Latest developments in the design and operation of logistics and intermodal transport in the ports hinterland: new challenges and new solutions

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Based on a short overview on the state of the art of transport infrastructure and related bottlenecks within this paper intelligent solutions for the design and operation of logistics and intermodal transport in the ports hinterland will be outlined.

They are mainly based on real examples and practical experiences of companies in Germany.

The solutions cover four present and future challenges, and focus essentially on the topics security, climate and energy, meso-logistics and knowledge regions as well as control logic and autonomous control of cargo flows.

For facing these challenges major tasks of the public and the private sector are mentioned.
1954 – 2008
more than 50 years of innovation in maritime economics and logistics
www.isl.org

Logistics Systems
Univ.-Prof. Dr. Hans-Dietrich Haasis

Maritime Economics and Transport
Univ.-Prof. Dr. Manfred Zachcial

Information Logistics
Dr. Frank Arendt

Planning and Simulation

Bremen, Bremerhaven, Lübeck
70 employees

Services for you: research & networking, consultancy, planning & simulation, analysis & forecasting, software development, information hub

Clients: CEC, Federal Ministries, regional institutions, industry, commerce, LSP, NGOs
EIA - Intermodal transport promotion centre, Bremen
since 2005

Promotion and dissemination of best practices
Networking and initiation of cooperations and strategic alliances
Business models development and controlling
Know-how transfer and knowledge management
Search for intermodal multiplicators
Supporting new products/services
Source: GVZE Bremen
Transport statistics

Survey

NR ports’
modal split

transport
statistics

Survey

NR ports’
cargo traffic

Trade statistics

Trade by origin/destination (e.g. UN, national statistics)

Estimating deepsea, shortsea, and transhipment volumes
Introducing the Container Traffic Model

The North European Container Traffic Model developed by ISL and Global Insight:

- Differentiates transhipment volumes from hinterland traffic,
- Identifies the volumes and modal split of container traffic with the various corresponding hinterland regions of the North range ports,
- Assesses the container traffic volumes between the North range ports and corresponding shortsea destinations,
- Provides the basis for forecasts of port traffic and hinterland transport volumes.

The Modell was implemented successfully for the years 2003 and 2005 so far!
Container Traffic Model

Featured Ports and regions

- 6 Ports within the Hamburg-Le Havre Range
- 32 Hinterland regions:
  - 13 European States
  - Germany (by federal districts)
  - Poland (two regions)
  - Denmark (two regions)
  - France (three regions)

- For all Regions Volumes are identified and split into mode of transport (road/rail/river)
Market shares by hinterland regions and modal split (ex.: Hamburg)

Source: ISL/Global Insight, Containerverkehrsmodell zur Bestimmung der Marktposition des Hafens Hamburg in europäischen Hinterland- und Transhipmentregionen, study for the Hamburg Port Authority, Bremen 2007
Mesologistics: Mikro-Makro-Link

- Makro-logistics
- Meso-logistics
- Mikro-logistics
- Regions
- World

Supply Chain 1
Supply Chain 2
Supply Chain 3
Supply Chain 4
Supply Chain 5
Supply Chain X
Region A
Region B
Region C
Region D

Mikro-Makro-Link
Meso-logistics

The performance of supply chains can be improved through co-operation and communication between various supply chain partners on a regional level. Meso Logistics analysis operative and strategic business processes between companies and institutions in a supply chain region. By this, amongst others a regional knowledge management is obtained.

References:

- Bremen – The „Logistics Family“
- MAREDFlow: Regions of Knowledge Pilot Action.
- LOGALL: Strategic Logistics Alliance Hanse-Passage
- Start up of new intermodal solutions
Structure and process modelling are not enough: Knowledge Management

Interface problems within heterogeneous IT-Infrastructure
Missing insight in business processes of partners within the supply chain
Missing exchange of information between partners and inside a company
Know-how of relevant key actors is not documented
No incentive system to think beyond the existing solutions

shipping companies
terminal operators
port operators
forwarders
warehousing companies
logistics service providers
services
regional authorities
railway companies
industry, commerce
How to secure the chain?

- Certification of partners
- Data reporting and analysis
- Securing the container integrity
- Securing the container environment
- Inspection and scanning
Certification

- C-TPAT (Customs Trade Partnership Against Terrorism)
  - voluntary certification in the US trade
  - US Customs promised to offer accelerated procedures for those parties being certified

- Part of the new Customs Code of the European Union, this approach can be found as “Authorised Economic Operator” (AEO)
  - This status can be achieved from beginning 2008
  - Although also the AEO certification is voluntary, it is expected that is will become de-facto mandatory in such a way that it is quite likely that shippers will use only AEOs as their partners
  - A mutual recognition of AEO and C-TPAT is actually in discussion.
  - Freight forwarders, inland transport operators, etc. are still quite reluctant because the benefits are not obviously at this point of time.
Technologies

- **Electronic seals**
  - combining the strengths of a high security seal with an RFID transponder
  - allowing to check the number and status of that seal automatically e.g. when passing a container terminal gate

- **CSDs (Container Security Devices)**
  - More sophisticated
  - allowing to register the opening of doors, light falling into the container, detection of special substances, obtaining the actual position, communicating via GSM or satellite

- **Challenges**
  - Standardisation required!
  - Who is willing to pay for?
  - Making the use of technologies mandatory?
Advance data reporting

- CSI (Container Security initiative)
  - Customs Cooperation between the US and the rest of the world since 2002
  - Presence of US Customs forces in all major ports exporting cargo to the US who together with their local colleagues assess the risk of containers and jointly decide on further measures e.g. on X-ray scanning or even opening and cargo inspection
  - Basis for this risk assessment are IT systems analysing data – primarily from shipping manifests. Data must be provided well before the container is to be loaded
  - The Advance Manifest System and the related 24-hour-rule require exporters and shipping agents to provide the vessel manifest 24 hours before loading in electronic form

- From 2009, this method will be also applied for all transports heading to the EU

- For the exporting companies their flexibility of re-scheduling cargo containers, will be quite limited
Technologies

• Project CHINOS
  – funded by European Commission DG Research
  – using RFID tags and damage documentation along container transport chains
  – trials in Bremerhaven, Thessaloniki, Graz Freight village and Warsaw railway station
• Intermodal Global Door-to-door Container Supply Chain Visibility
• Funded by the European Commission, DG Research
• Duration: 06/2008 – 05/2011
### INTEGRITY Partners

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<th>Terminal and Transport Operators</th>
<th>Logistics Providers &amp; Shippers</th>
<th>Customs Authorities</th>
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Coordinator
Motivation

- Strong continuing growth in global container transport
- Increased bottlenecks in European deep sea ports and hinterland connections
- Complex logistics chains with multiple actors
- Information gaps along the chain
INTEGRITY Corridor

- Door-to-door: China - Shenzhen – Rotterdam/Felixstowe – European Hinterland
- Monitoring of 5,000 containers
- Cooperation with EU/China Customs Project (SSTL)

2008 - 2011
INTEGRITY = Supply Chain Visibility

**Customs**
- Support of new EU Customs Code
- Support of AEO concept
- Support of Advance Manifest Reporting
- Shifting security checks to export countries
- Mutual recognition of security check procedures
- Offering pre-arrival clearance

**3PLs**
- Cargo Owners
  - Predictability
  - Reliability
  - Reduction of uncertainty
  - Optimisation of speed
  - Reduction of goods in stock and in security process

**Supply Chain Visibility**
- Consensus building
- Intelligent data sharing and evaluation platform SICIS
INTEGRITY – Example security pipeline

Pre-carriage
- AEO Packing Centre / Warehouse
- E-seal application after stuffing
- AEO Truck / Rail / Barge Operator
- ISPS certified Port of Loading operator
- Scan, radiation and e-seal check in the Port of Loading

Sea transport
- ISPS certified vessel
- Satellite tracking

On-carriage
- Customs control based on data from Port of Loading
- Pre-arrival clearance
- ISPS certified Port of Discharge operator
- AEO Truck / Rail / Barge operator
- E-seal check at final destination
Energy consumption in transport and logistics
MOIN-Group

Die weltweite Ölförderung nähert sich ihrem Maximum

In 5-10 Jahren werden die weltweiten Ölreserven zur Hälfte verbraucht sein
Dann wird die weltweite Ölförderung zurückgehen

Quelle: C.J. Campbell, Petroconsultants
Reduction of energy and of CO2 emissions

Technical optimisation
- air pressure in wheels
- innovative technologies
- engine optimisation

Optimisation of logistics
- avoidance of transports
- bundling of cargo

Knowledge management
- qualification
- motivation
- training

Use of alternative engines
- gas, hydrogen, electricity

Shifts
- from road to ...
- from air to ...
- ...

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Intermodal Supply Chains

- Design of cooperative intermodal solutions
- Location planning and process optimisation
- Promotion of intermodal transport
- Controlling of intermodal interfaces
- Simulation and software support
- Networking between partners
- Communication of best practices

- Elaboration of value adding activities and chain design
- Developing of business models
- Performance management for intermodal SC
- Knowledge management within the SC
- Consultancy in mass customisation for SC
Quelle: http://www.skysails.info/
Conventional control
- Hierarchical structure
- Global information
- Central planning and control

Autonomous control
- Heterarchical structure
- Local information
- Decentralised control
- Intelligent objects

Advantages / Benefits
- Higher flexibility by higher and faster adaptability
- Higher robustness and fault tolerance
- Higher performance by self-optimisation