Developing Infrastructure and Operating Models for Intermodal Shift (DIOMIS 2)

Benchmarking Intermodal Transport in the U.S. and Europe

10 March 2009
Benchmarking intermodal transport US and Europe

Objectives of survey

- Comparison of American and European intermodal business
- Identification of US practices and technologies that could be transferred or adopted by European intermodal actors
- Recognizing common challenges
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Who provides intermodal services in the U.S.? - Class I freight railways (revenues > $360m)

- Union Pacific
- Canadian Pacific
- BNSF Railway
- Norfolk Southern
- KCS
- CSX
U.S. Class I freight railways fully equipped

- Fully integrated, private railway companies owning most of critical resources to supply intermodal services

- Rail network
  - Own large networks
  - Trackage rights – right to operate on foreign rail lines by own locos and staff
  - Haulage rights: subcontract traction service to foreign railway.

- Intermodal terminals

- Locomotives

- Wagons:
  - Own wagons
  - TTX wagon pool: a cooperative society, collectively owned by major American railways.
U.S. rail network
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Intermodal market segments of U.S. railways

- **International traffic (container hinterland transport):**
  intermodal transport of sea-borne freight containers, mostly marine (ISO) containers between American sea ports and inland areas.

- **Domestic traffic (continental traffic)**
  intermodal transport of commodities with origin and destination in North America, employing domestic containers, liftable trailers (semi-trailers), and RoadRailers.
Intermodal technologies

- Container on Flatcar (COFC): Transportation of both marine (ISO) and domestic containers on a flat car (container wagon)
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Intermodal technologies

- Trailer on Flatcar (TOFC):
  Movement of a semi-trailer or a container mounted on a chassis on a special flat car (piggyback transport).
Intermodal technologies

- **RoadRailer technology:**
  
  Horizontal loading system of special trailer on bogie; operated only by Norfolk Southern subsidiary as separate field of business in dedicated services.
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U.S. Class I freight railways: traffic by commodity group

Tons Originated - 2007

- Coal 44%
- Chemicals 9%
- Farm products 8%
- Non-metallic minerals 7%
- Misc. mixed shipments 6%
- Food & kindred 5%
- Other commodities 20%

Intermodal traffic volume: ≈ 163m tonnes
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U.S. Class I railways: gross revenue by type of freight

Intermodal
Coal
Chemicals
Farm products
Food products
Motor vehicles
Metal products
Pulp & paper
Lumber & wood
Petroleum & coke
All other

$ bn

22%
### Intermodal traffic in North America by markets 2007

<table>
<thead>
<tr>
<th>Market segment</th>
<th>Traffic volume</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Loadings</td>
<td>TEU</td>
</tr>
<tr>
<td>Domestic</td>
<td>Containers</td>
<td>3,598,006</td>
<td>4,600,000</td>
</tr>
<tr>
<td></td>
<td>Trailers</td>
<td>2,145,466</td>
<td>9,800,000</td>
</tr>
<tr>
<td></td>
<td>Subtotal</td>
<td>5,743,472</td>
<td>14,400,000</td>
</tr>
<tr>
<td>International</td>
<td>Containers</td>
<td>8,335,480</td>
<td>14,300,000</td>
</tr>
<tr>
<td>Total intermodal</td>
<td></td>
<td>14,078,952</td>
<td>28,700,000</td>
</tr>
</tbody>
</table>
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Intermodal Loadings

- 0
- 2,000,000
- 4,000,000
- 6,000,000
- 8,000,000
- 10,000,000
- 12,000,000
- 14,000,000

Years:
- 1955
- 1965
- 1970
- 1975
- 1980
- 1985
- 1990
- 1995
- 1996
- 1997
- 1998
- 1999
- 2000
- 2001
- 2002
- 2003
- 2004
- 2005
- 2006
- 2007
North American intermodal traffic: relative decline of trailer due to double-stack efficiency
## Benchmarking intermodal transport US and Europe

### Intermodal traffic in North America and Europe 2007

<table>
<thead>
<tr>
<th>Market segment</th>
<th>Intermodal traffic volume (TEU)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>North America</td>
</tr>
<tr>
<td>Domestic / Continental</td>
<td>14,400,000</td>
</tr>
<tr>
<td>International / Container hinterland</td>
<td>14,300,000</td>
</tr>
<tr>
<td>Total</td>
<td>28,700,000</td>
</tr>
</tbody>
</table>
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Main business model in European intermodal traffic

- Initiates service
- Procures full train capacity and rail traction service
- Bears economic risk

Shipper

Forwarder
Truck comp.
Shipping line

Intermodal
operator

Terminal
operator

Railway

Network
manager

Sells door-to-
door logistics

Procures train slots by load unit

Procures slot time

Procures slot time & track access
Business model in U.S. International intermodal traffic

- Shipper
- Steamship line
- Railway
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Business model in U.S. domestic intermodal traffic

- Shipper
  - LTL carrier
  - Parcel carrier
  - Motor carrier
  - IMC
- Railway
Marketing policy

- International traffic:
  - Cost-efficient
  - Regular, frequent

- Domestic traffic:
  - Time-sensitive
  - Distinguished markets
  - Cost-efficient
Marketing policy in domestic traffic

- **Partnerships** with parcel carriers (UPS) or motor carriers (J.B. Hunt since 20 years!) - also in international traffic with shipping lines (APL) – which systematically shift traffic from road to intermodal:
  - Contributing base load
  - Loadings from other customers used to complete train capacity

- **Supply of various service levels** differentiated by speed of service (O/D transit time)
  - Premium services usually are geared to high-end customers e.g. parcel and LTL carriers (UPS)
  - Also used by „Express“ marine containers
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Marketing policy in domestic traffic

Example: BNSF

<table>
<thead>
<tr>
<th>Trade lane</th>
<th>Distance (miles)</th>
<th>Distance (km)</th>
<th>Service level</th>
<th>Service time (h)</th>
<th>$\bar{\text{Speed}}$ (km/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Los Angeles - Dallas</td>
<td>1545</td>
<td>2484</td>
<td>Expedited Service</td>
<td>68</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Premium Service</td>
<td>92</td>
<td>27</td>
</tr>
<tr>
<td>Los Angeles - Chicago</td>
<td>2120</td>
<td>3409</td>
<td>Expedited Service</td>
<td>59</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Premium Service</td>
<td>94</td>
<td>36</td>
</tr>
</tbody>
</table>
Marketing policy in domestic traffic

- Supply of service levels differentiated by other features:
  - Priority access on train: reserved capacity.
  - Priority cut-off time and time of availability: last in the gate; first off the train - first out of gate.
  - Service guarantee: e.g. full or partly refund of freight rate if schedule is failed.
  - Guaranteed reservations of equipment
  - Proactive service monitoring: if train is running behind schedule the railways keep the customer informed of its status.
  - Subject to next-day rolling: shipments moved in “Standard” service level can be shifted on the next day departure.
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Price policy

- Mostly non-public prices („price authorities“)
- Price differentiation follows service level differentiation for domestic services: customer pay a premium for higher service levels
- Bill optimizer for international traffic
- Transloading issue at ports: marketing channel conflicts between international and domestic traffic
Price policy

- Numerous surcharges:
  - Surcharge for transport of units carrying hazardous goods.
  - Surcharge for transport of temperature-controlled units.
  - Fuel surcharge: weekly adjusted based on the price index of the U.S. Federal Department of Energy
  - Alameda Corridor surcharge: levied to pay off bond debt & federal loan; e.g. $38.62 for a loaded 40’ seaborne container and $12.96 for a loaded 53’ domestic container or trailer)
### Key indicators of intermodal trains in the U.S.

<table>
<thead>
<tr>
<th>Performance measures</th>
<th>Max</th>
<th>Top</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max train length (m)</td>
<td>3,050 (10,000')</td>
<td>1,830 - 2,440 (6-8,000')</td>
<td>1,340 (4,400')</td>
</tr>
<tr>
<td>Max speed (km/h)</td>
<td>113</td>
<td>96</td>
<td>-</td>
</tr>
<tr>
<td>Max axle weight (tonnes)</td>
<td></td>
<td>31.8</td>
<td></td>
</tr>
</tbody>
</table>
**Key indicators of intermodal trains in the U.S.**

<table>
<thead>
<tr>
<th>Performance measures</th>
<th>East</th>
<th>West</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Loading capacity</strong></td>
<td>(TEU)</td>
<td>250 - 350</td>
</tr>
<tr>
<td></td>
<td>(Truckloads)</td>
<td>120 - 170</td>
</tr>
<tr>
<td><strong>Length of haul</strong></td>
<td>(km)</td>
<td>1,000 - 1,200</td>
</tr>
</tbody>
</table>
Key drivers of intermodal growth in the U.S.

- Deregulation of freight rail traffic:
  - Productivity gains;
  - Mergers: economies of scale; reduction of interfaces
Mergers between Class I railways

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ATSF  BNSF  BNSF
BN    BN    BN
SLSF  IC    IC
CN    CN/IC CN/IC
ICG   CSX   CSX
SBD   CR    CR
Chessie  NS  NS
CR    SOU   SOU
SOU   N&W   N&W
N&W   DRGW  DRGW
DRGW  SP/SSW SP/SSW
SP/SSW UP    UP
UP    MP    MP
MP    UP/MP UP/MP
UP/MP WP    WP
WP    MKT   MKT
MKT   CNW   CNW
CNW   KCS   KCS
KCS   CP/SOO CP/SOO

2008-07-01
Chart 34
Key drivers of intermodal growth in the U.S.

- Clear, easy to understand and rather standardized business models and distribution channels
- Intermodal service innovations
  - Dedicated intermodal services
  - Service levels
  - Guaranteed services
  - Partnerships with LSP (parcel & motor carriers, steamship lines)
- Improved performance; goal: 92% rate of punctuality.
Key drivers of intermodal growth in the U.S.

- Technology innovations
  - Doublestack wagons
  - Shuttle trains
  - IT-based central booking/reservation systems
  - RFID and OCR identification technologies at terminal
- Standardized intermodal equipment
Key drivers of intermodal growth in the U.S.

- Heavy investments in rail & intermodal traffic:
  - Enlargement of network from single to double or triple track line
  - Raising of clearance (doublestack)
  - Advanced signalling systems (capacity increase)
  - Terminals
  - Intermodal wagons
  - Locomotives
Key drivers of intermodal growth in the U.S.

- Strong U.S. domestic economy
- Growth of maritime container traffic particularly since 2001: elimination of trade barriers for Chinese products