Hinterland connections and intermodal transport

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TUDTR
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Statement

This presentation is based on the presentation prepared by the Technical and Managerial Port Assistance Office (TEMPO) of the Port of Rotterdam, and has been updated and supplemented with additional and recent information.

Useful information was also received from the Dutch Inland Water Transport Promotion Office (DIWTPO).
Topics

- Definitions
- Developments
- Hinterland connections
- Performance indicators
- Road transport
- Rail transport
- Inland Water Transport
- Conclusions and Recommendations
Definitions
**Definitions**

- Hinterland is the area to be reached from the port to transport goods for import and export.

- Types of hinterland
  - Direct (or captive) Hinterland
  - Potential hinterland
  - Commodity Hinterland
Hinterland and destination by mode of transport
Definitions (contd.)

Intermodal transport

- The movement of goods stowed in one and the same intermodal transport unit.
- Which uses several carriers or modes of transport.
- Without handling the goods themselves when changing modes.
Developments
Comparison Inland Transport in selected countries (2000)
(billion ton kilometers)
(Source: DIWTPO)
Comparison Inland Transport in selected countries (2000) (percentages) (Source: DIWTPO)
Modal split of goods transport in the European Union

The Netherlands
Belgium
Germany
France
Austria

Road transport  Inland shipping  Pipelines  Rail

Inland shipping plays a important role in five European countries. Source: Eurostat
Throughput Port of Rotterdam

Year


Million tons

0 50 100 150 200 250 300 350 400

Hinterland Transport
Modal split all cargo Rotterdam (2002)
Modal split containers Rotterdam

Year
2001 2002 2003 2004

containers (1,000)
0 500 1000 1500 2000 2500 3000 3500 4000

Barge Rail Road

Hinterland Transport
Selection Criteria and Performance Indicators
Selection criteria for mode of transport

- Quality = Reliability, Regularity and Service
- Availability
- Costs
- Transit time (frequency, transport time)

Other criteria
- Value of goods
- Regulations

PRICE QUALITY RATIO
## Performance indicators for modes of transport

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed</td>
<td>Time required to reach the destination (transit time)</td>
</tr>
<tr>
<td>Costs</td>
<td>Cost of the movement</td>
</tr>
<tr>
<td>Penetration</td>
<td>Possibility to reach destinations</td>
</tr>
<tr>
<td>Control</td>
<td>Possibility to intervene once a movement has started</td>
</tr>
<tr>
<td>Reliability</td>
<td>Chance to reach the destination on time (as agreed)</td>
</tr>
</tbody>
</table>
Road Transport
# Performance Truck

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Plus</th>
<th>Neutral</th>
<th>Minus</th>
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<tbody>
<tr>
<td>Speed</td>
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<td>Costs</td>
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<td>Control</td>
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<td>Penetration</td>
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<tr>
<td>Reliability</td>
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</table>
Characteristics road transport

- Intermodal:
  - Especially for pick-up and delivery of containers
  - Containers with a continental origin / destination

- Causes of problems in Europe: environment, congestion, safety
Restrictions

- Transit cargo restricted in several transit countries

Examples of restrictions:
- Restricted weekend transport
- Germany: Eurovignet / toll Brenner Autobahn
- Switzerland: low tonnage 28 ton (EU 40 ton) / transit embargo from 2004

Alternative: Intermodal transport
Alternatives for road?

In general

- Rail transport less than 500 km more expensive than road transport
- Barge transport less than 100 km more expensive than road transport
Organisation intermodal road transport

- Intermodal maritime transport:
  - Carrier haulage: shipping lines organise inland transport
  - Merchant haulage: receiver organises inland transport

- Intermodal continental transport
  - Trucking company arranges pick-up / delivery with other mode(s) of transport
Rail Transport
Composite (or mixed) train

- Train made up of cargo (loading units) for different destinations
- No fixed combination
- No fixed frequency
- Time consuming shunting operations
# Performance Composite Train

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<tr>
<td>Reliability</td>
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</table>
Block train or shuttle train

- Fixed combination
- Fixed frequency
- Fixed destination
- Visa-versa
# Performance Block Train

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Rail Service Centre
USA : leader in rail transport

- After 1980 deregulation of rail sector with the objective to achieve higher efficiency
- Rail connection West- East as alternative for Panama Canal
- Middle 80-s introduction of double stack trains: reduction of 40% of transport costs
- Rail operators are responsible for their own infrastructure and equipment
Double stack rail transport in USA

- 3 locomotives
- 400 TEU capacity
- Maximum length 1,640 metres
- Distance car-rail 0.25 metres
- Also transport of 45 ft boxes
Double stacking
Inland Water Transport
# Performance Barge

<table>
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<tr>
<td>Penetration</td>
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<tr>
<td>Reliability</td>
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Barge container (million boxes) movement to / from hinterland Port of Rotterdam
Location terminals
Reasons for increased share of container transport by barge

- Economy of scale resulting in competitive prices
- Scheduled sailings: applicable for JIT transport
- Inland container terminals
- Increase in container traffic
- Infrastructure available and maintained
- Safe and environmental friendly
- Road congestion
Disadvantages

- Low level of penetration
- Relatively high additional costs
  - Pick-up / delivery containers (by truck)
  - Stevedoring
  - Turnaround time in port
Cross section barge terminal
Dedicated barge terminal
Container barge
Container barge Jowi
Motorship / push barge combination
Motorship / push barge combination
Container barge
Length: 110 m
Width: 11.40 m
Draft: 3.20 m / 3.70 m
Max. TEU Capacity: 208

Motorship / push barge combination
Length: 186 m
Width: 11.40 m
Draft: 3.00 m / 3.40 m
Max. TEU Capacity: 368

Push unit
Length: 125 m
Width: 22.80 m
Draft: 3.50 m / 4.00 m
Max. TEU Capacity: 512
Bulk cargoes

Push convoys

- Biggest barge: 3,000 DWT
- Biggest convoy: 6 barges or 18,000 tons
- Dimensions barge: L = 70-75 m
  W = 9.5-11.40 m
  D = 3.2-4.0 m
  DWT = 1,700-3,000
Push convoy
Push convoy
Bulk cargoes

**Upstream configuration**
- Push barge: 76.5 x 11.4 m
- Push tug: 23 m
- Total length: 270 m

**Downstream configuration**
- Push barge: 76.5 x 11.4 m
- Push tug: 195 m
- Total length: 35 m
Bulk transport USA
Developments in bulk transport

In the past

- 10 Conventional barges each 1,500 tons and in total 3,000 HP and 30 man crew

Today

- One push barge convoy transports 15,000 tons with 6,000 HP and 3 men crew
Ro / Ro barge
Barge transport of liquid bulk cargoes
Suggestions: How to make best use of inland water transport?

- Development of inland terminals
- Provision of infrastructure
- Regular sailings: Regularity and Reliability
- Adequate barges
- ICT / application of EDI
- Stimulation by the Authorities
  - Less road congestion
  - Less impact on environment
## Performance hinterland transport modes (European context)

+ : good  
0 : average  
- : poor

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Road</th>
<th>Rail Shuttle</th>
<th>Barge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed</td>
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<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Costs</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Control/flexibility</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Penetration</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Reliability</td>
<td>-</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td>Environm. Impact</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>
NO2 emission per ton km
(grams NO2 per ton km)

Rail: 0.01
Barge: 0.01
Road: 1.29
CO2 emission per ton km
(grams CO2 per ton km)

- Rail: 25 grams
- Barge: 33 grams
- Road: 130 grams

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Conclusions and Recommendations
Preferred boundary conditions for intermodal transport

- Door-to-door concept
- One price
- One transport document
- One responsible party
Impediments of intermodal transport

Following problem categories may constitute an impediment to the development of intermodal transport:

- Fragmentation of initiatives and activities
- Power struggle for chain management
- Hardware problems
- Lack of organizational innovation
Recommendations

- Concentrate volumes
- Strengthen know-how and awareness
- Harmonize tasks and responsibilities
- Improve connections
- Break down barriers for use
- Upgrade equipment and infrastructure
THANK YOU FOR YOUR ATTENTION