



Future challenges for the port and shipping sector: a research agenda

Hilde Meersman



Based on:

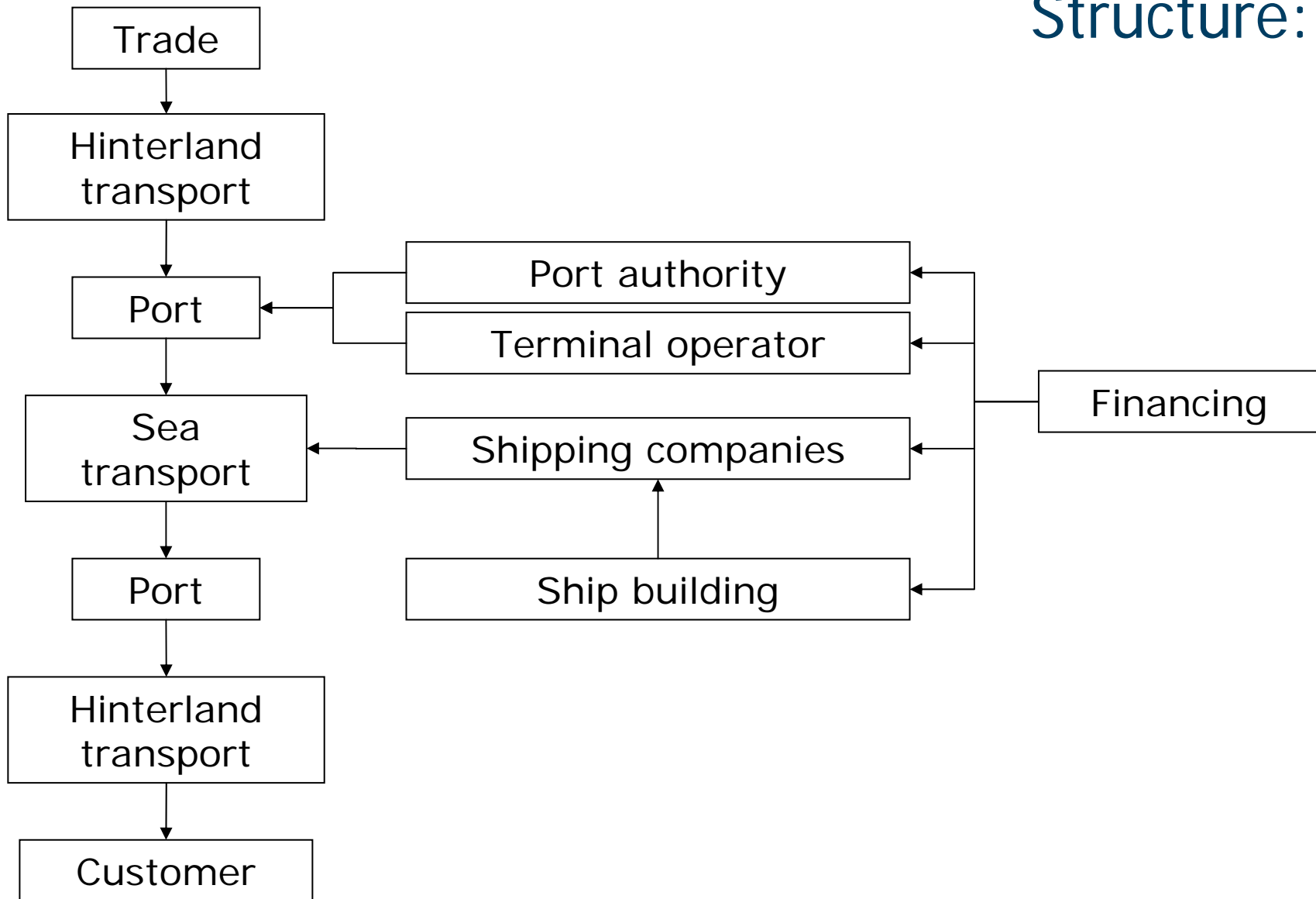
- Expert colloquium on Future Challenges for the Port and Shipping Sector, October 2007, Grobbendonk, Belgium
- Meersman, Van de Voorde & Vanellander (eds.), 2009, Future Challenges for the Port and Shipping Sector, The Grammenos Library, Informa, London
- Meersman, Van de Voorde & Vanellander, 2009, Zeehavens en maritiem transport: cruciale schakels voor logistiek succes (Ports and Maritime traffic: critical for successful logistics) Policy paper for the Flemish government and discussed with stakeholders

and

endless discussions with colleagues in Antwerp and on the many trips to and from conferences and meetings of the WCTRS



Structure:





1. Economic activity and international trade: the source of maritime trade and port activity

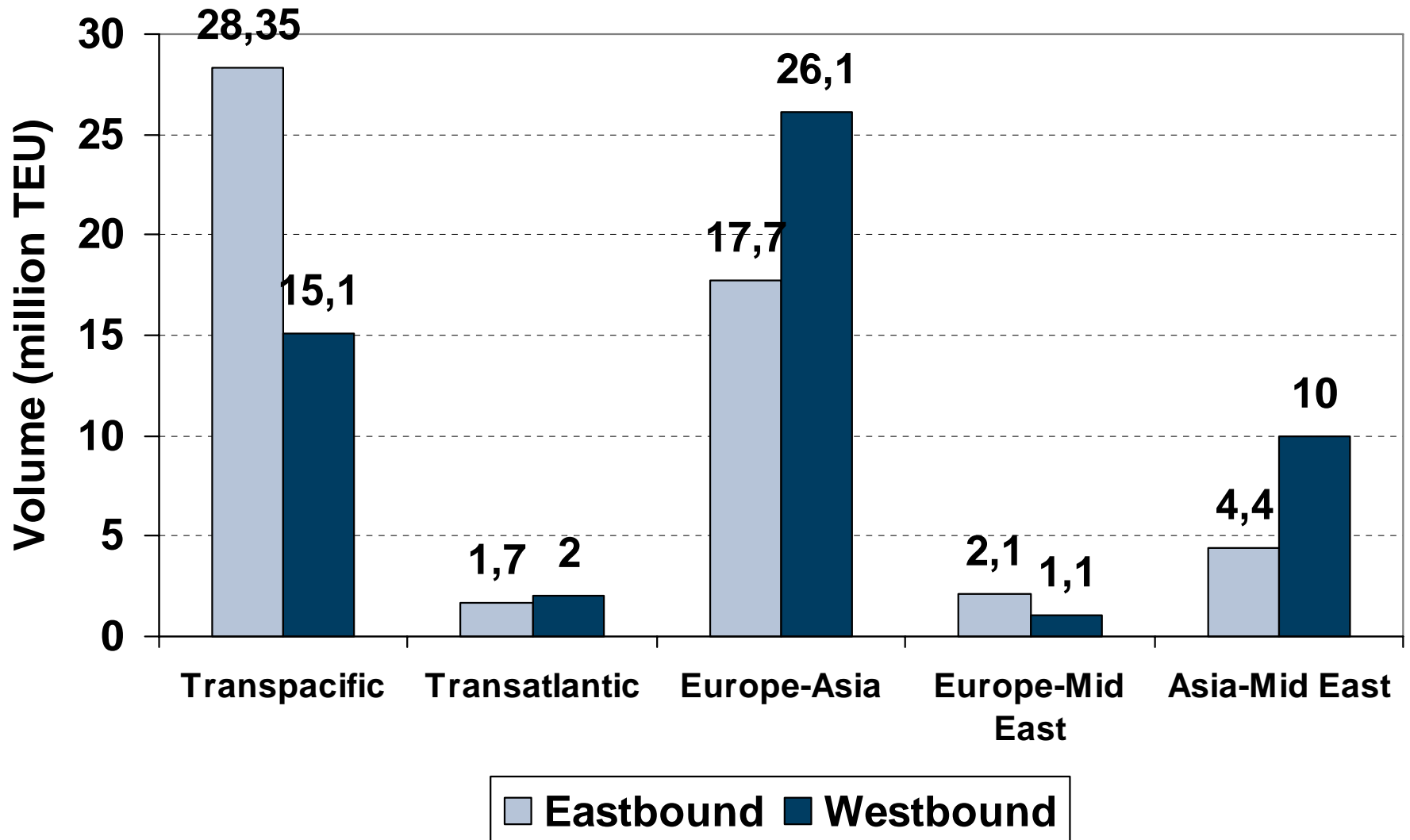
- There is still a strong relation between maritime traffic on the one hand, and economic activity and international trade on the other hand
- A lot of uncertainty on future development of world economy:
 - globalisation / regionalism?
 - free trade / protectionism?
 - will USA continue to dominate?
 - position of BRICs and Next11?
 - unbalanced trade patterns?
 - consequences of ageing population in Europe and role of public sector?
 - evolution of prices of oil and raw materials?
 - etc.



- focus on forecasting and/or scenario's of maritime trade starting from evolution of economic activity or trade
- examples:
 - Meersman & Van de Voorde:
 - container throughput in Hamburg-Le Havre range; port throughput in Antwerp for different good categories; related to import, export, industrial production, gdp
 - UNESCAP Regional Shipping and Port Development: Container Traffic Forecast 2007 Update
 - based on Maritime Policy Planning Models; forecasts up to 2015; starts from GDP growth (IMF) which is translated in trade and container flows; at port level; used to forecast berths needed



UNESCAP (2007) Container flows by trade group in 2015



Dutch Bureau for Economic Policy Analysis: Four scenarios for Europe

International cooperation

Strong Europe (SE)

annual % change
2000-2040

World Trade	4.5%
World GDP	2.5%
Non-OECD GDP	4.6%
EU-15 GDP	1.6%
Nld GDP	1.6%
Nld Pop	18.9 mln

Global Economy (GE)

annual % change
2000-2040

World Trade	5.6%
World GDP	3.1%
Non-OECD GDP	5.0%
EU-15 GDP	2.5%
Nld GDP	2.6%
Nld Pop	19.7 mln

Regional Communities (RC)

annual % change
2000-2040

World Trade	2.4%
World GDP	1.7%
Non-OECD GDP	3.6%
EU-15 GDP	0.6%
Nld GDP	0.7%
Nld Pop	15.7 mln

Transatlantic Market (TM)

annual % change
2000-2040

World Trade	3.7%
World GDP	2.3%
Non-OECD GDP	3.2%
EU-15 GDP	1.9%
Nld GDP	1.9%
Nld Pop	17.1 mln

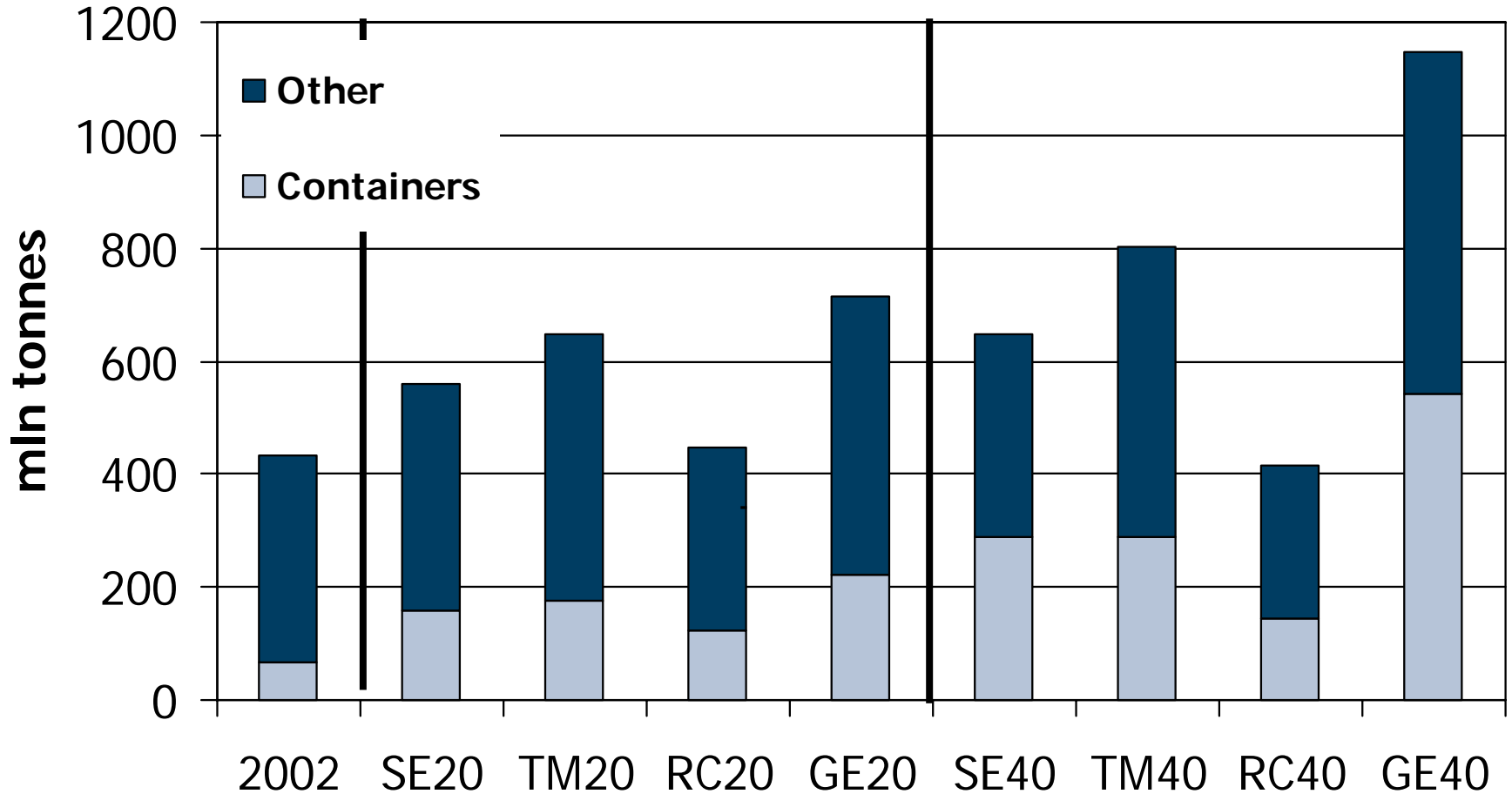
National sovereignty

Public Responsibilities

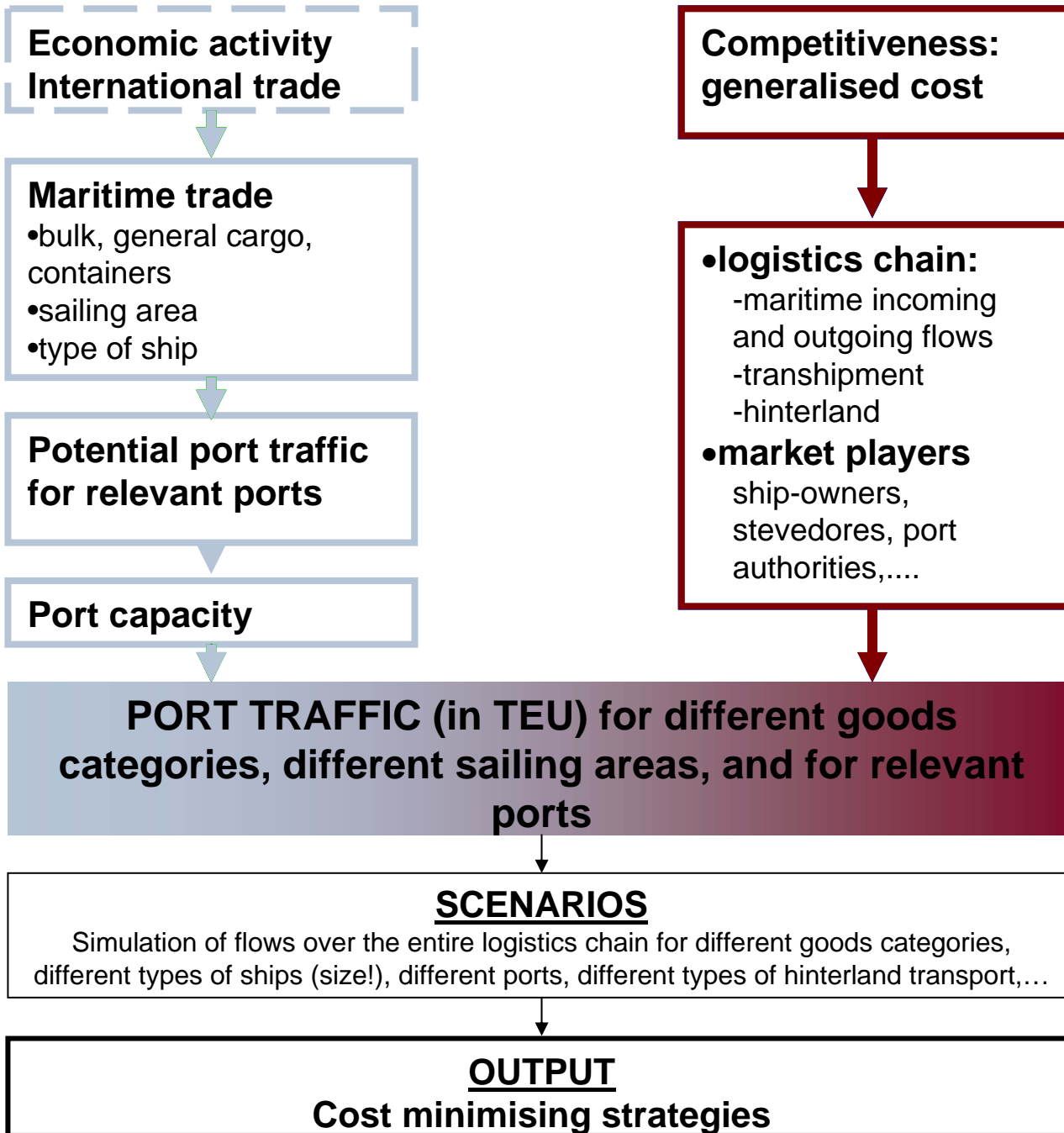
Private Responsibilities



Throughput in Dutch Seaports in 2020 and 2040 for four cases



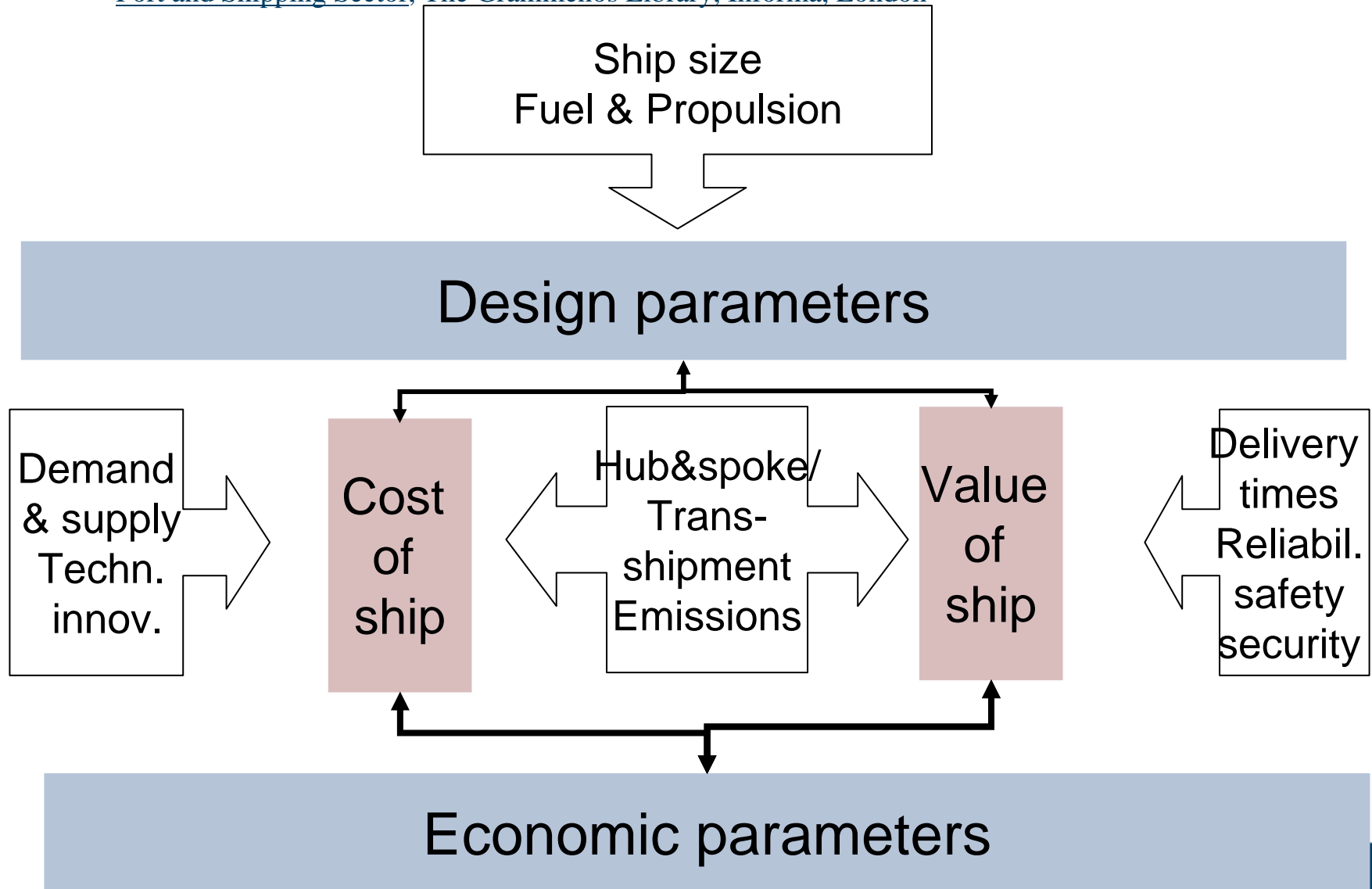
Source: Levinga, Rozemeijer, and Francke (2006)





2. Ship design: Interaction technological and economic evolutions

Hopman & Nienhuis in Meersman, Van de Voorde & Vanelslander (eds.), 2009, Future Challenges for the Port and Shipping Sector, The Grammenos Library, Informa, London





- Large vessels:
 - No insurmountable technical limits on ship size
 - Limitations: infrastructure & market power of main ports
 - Further developments in automated throughput
 - higher capital costs but operational costs become very small
- Small vessels:
 - onboard loading and unloading facilities
 - flexible systems with applications in inland navigation; capacity utilisation
- Regulations are important drivers for improvements in reliability, safety and environmental impacts



3. Understanding the impacts of port competition

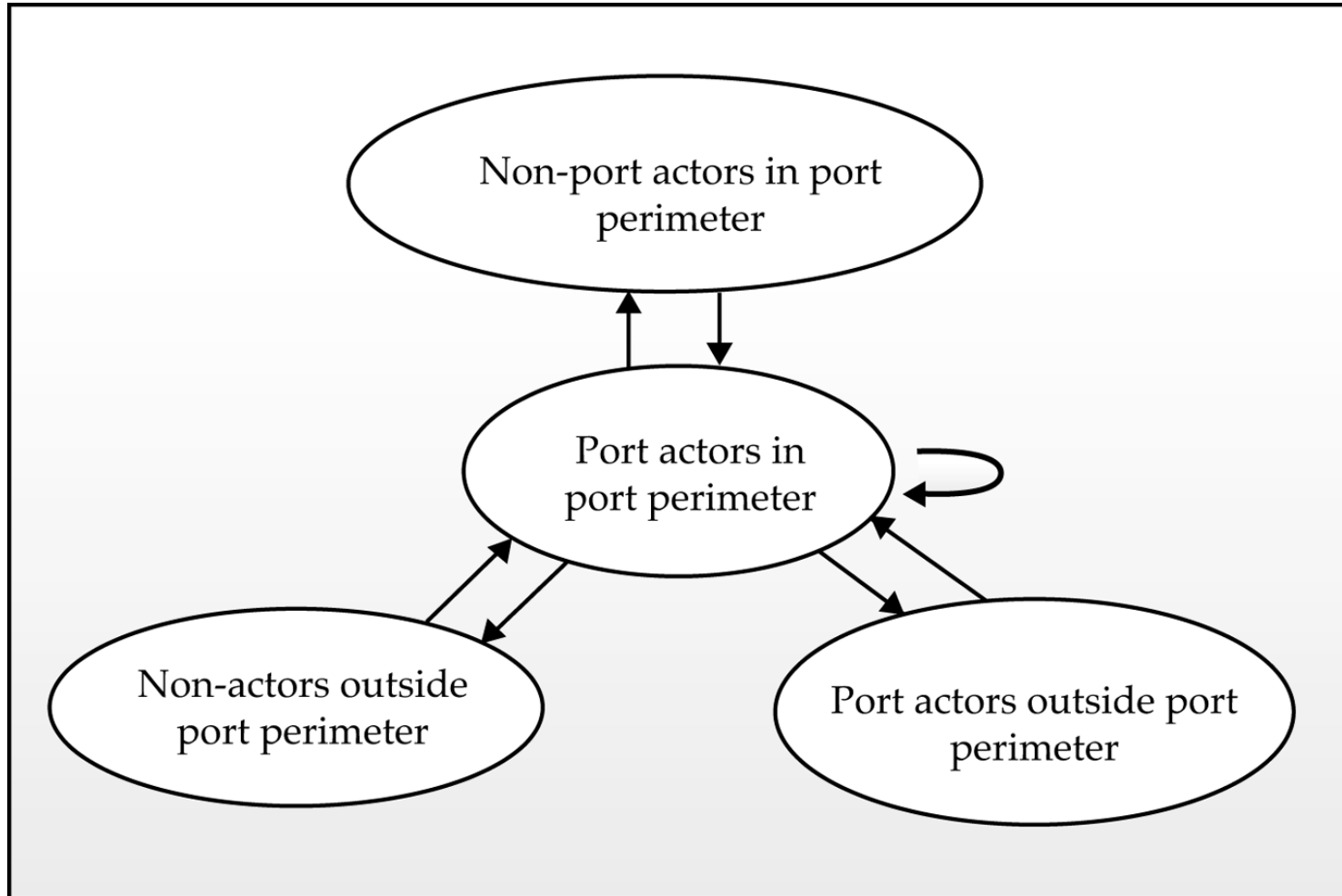
Some important evolutions

- increasing vessel sizes
- specialisation of vessels and use of unit loads
- vertical integration within intermodal chains
- hub & spoke; transshipment activities
- economic and managerial integration of logistics chain, driven by capital flows
- in- & outsourcing of logistic activities
- growing public concern about the sustainability of port activities



- Research should be able to analyse and predict the consequences for
 - the capital/labour ratio and future employment in the ports and maritime sector
 - port planning, port capacity and port expansion
 - the optimal land-use
 - the public support e.g. NIMBY syndrome
 - pricing strategies for optimizing capacity utilization

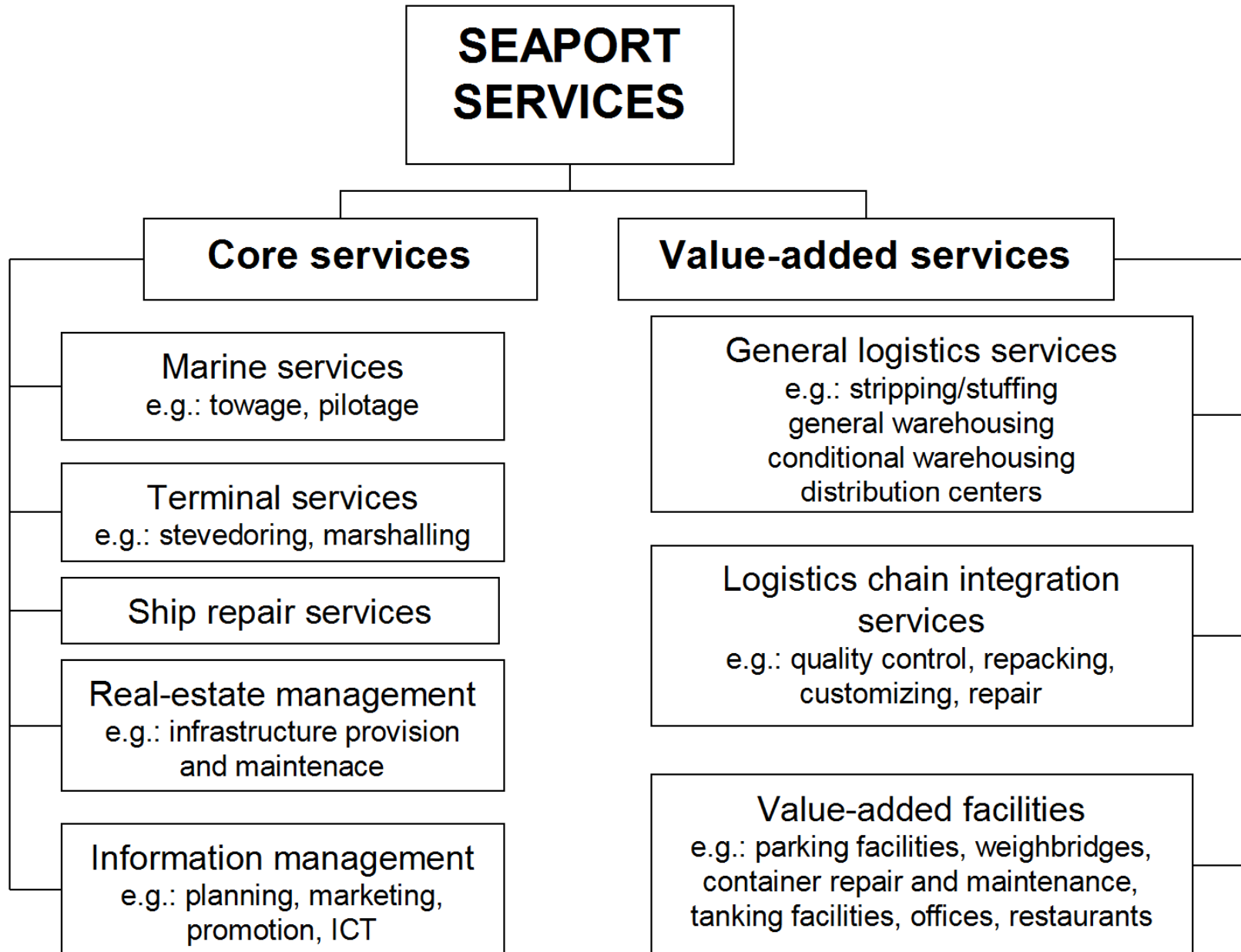
4. A multi-actor playing field

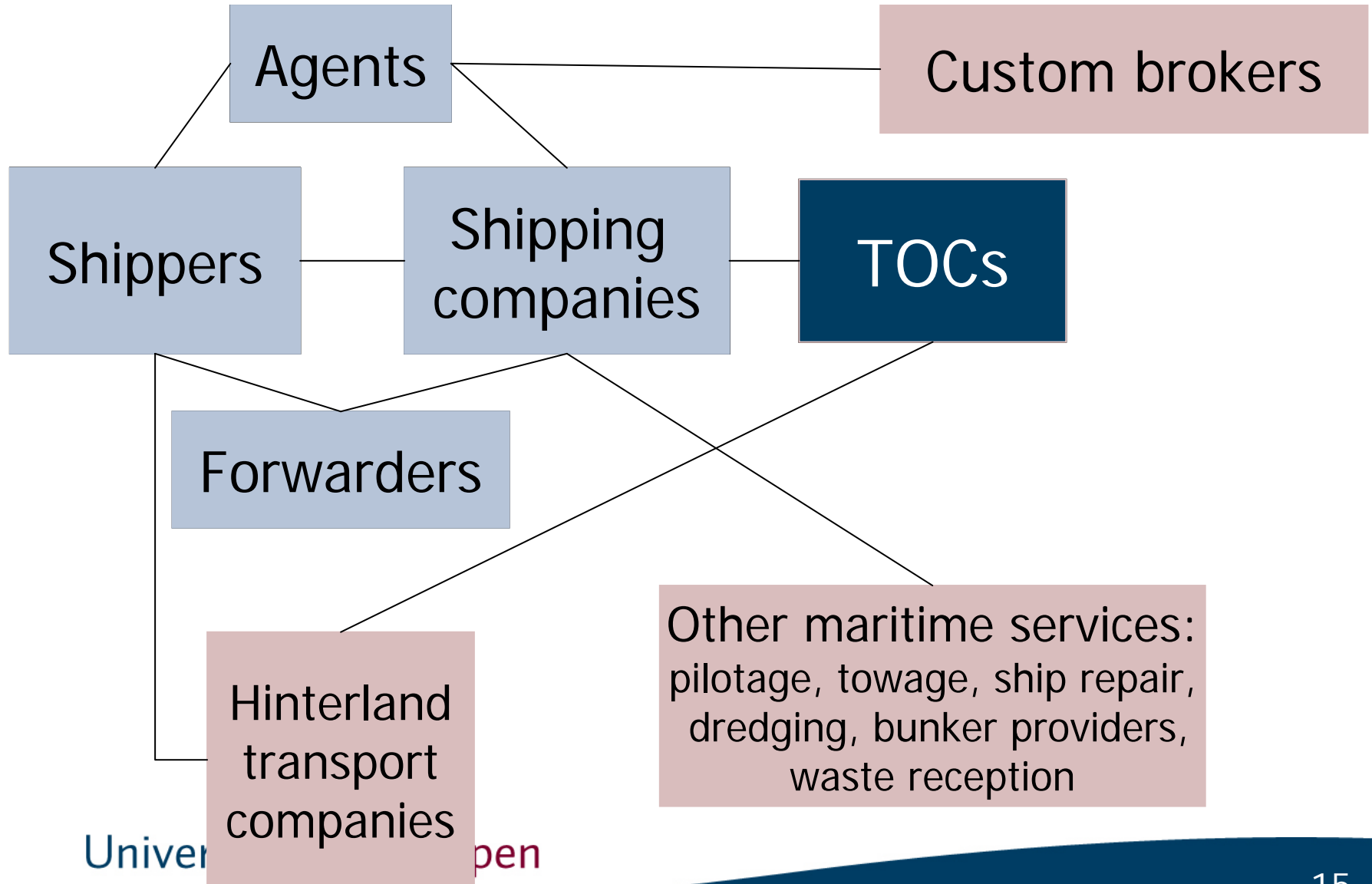


Source: Meersman, Van de Voorde & Vanelslander (eds.), 2009, Future Challenges for the Port and Shipping Sector, The Grammenos Library, Informa, London



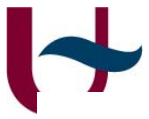
Principal roles of seaports





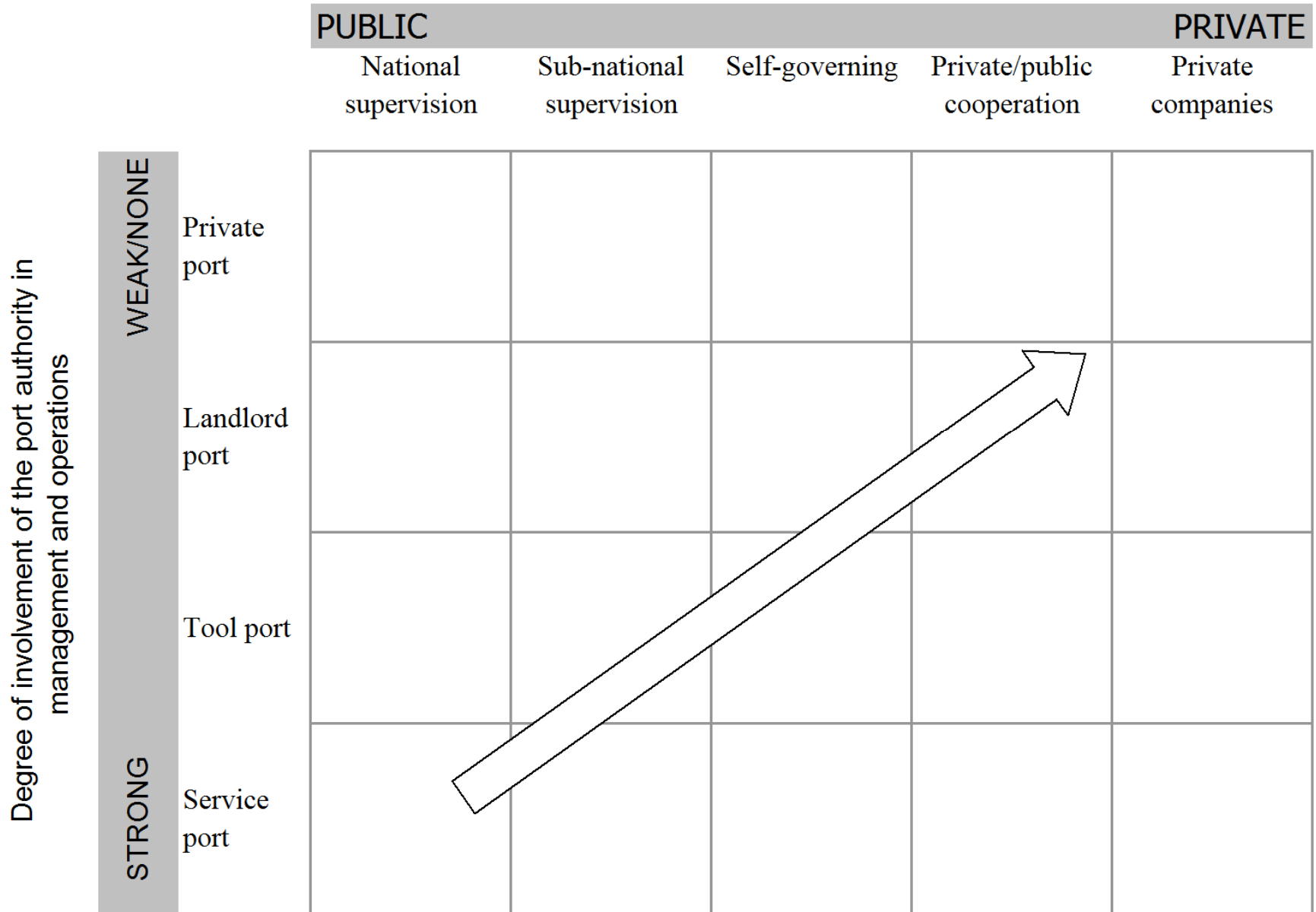


- Spill-overs
 - identification of the spill-overs: financial, employment, value added, environmental
- Direct and indirect impacts of strategies and policies
 - Input-output analyses can study direct and indirect impacts
 - Input-output analysis combined with micro- and company-data can reveal strategically important port actors
 - Input-output analysis with specific attention to environmental impacts
- System Dynamics to simulate the complexity of the port sector



5. A new role for port authorities (?)

Degree of decisional and financial independence





What do PAs do?

Strategic port planning and development

Understanding the competitive position of the port

Port business plan

Traffic, economic, financial forecasts

Port promotion and marketing

SWOT-analysis, factor analysis, surveys, market structures, pricing, port choice



What do PAs do?

Provision of infrastructure for maritime access and of infrastructure within the port area

Optimal design of infrastructure; socio-economic evaluation tools

Management of major port works and assets

Technology, timing of works

Design, awards and management of authorizations and **concessions**

Concession policy



What do PAs do?

Economic and technical regulation

Economic and legal theories and applications of regulations (how, enforcement, national, international,...)

Monitoring of regulation and competition issues

Environmental protection

Research in defining impacts and their magnitude, socio-economic impacts

Contribution to security design and enforcement, control of safety

Technical innovations, costs and benefits of security & safety measures



What do PAs do?

Control and co-ordination of most port operations (as needed)

Interaction with national transport authorities

Interaction with local authorities (e.g. co-ordination of land use, plans)

Interaction with other port authorities

Interaction with users, operators, workers, . . .



6. Facing bottlenecks: hinterland connections

- Poor connecting services and time-consuming hinterland connections risk to wipe out the scale economies generated on the maritime leg and in the port.
- Hinterland accessibility becomes a crucial factor for the competitive position of a port
- Port and maritime actors can hardly control the land-side accessibility



7. Financing needs

- Ship financing
 - large amounts, but vessels are mobile and can be sold
 - private

- Port and hinterland infrastructure financing
 - large amounts, irreversible, large sunk costs
 - public



7. Financing needs

- Shipping finance
 - Estimating and forecasting the returns and the volatility
 - Study the shipping cycle and the related markets
 - Financial engineering can lead to more flexibility
- Financing infrastructure
 - What if public money is not sufficiently available?
 - Private-Public Partnerships?
 - Evaluation of mega-projects:
 - Uncertainty and risk
 - Can the project be implemented gradually?
 - Systems engineering
 - Ex post evaluation

Vessel prices (July 2005)		
	<i>New</i>	<i>2nd hand (10yr)</i>
Dry bulk	29 – 60 \$m	25 – 54 \$m
Tanker	44 – 120 \$m	30 – 70 \$m
Containership	27 – 125 \$m	24 - \$m
Train engine prices		
Bombardier	ca 5.6 \$m	
Truck prices		
	ca 0.12 \$m	

Heathrow terminal 5	ca.4 £bln
Maasvlakte 2	ca. 3 €bln



- Shipping finance
 - Estimating and forecasting the returns and the volatility
 - Study the shipping cycle and the related markets
 - Financial engineering can lead to more flexibility
- Financing infrastructure
 - What if public money is not sufficiently available?
 - Private-Public Partnerships?
 - Evaluation of large infrastructure projects:
 - Uncertainty and risk
 - Can the project be implemented gradually?
 - Systems engineering
 - Ex post evaluation



Industrial production and international trade

- Forecasting of potential maritime and port flows
- Port competition models

Relationship between technology and the economy

- Model that quantifies the relationship between technology, economy and shipping sector
- Quantitative insight into all costs and benefits at disaggregated level
- Innovation strategy



Port competition

- Transparent procedures
- Pricing models
- Port choice models

Port authorities

- Understanding of who does what, at which cost and for which price
- Insight into costs and benefits of cooperation strategies

Industrial and economic structure of ports

- Quantification of relationship between port players
- Evaluation of spillovers
- Market simulation models



- Hinterland**
- Inventory of hinterland network
 - Prioritised list of infrastructure investments
 - Potential future bottlenecks

- Financing**
- Financing models
 - Financing simulation models