Hinterland transport by rail – comparing the conditions for maritime containers and semi-trailers

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Based upon articles co-authored with Rickard Bergqvist, University of Gothenburg, Violeta Roso and Kent Lumsden, Chalmers University of Technology

SKEMA Workshop, Copenhagen, 18th of February 2010

Source: Tomas Dyrbye, Maersk Line
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1 TEU-ship outside Port Thieffrock in S:t Winnifred & Augustus

...and a fleet
Long term problems

- Larger container flows and ships strain seaports and hinterland transport
- Development of hinterland transport lags behind in terms of costs and capacity
- Less acceptance for road transport
- Less investments in road infrastructure
- Concentration and competition between ports

- Road-as-usual is not an option!

An illustration: Maersk in the US

- “The current shipping industry service model in which acceptance and pricing of end-to-end rates is driven overwhelmingly by the ‘market perception’ of port-to-port ocean leg vessel capacity supply and demand does not make sense any more”
- “the ‘bottlenecks’ and primary transportation cost drivers in North America have shifted from the ocean leg to the inland leg of the transport”
- “faster and more reliable service delivery based on less complex routes that are better managed and administrated”
- “we will stop using 66 rail ramps in North America and remove service from 18 inland destinations”
- “reduce the number of rail routes we use and link ports to specific service areas”
- “for inland destinations with high cargo volumes, there may be two or more ports of entry, while areas with less cargo would be served by a single port”

Source: American Shipper, January 2007
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Traditional hinterland transport

The dry port concept

- Conscious development of hinterland transport
- Moving shippers’ interface towards ports
- Goes beyond just transportation
- Benefits several actor categories
  - Seaports
  - Shipping lines
  - Rail operators
  - Road operators
  - Shippers
  - Local authorities
  - The society as a whole
- Requires fair distribution of costs and benefits
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A distant dry port

Examples: Barcelona-Rotterdam, Isaka in Tanzania, ICDs in India

Distant DP
Isaka Dry Port, Tanzania
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A mid-range dry port

Examples: Virginia Inland Port, Edouard Herriot Port in Lyon

Mid Range DP
Virginia Inland Port, USA
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A close dry port

Examples: Alameda Corridor, Enfield in Sydney, Green Cargo FS Göteborg

Close DP - Sydney, Australia

Port Botany
### Distant | Mid-range | Close
---|---|---
**Seaports** | Less congestion | Less congestion | Less congestion
Secure hinterland | Dedicated trains | Sequenced loading | Sequenced loading
| Direct loading ship-train
**Shipping lines and forwarders** | Lower costs | Lower costs | Lower costs
Improved service | Improved service | Improved service
**Rail and inter-modal operators** | More business | More business | More business
Economies of scale | Day trains | Day trains
**Road operators** | Less time in congested roads and gates | Less time in congested roads and gates | Less time in congested roads and gates
| Avoiding env. zones | Avoiding env. zones
**Shippers** | Improved port access | Improved port access | Improved port access
"Environment marketing" | **Seaport cities** | Less road congestion | Less road congestion | Less road congestion
Land use opportunities | Land use opportunities | Land use opportunities
**Society** | Modal shift | Modal shift | Less local emissions in the port city
| Less infrastructure | Less infrastructure |
Why the Swedish example is interesting

- Division between infrastructure and operations in 1989
- Reasonably well functioning and large rail market
- Intermodal terminal ownership and operations have changed dramatically
- Competition for containers between a few direct calls, feeder shipping and road/rail to continental ports
- Container rail shuttles from Port of Göteborg are successful
  - 25 shuttles and increasing
  - 10 different operators
  - Often use small terminals as dryports
  - Some shuttles operated in a small scale and over short distances
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Johan Woxenius

Founder
LIGHTHOUSE MARITIME COMPETENCE CENTRE
Nov 2005
Göteborg

Source: Port of Göteborg

Nov 2006

Port of Göteborg
Rail Shuttle

Daily trains besides the Port of Göteborg
Rail Shuttle System

Source: Port of Göteborg
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Dec 2008

Rail shuttles of Port of Gothenburg, May 2009

Source: Port of Gothenburg
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The rail shuttle system of Port of Gothenburg

- **Shuttles**: 25
- **Operators**: 10
- **New shuttles**: 9
- **Growth May 2009 over May 2008**: 10%
- **Market share May 2009**: 60%

**Rail operators of Port of Gothenburg, May 2009**

Source: Port of Gothenburg, May 2009
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Rail container volumes, Port of Gothenburg, TEU

Volume in May 2009 all-time high at 31,280 TEU

Swedish port throughput, 1st quarter 2008

Source: Skeppsmäklarnytt, No. 8, 2008
<table>
<thead>
<tr>
<th>Container</th>
<th>Semi-trailer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geographic transport market</td>
<td>Transocean/deep sea/short sea</td>
</tr>
<tr>
<td>Modal competition</td>
<td>Air for deep sea leg</td>
</tr>
<tr>
<td>Business priority</td>
<td>Utilising economies of scale</td>
</tr>
<tr>
<td>Port geography</td>
<td>Few large hub ports + feeder ports</td>
</tr>
<tr>
<td>Hinterland depth</td>
<td>Deep</td>
</tr>
<tr>
<td>Transport time/speed</td>
<td>Fast</td>
</tr>
<tr>
<td>Precision</td>
<td>Day</td>
</tr>
<tr>
<td>Order time</td>
<td>Week</td>
</tr>
<tr>
<td>Frequency</td>
<td>Weekly</td>
</tr>
<tr>
<td>Max ship size last 10 years</td>
<td>+66% (Sovereign-Emma Maersk)</td>
</tr>
<tr>
<td>Transport service</td>
<td>Shipping line, line agent or sea forwarder</td>
</tr>
<tr>
<td>co-ordinator</td>
<td></td>
</tr>
<tr>
<td>Cargo dwell time in port</td>
<td>Days</td>
</tr>
<tr>
<td>Empty unit dwell time</td>
<td>Days/weeks</td>
</tr>
<tr>
<td>Port work content</td>
<td>Substantial</td>
</tr>
<tr>
<td>Rail technology</td>
<td>– flat wagon/twist locks</td>
</tr>
<tr>
<td>Road technology</td>
<td>Awkward at end points</td>
</tr>
<tr>
<td>Road-rail transhipment technology</td>
<td>Fairly simple – automation possible</td>
</tr>
</tbody>
</table>

### Drivers for more semi-trailers on rail to and from ports

#### Internal
- Costs of road haulage
- Congestion
  - At port gates
  - In port city traffic
- Scale and concentration of flows
- New rail technology
- Image of road haulage
- Lack of drivers

#### External
- Image of road haulage
- Shipper demands
- Political pressure and regulation
- Emission caps
  - Stenungsund petro-chemical industry
  - Arlanda airport
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FlexiWaggon

Source: Jan Eriksson, FlexiWaggon

G2000 RoRo

Source: Novatrain AB
Kölker-Thiele: ALS

Source: World Cargo News, August 97

Transtech: The Tiphook System

Source: Transtech
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Modalohr
Source: Lohr Industries

Cholerton: Shwople
Source: Cholerton
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Unitised goods in the Port of Gothenburg

Containers
- 2007: 841 000 TEU
- Handling in one terminal

Stora Enso Cargo Unit (SECU)
- Up to 90 tons
- Rail shuttles to six Swedish paper mills

Outokumpu Stainless
- Rail shuttle for coils and slabs to and from Avesta

New vehicles
- 2007: 320 000 new cars
- Daily trains to all major cities in Sweden and Norway

Semi-trailers and trucks
- 2007: 686 000 RoRo-units
- Handling in five terminals
  - RoRo and ferry berths

Terminals in Göteborg

RoRo-handling

Container-handling

Intermodal terminals

Map: Eniro
South bank terminals

- Stena Line
- Ferries and RoPax to Denmark and Germany
- Large share of accompanied trucks and semi-trailers
  - Bridge substitute role
  - Port has minor role
- About 50,000 annual semi-trailers through Cargo Net’s domestic road-rail terminal 5 kms from the berths

North bank terminals

- DFDS, Cobelfret etc.
- Unaccompanied semi-trailers to UK and Benelux
  - Planning of transport chains
  - Dwell time in port
- On-dock or near-dock rail terminals
- Now appr. 0.5% of semi-trailers go by rail
- Aim for 10%
Challenges

- Tradition – need for more planning
  - More links in the transport chains
  - Booking principles and systems
  - Semi-trailers lacking lift pockets
- Dispersed berths and road-rail terminals
  - Difficult to form trains
  - Difficult to mix with container flows
  - Unclear location of moved “domestic terminal”
- Rail capacity close to the port and in the Göteborg area
- Rather short road haulage distances

Semi-trailer volumes via the north bank terminals of PoG

<table>
<thead>
<tr>
<th>Distance</th>
<th>Export</th>
<th>Import</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Share of total semi-trailer volume</td>
<td>Number of regions</td>
</tr>
<tr>
<td>0-150</td>
<td>54%</td>
<td>3</td>
</tr>
<tr>
<td>151-250</td>
<td>25%</td>
<td>8</td>
</tr>
<tr>
<td>251-400</td>
<td>12%</td>
<td>7</td>
</tr>
<tr>
<td>&gt;401</td>
<td>9%</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>22</td>
</tr>
</tbody>
</table>

Data refers to 2006, source: Port of Gothenburg
Potential for rail transport of semi-trailers

- 100,000 annual semi-trailers further than 150 kms from the port
- The hinterland for semi-trailers and containers overlaps
- Relieves the city traffic and port’s gate congestion
- If 80,000 semi-trailers by rail
  - €30 million in turnover
  - €3 million in cost savings
    (10% - based on experience from the container shuttle services)
  - 25,000-30,000 tons of CO₂ reductions

Road to and from Port of Göteborg, haulage distance 50 kms, 2004
Truck flows to and from Port of Karlskrona, 50 km local haulage, 2004

Example of map Poland
- Number of trucks, 50 km local haulage
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Hinterland rail in the last ten years

- Adventageous macro factors
  - Globalisation and increased trade
  - Continued containerisation
  - Environmental concerns
  - Fuel prices
- Held back competition
  - Shortage of trucks and drivers
  - Congestion
  - Image
- Productivity gains
  - Investments
  - Deregulation

Hinterland rail transport in the recession

- Immediate effects
  - Drop also in trans-ocean, domestic and intra-European flows
  - Drop in fuel prices, spare transport capacity available
  - Road hauliers might choose not to subcontract the long haul
  - Effect in Gothenburg – all-time high and 60% market share!
- Short-run effects
  - Breath-space and time for reflection
  - Getting the business model and operations in order
  - Assessing new businesses and alliances
- Long-run effects
  - Will trade recover? Freight rates?
  - Survival of shipping lines and rail operators dependent on economies of scale?
  - Stimulation packages
    - Favours domestic labour markets - revival of protectionism?
    - Investments in infrastructure?
    - Lost focus on CO₂?