, and local)
- Fine dust, noise, CO2, safety, water quality, security, etc.
- Strict execution of European regulations in the Netherlands
- More flexibility in other ports can be found in: 1) gassing of insects in cacao; 2) lifting sacks; and 3) fire protection measures
- Housing encroaching former port areas (unfair)
5. other port cities in HLH-range

- Changes in the port-city interface are emerging in other ports as well
- Rotterdam: redevelopment of port areas near the city. In contrast to Amsterdam, port area will increase
- Same challenges apply to Le Havre, although timing and intensity can be different (City of Le Havre, 2007)
- Hamburg: comparable developments take place
- Vlissingen: difficulties to grow due to a lack of available land and limited extra noise usage space (Provincie Zeeland, Gemeente Vlissingen, Gemeente Borsele, 2006; Scherbeijn, 2007)
- Bremen: opportunities to expand port area do not exist
- Antwerp: expansion opportunities in the existing port area were limited and forced a move of the port towards the sea
6. Conclusions

- Over time, both spatially and functionally port and city became increasingly separated from each other.

- Amsterdam: expansion of port area has stopped, while the urban housing frontier is gradually encroaching on the existing, and now fixed, harbour area.

- Amsterdam is not unique, it seems that the era of unproblematic port expansion has ended.

- New phase: the city is expanding more rapidly into the direction of the port, than the port moves away from the city.
6. other port cities in HLH-range

- **t1**: SYMBIOSIS
- **t2**: VACUUM
- **t3**: PORT
- **t4**: CONFLICT

DIRECTION OF MAIN SPATIAL DEVELOPMENT
Public-private partnerships in terminal investments
3. Investments in container terminals; public-private interests

- First explore infrastructure investments in general

- ... and then consider container terminal investment in particular

- Public private partnerships (PPPs) in container terminal market analyzed and European state-of-the-art in terminal investing examined

- Broader aspects of transport and infrastructure are explored in order to give an adequate analysis of private and public roles in container terminal investments
3. Maritime container terminal investment: European state-of-the-art

• Port authorities and container terminal operators increase their scale

• Location of individual port is less important compared with its ability to offer services and hinterland connections (see also van Klink, 1995)

• Ports becoming landlords and lease container facilities to private companies. Port authorities are linking up.

• EU-research shows considerable variation in financing of ports and maritime infrastructure in Europe and policies on charging their users, reflecting differences in ownership and organization (EC, 1997).
3. Maritime container terminal investment: European state-of-the-art

- In Northern European landlord ports, most common financial structure is in which government pays for access to the port by land and sea,

- an (autonomous) port authority funds infrastructure, such as land reclamation and quay walls,

- and private container terminal operators fund the suprastructure: paving, buildings and mechanical equipment.

- Infrastructure costs recovered to greater or lesser extent through charges on ships and cargo, and rental and leasing payments from container handling companies.
Figure 5.3 An overview of actors and relations in container terminal investment

= Payment for a service or for infrastructure.

= Supply of the service containers handling.

= Supply of infrastructure/containers.
3. Container terminal infrastructure investments

1. new container terminal developed on a greenfield site;
2. existing container terminal can be extended;
3. and, industrial site can be redeveloped into a container terminal.

• Four main categories of terminal investment:
1. infrastructure investments consist of investments in rail, road, barge and sea facilities to the terminal (terminal external);
2. terminal superstructure investments consist of specific investments (e.g. quays and crane rails) in terminal infrastructure (terminal internal);
3. investments in the terminal suprastructure are investments on the terminal site that are not specific for a container terminal (e.g. terminal buildings, pavements, lighting, etc.);
4. IT-structure investments are all information technology investments needed for the container terminal.
3. The relation between risks, profits and public private partnerships

- Next Figure presents short-term investment situation where, under certain assumptions, it is profitable for a private company to invest in a terminal on the basis of a PPP.

- As a consequence, investment costs are reduced (for the private party) through suitable lease contracts.

- This results in a lower average total cost curve, which is now below the average revenue curve. Marginal costs are no longer considered constant.

- Price will be set at $p_1$ and the terminal operator will make a profit of $p_1p_2BA$. 
Figure 5.4 Cost structures for an investor in a container terminal

Price

Average total costs

Marginal revenues

Marginal costs = variable costs

Average revenues

Number of containers

Marginal costs = variable costs

Price

p1

A

B

p2

0

q

Number of containers
The relation between risks, profits and public private partnerships

- Marginal cost curve becomes almost vertical when terminal capacity is no longer sufficient to handle all containers.

- More containers can be handled only when capacity is expanded and all other measures to increase terminal productivity are taken (e.g. longer operating hours, more cranes, higher employment, etc.).

- Although terminal operations can be profitable business for private investors, the role of port authorities should not be underestimated.

- Differences in financial performance are not simply a question of some operators in Europe being more efficient than others, but strongly influenced by government policy towards container terminal investment.
The relation between risks, profits and public private partnerships

• It seems that more public involvement leads to improved financial performance of the operator

• Just read a paper; PPP results in more efficiency in exchange for less control (for public authorities)
<table>
<thead>
<tr>
<th>Terminal name</th>
<th>Investment (Euro)</th>
<th>Capacity TEU/year</th>
<th>Investment/TEU (Euro)</th>
<th>Public Investment</th>
<th>Private Investment</th>
<th>PPP-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceres Paragon Marine Terminal (NT)</td>
<td>172 mln</td>
<td>950,000</td>
<td>180</td>
<td>128.5 mln</td>
<td>43.5 mln</td>
<td>75-25</td>
</tr>
<tr>
<td>Oosterhout (NT)</td>
<td>-</td>
<td>25,000</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Alphen aan de Rijn (NT)</td>
<td>22.5 mln</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>IMCA (R)</td>
<td>22.5 mln</td>
<td>150,000</td>
<td>150</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>WCT (NT)</td>
<td>550 mln</td>
<td>2,500,000</td>
<td>220</td>
<td>-</td>
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<tr>
<td>Valburg (NT)</td>
<td>550 mln.</td>
<td>1,400,000</td>
<td>415</td>
<td>-</td>
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<tr>
<td>Zeeland Container Terminal (NT)</td>
<td>31 mln</td>
<td>100,000</td>
<td>310</td>
<td>17 mln.</td>
<td>14 mln.</td>
<td>55-45</td>
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<tr>
<td>Beverwijk (NT)</td>
<td>6 mln</td>
<td>40,000</td>
<td>150</td>
<td>1.4 mln.</td>
<td>4.6 mln.</td>
<td>23-77</td>
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<tr>
<td>Container Terminal Twente (NT)</td>
<td>4.6 mln</td>
<td>22,500</td>
<td>205</td>
<td>2.8 mln.</td>
<td>1.8 mln</td>
<td>60-40</td>
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<td>Wanssum (NT)</td>
<td>10 mln</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Container terminal Zutphen (NT)</td>
<td>7 mln.</td>
<td>15,000</td>
<td>465</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>Moerdijk Container Terminal (E)</td>
<td>20 mln</td>
<td>150,000</td>
<td>135</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>Container terminal Acht (R)</td>
<td>4.5 mln.</td>
<td>50,000</td>
<td>90</td>
<td>1.4 mln.</td>
<td>3.2 mln.</td>
<td>30-70</td>
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<td>Euromax Container Terminal (NT)</td>
<td>525 mln.</td>
<td>1,700,000</td>
<td>310</td>
<td>300 mln.</td>
<td>225 mln.</td>
<td>57-43</td>
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<td>Shell Haven (R)</td>
<td>835 mln.</td>
<td>3,500,000</td>
<td>240</td>
<td>-</td>
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<td>Trinity Container Terminal (E)</td>
<td>114 mln.</td>
<td>500,000</td>
<td>230</td>
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<td>-</td>
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<td>Container Terminal Deurne (NT)</td>
<td>4.9 mln</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>CTIV (NT)</td>
<td>260 mln.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Containerterminal Duinkerken (E)</td>
<td>15 mln.</td>
<td>-</td>
<td>-</td>
<td>9 mln</td>
<td>6 mln</td>
<td>60-40</td>
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<tr>
<td>Harwich Container Terminal (E)</td>
<td>160 mln.</td>
<td>1,700,000</td>
<td>95</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
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<td>Southampton CT (NT)</td>
<td>860 mln.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>River Terminal Wielsbeke (NT)</td>
<td>5 mln.</td>
<td>75,000</td>
<td>70</td>
<td>2.4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>198 mln.</strong></td>
<td><strong>858,000</strong></td>
<td><strong>216</strong></td>
<td><strong>58 mln.</strong></td>
<td><strong>38 mln.</strong></td>
<td><strong>48-52</strong></td>
</tr>
</tbody>
</table>
The relation between risks, profits and public private partnerships

- Public-Private ratio varies between 23-77 for the container terminal in Beverwijk and 75-25 for the Ceres Paragon Marine Terminal in Amsterdam

- Governmental involvement is rather high and several initiatives suggest that this is growing

- Authorities want to be involved, because they believe that economic benefits are connected to this activity

- Differences in government involvement are considerable indicating that unfair competition between terminals is taking place (no level-playing field, leasing agreements are confidential)
Ceres Terminals Inc. has invested EUR 43.5 million (terminal buildings) and the Amsterdam Port Authority another EUR 128.5 million in infrastructure and part of the cranes (Ceres, 1998)

Total investment estimated at EUR 172 million
• and the terminal was fully operational in July 2001
• Total extra employment estimated at 600 employees
The relation between risks, profits and public private partnerships

• Port of Felixstowe (United Kingdom)

• Terminal consisted of 540 acres and an additional 250 acres for which a long-term lease has been granted. Expansion had a 2-year time path and added about 500,000 TEU

• Total investment estimated at EUR 114 million. Expansion included a quay extension of 270 meters and an additional 25 acres

• 26 km approach channel was dredged to a depth of 15 meters (at high tide). Dredging costs were in the order of EUR 46 million.
The relation between risks, profits and public private partnerships
The relation between risks, profits and public private partnerships

- P&O Shell Haven Container Terminal (Thurrock, Essex)

- P&O and Shell redeveloped this former refinery site into a container port of 3.5 ml TEUs, now DP World. Site of 1,500 acres and 3,000m of quays

- Surrounding area developed to provide transport and logistics services

- Site well connected by road and rail to UK national network, and the capacity of these connections planned to increase

- Total investment is thought to exceed EUR 835 million
The relation between risks, profits and public private partnerships
3. Conclusions: Maritime container terminals and PPPs

- The institutional arrangements of financing maritime terminals and other maritime infrastructure in Europe vary considerably

- Fully privatized port activities are rarely found. Most ports still receive public funding, making it difficult for other ports to be competitive without government support

- Terminal operators expect the government to supply enough infrastructure to and from the terminal

- The greater the financial government involvement, the better are the economic prospects for the terminal operator
3. Conclusions: Continental container terminals and PPPs

- Continental terminals expect the government to supply and maintain sufficient infrastructure to and from the terminal.

- Government involvement does more harm than good to the business performance of continental container terminals.

- Often, container terminals are backed by a transport or freight handling company that diversifies into container handling.

- Government role for continental terminals is less important than for maritime terminals. Government involvement should be focused on the barge and road access of the terminal.
3. Conclusions: Policy recommendations

• Continental container terminals in particular are becoming more and more engaged in normal business. The chance for normal profits seems to be higher in investments in container terminals than in conventional investments in infrastructure.

• In the long run, a fully competitive market for container terminals is not unrealistic. The main obstacle to this trend is government involvement: as long as some governments subsidise port activities, there is unfair competition.

• In order to deal with this effectively, it is plausible that co-ordination on a European level may be necessary. As current EU-policy is aimed at fair competition without distorting market regulation, it is likely that the EU will discourage financial involvement of (local) public authorities in the port sector.
3. Conclusions: Policy recommendations
3. Role of transport and infrastructure

- In Europe, traditional approach to transport infrastructure based on government intervention and direct state finance the norm

- In port financing, privatization effective for efficiency and lowering costs

- Trend reinforced by public budget deficits in countries, and need for more efficiency

- However, in Europe, involvement of private parties in investments in infrastructure has been limited, except for container terminals

- Private involvement in financing and operating container terminals in ports high, compared with other transport infrastructure
3. Role of transport and infrastructure

- Objectives of private financing can be identified (ITS, 1999):
  1. minimization of impact of additional taxation or debt;
  2. introduction of benefits of private sector management and control into projects (possibly leading to lower costs);
  3. promotion of innovation in infrastructure projects;
  4. increase in financial resources available for the projects.

- Private finance can be said to be only purely private if (ITS, 1999):
  1. the private party runs all risks;
  2. the investment is paid directly by its users;
  3. the operation is based upon user charges.
3. Role of transport and infrastructure

- Characteristics of infrastructure investments
  1. expected economic life of infrastructure is very long
  2. during the construction time, a large amount of capital is required
  3. waiting period prior to actual infrastructure construction can be long
  4. irreversibility of the investment, once the project has started
  5. the long-construction period
  6. uniqueness of each infrastructure project
  7. relatively low level of operational (variable) costs, especially on long-distance infrastructure
3. Role of transport and infrastructure

- In such cases (high fixed costs and low variable costs), setting prices according to marginal costs (which is economically optimal) does not allow a satisfactory return on investment and this, in general, makes infrastructure investments unattractive to the private investor.
3. Role of transport and infrastructure

- Figure 5.1 exemplifies this case (for simplicity, average variable and marginal costs are considered constant, which is a plausible assumption as long as capacity is sufficient).
- Figure 5.1 depicts the investment situation of an investor in infrastructure in general.
- For a profit maximizing monopolist the optimal volume of transport is \( q \) and the resulting optimal price is \( p_1 \).
- This results from the condition that marginal revenue is equal to marginal cost implying that price is equal to marginal cost plus a mark-up.
- Total revenue is given by the area \( 0qA_{p1} \) and total cost by \( 0qB_{p2} \).
- A loss of \( p_1p_2BA \) is incurred at this level of traffic and, as a matter of fact, there is no price at which the project is profitable assumed that prices couldn’t be raised (the average total cost curve is always above demand line). It is now possible to operate the infrastructure project at a profit, only if external funds are available (government or other interested parties).
3. Role of transport and infrastructure

According to Dietrich (1994) two important principles have had an important influence on economic perspectives on the public sector and its relationships with private sector activities. First, the two sectors are involved in separate activities with different responsibilities. Secondly, the public sector must restrict itself to developing a legal and economic infrastructure. As government activity is based on the power of the state, contacts can be either based on governments determining infrastructure conditions within which private actors operate autonomously, or contacts can be direct and interactive.
3. Role of transport and infrastructure

- In the left part of Figure 5.2 we observe that the government is more efficient in cost terms but the reverse holds for benefits. On the cost side private sector failures exist, perhaps because of the public good characteristics of the activity in question with resulting free-rider problems. This is the case in container terminal investment where especially access to terminals via road, rail and water carry public good characteristics. Also the fixed lease term means that container terminal operators are not willing to invest huge amounts in a container terminal that after the lease period can be contracted to another operator. In the right-hand part of Figure 5.2 we observe that from a cost perspective firms are more efficient indicating that the activity in question is readily marketable. Resource benefits however, indicate advantages of government activity. This might indicate the existence of private sector failures (i.e., relative inability to change the characteristics of activities).
3. Role of transport and infrastructure

- In the container terminal market it seems that the left part of Figure 5.2 holds true. Risks for private companies to invest huge amounts of money in container terminals are high, due to the long expected economic life of infrastructure. This may range from 20 years to more than a century. The pay-back period of infrastructure investments is also long; usually around 15 to 30 years. Private investments usually must generate profits in a far more restricted time period (e.g. 5-10 years). Secondly, the relatively low level of the operational (variable) costs, imposes a further risk increase for the private container terminal investor. Thirdly, during the construction time, a large amount of capital is required. Often high loans have to be acquired and the government is usually better able to attract cheaper loans (i.e., lower interest rates). Fourthly, the waiting period prior to actual infrastructure construction can be very long due to political decision making. These formalities often lead to project changes that have a major influence on the costs of projects. In general, private companies are not willing to run these political risks, which forms another reason for government intervention. Fifthly, the irreversibility of the investment once the project has started causes another risk for private parties. If the construction is discontinued, this would lead to a significant capital loss, and this is another reason for government intervention to reduce the initial risks. Sixthly, the long construction