Implementing urban waterway transportation in city logistics
Agenda

- Introduction
- Theory
- Methodology
- Results/Analysis
- Discussion
- Conclusion
Introduction

- Urbanisation puts stress on urban supply chain
- Modal shift from road to waterway can be beneficial
  - Less pollution
  - Less congestion
  - Less accidents
Utilizing waterway transportation

Source: Haropa Ports Rouen
Utilizing waterway transportation

Source: Haropa Ports Rouen
Research question

- How can a **combined goods** and **waste** transportation system be **implemented** in urban supply chains utilizing inland waterways?
  - What are the drivers and barriers implementing waterway transportation?
  - How should the waterway supply chain be designed?
Gothenburg - Frihamnen

Source: Googlemaps 2016
Gothenburg - Frihamnen

Source: Göteborg Stad, 2016
Watch 2:48-2:59 min
https://www.youtube.com/watch?time_continue=235&v=IPbmlkvEwM0
Logistics and supply chain design

- Economies of scale
- Supply Chain Design
  - Adapted to
    - Type of product
    - Volumes
    - Requirements on load carrier
  - Factors choosing distribution network
    - Response time
    - Product variations
    - Product availability
Supply Chain Goals and Performance

- Delivery Service
  - Inventory level
  - Delivery precision
  - Delivery reliability
  - Delivery time
  - Delivery flexibility

- Environmental aspects of logistics
Distribution system

- Transport system efficiency
- Intermodal transportation
- Reverse logistics
Barge transportation Paris

Source: Flipo, E. (2013)
Barge transportation Paris

Source: Flipo, E. (2013)
Barge transportation Paris

Traffic

450,000 Km saved of 12,857 Paris Periféric

- 3,874 Trucks / year

- 35 AccidentsSaved / year

Air Quality

- 234 Tons of CO₂

- 23% NOx Azotes oxide

- 46% CO Carbon monoxide

- 43% hydrocarbures

Gas

88,500 L Gasoil Saved / year

Society saving

External costs saved per year

1 M€

Source: Flipo, E. (2013)

* Based on a full load of 48 containers
Barge transportation Paris

- Required Investments:
  - 73 specific containers
  - 14 trucks
  - 1,6 mio € reconditioning quay

- Parties involved:
  - Supermarket chain
  - Logistics provider
  - Specialists in transportation and cargo handling
  - Administrative organisations

- Success factors:
  - Close connections within partnering organizations
  - Working in small teams
  - Quick decisions
  - Location of distribution centre near inland waterway port
  - High volumes covering fix costs
  - Operational help from French legislation and the region
Floating distribution centre Paris

Source: Fluvialnet 2012
Floating distribution centre Paris

Source: Googlemaps 2016
Floating distribution centre Paris

- Project results:
  - 15 less heavy trucks per day
  - 51 mt less CO2 emissions
  - Less noise
  - Limited congestion
  - Improved utilization of infrastructure

- Success factors:
  - Avoiding:
    - Heavy goods eco-tax (above 3,5 mt)
    - Urban tolls
    - Air priority zones
    - Limited speed zones (20 km/h)
    - Limitation of delivery times by conventionally fuelled vehicles
  - Financial aid from inland waterway administration for ships crane and further upgrades
Methodology
What do you see?
Interviewees
Gothenburg - Frihamnen

Source: Googlemaps 2016
Results – Delivery system quality

- **Time**
  - Just in time
  - Transportation time
  - Delivery time windows
  - Response time

- **Sustainable**
  - Congestion
  - Emissions
    - Pollutant
    - Noise
    - Visual intrusion

- **Service level**
  - Delivery agreements
  - Delivery handling for customer
  - Predictability
  - Reliability

- Minimized storage
- High load factor
Drivers

- Political incentives
- Environmental drivers
  - Congestion
  - Pollution
  - Noise
- Technical development of vessels
- Public interests
Barriers

- **Economic** factors
  - Ownership of infrastructure
  - Financing infrastructure
  - Investment costs
  - Financial risk on logistics provider
  - Transshipment costs

- **Policies**

- **Lock-in** into existing systems

- **Market** demands

- **Change**

- **Operational** factors
  - Consolidation
  - Location
  - Adaption towards goods requirements
  - Visual intrusion
Discussion

- **Supply chain design** influenced by various factors:
  - Type of goods and waste
  - Compatibility of modes
  - Cargo handling time
  - Response time
  - Transportation time vs. Delivery time
  - Service level
  - Pollution (air, noise, visual intrusion)

- Strong barriers vs. weak drivers → emphasis on policy
Discussion

- Early planning required and high importance of close cooperation
- Key in logistics: economies of scale,
  - Short-term goals:
    - Start small
    - Show that it works
    - Build trust
  - Long-term goals:
    - Scale up
**Conclusion**

- **Supply chain design** dependent on various complex factors
- Time and cost
- **Strong barriers** have to be met with **strong drivers**
- Start small (**short-term**), scale up (**long-term**)
- Early **cooperation** and **collaboration** within different sectors