Concepts of city logistics for sustainable and liveable cities

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Outline

1. What is city logistics?
2. Overview of urban freight transport management
3. Joint delivery systems
4. Conclusion
1. What is City Logistics?

- City logistics is the process for totally **optimising** the logistics and transport activities by private companies with the support of **advanced information systems** in urban areas considering the **traffic environment, its congestion, safety and energy savings** within the framework of a market economy

(Taniguchi, Thompson, Yamada and Van Duin, City logistics-Network modelling and Intelligent Transport Systems, *Pergamon*, 2001)
Smart solution by city logistics

- Increasing concern about the economic activation and negative environmental impacts, traffic congestion, safety and security relating to urban freight transport
- **City logistics** play an important roll for balancing the economic growth of cities and social and environmental issues
- Because city logistics provides the basic **framework** for social, cultural activities of people and economic activities of companies
- To create mobile, sustainable and liveable cities, appropriate **urban freight transport management** is required
International Conferences on City Logistics

• Organised by **Institute for City Logistics**


• **The 9th International Conference on City Logistics**, Canary Island, Spain, 17-19 June 2015 (www.citylogistics.org)

• New book “City logistics: mapping the future” (forthcoming in October 2014)
Stakeholders of City Logistics

- **Shippers**
  - manufacturers,
  - wholesalers,
  - retailers
- **Residents**
  - consumers
- **Freight carriers**
  - Transporters,
  - warehouse companies
- **Administrators**
  - national, state, and city level

City logistics company or NPO
2. Overview of urban freight transport management
Procedure of urban freight transport management

Source: PUBLIC SECTOR GOVERNANCE OF URBAN FREIGHT TRANSPORT, PIARC 2012
## Approaches to urban freight transport management

<table>
<thead>
<tr>
<th>Approach</th>
<th>Example</th>
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<tbody>
<tr>
<td>(1) Infrastructure</td>
<td>Development of bypasses/ring roads, urban distribution centers, loading facilities</td>
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<tr>
<td>(2) Regulatory</td>
<td>Introduction of fuel taxes, road user charge, dedicated freight&lt;br&gt;Impose vehicle restrictions&lt;br&gt;Introduce congestion charging</td>
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<tr>
<td>(3) Logistical</td>
<td>Use of small delivery vehicles&lt;br&gt;Improved terminal operations&lt;br&gt;Improve driver competencies</td>
</tr>
<tr>
<td>(4) Co-operative</td>
<td>Form freight partnerships&lt;br&gt;load sharing systems (increase load factors)&lt;br&gt;Joint delivering</td>
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<tr>
<td>(5) Technology</td>
<td>Use of electric delivery vehicles&lt;br&gt;Use of GPS and FTMS&lt;br&gt;Implement a vehicle parking reservation system</td>
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<tr>
<td>(6) Behavioral</td>
<td>Implement anti idling messages&lt;br&gt;Improve social acceptance of urban freight activities&lt;br&gt;Use of recommended truck routes</td>
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Source: PUBLIC SECTOR GOVERNANCE OF URBAN FREIGHT TRANSPORT, PIARC 2012
# Measures for urban freight transport management

<table>
<thead>
<tr>
<th>Measure</th>
<th>Example</th>
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<tbody>
<tr>
<td><strong>Traffic Flow Management</strong></td>
<td></td>
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<tr>
<td>Through-traffic optimization</td>
<td>Infrastructure: Ring roads, bypasses</td>
</tr>
<tr>
<td>Traffic management</td>
<td>Restriction of through-traffic in city</td>
</tr>
<tr>
<td>In/out-flow optimization</td>
<td>Infrastructure: Transshipment terminals outside city</td>
</tr>
<tr>
<td>Traffic management</td>
<td>Truck route designation</td>
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<tr>
<td><strong>Parking management</strong></td>
<td></td>
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<td></td>
<td>Infrastructure: Loading/unloading facility</td>
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<tr>
<td></td>
<td>Traffic management: Truck-only parking space</td>
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<tr>
<td><strong>Time management</strong></td>
<td>Limited time window for trucks</td>
</tr>
<tr>
<td><strong>Vehicle management</strong></td>
<td>Low-emission vehicles</td>
</tr>
</tbody>
</table>

Source: PUBLIC SECTOR GOVERNANCE OF URBAN FREIGHT TRANSPORT, PIARC 2012
Measures for urban freight transport management

<table>
<thead>
<tr>
<th>Measure</th>
<th>Example</th>
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<tbody>
<tr>
<td>Better transport method</td>
<td>Joint delivery</td>
</tr>
<tr>
<td></td>
<td>Infrastructure</td>
</tr>
<tr>
<td></td>
<td>Traffic management</td>
</tr>
<tr>
<td>Intermodal transport</td>
<td>Infrastructure</td>
</tr>
<tr>
<td></td>
<td>Transshipment equipments</td>
</tr>
<tr>
<td>Harmony with urban structure</td>
<td>Land-use plan</td>
</tr>
<tr>
<td></td>
<td>Environmental buffer along arterial roads</td>
</tr>
<tr>
<td></td>
<td>Land-use management</td>
</tr>
<tr>
<td>Other</td>
<td>Improve vehicle movement</td>
</tr>
<tr>
<td></td>
<td>Organizational activities</td>
</tr>
</tbody>
</table>

Source: PUBLIC SECTOR GOVERNANCE OF URBAN FREIGHT TRANSPORT, PIARC 2012
3. Joint delivery systems
Purposes of joint delivery systems (JDS)

• Increase *efficiency* of urban goods distribution by consolidating goods of competitive carriers as well as reducing the *negative environmental impacts*, alleviating *congestion*, improving safety and security conditions
History of joint delivery systems in Japan (1)

• Joint delivery systems started at Tenjin, Fukuoka by support of Ministry of Transport in 1978, and joint delivery company was set up in 1994

• Joint delivery systems for convenience store chains in 1970s (only private companies)

• Joint delivery systems (goods exchange systems) for department stores at Osaka started in 1990s (only private companies)
History of joint delivery systems in Japan (2)

• **Area type joint delivery systems** started at Shinjuku, Tokyo for high rise buildings in 1992, and at Motomachi, Yokohama for shopping streets in 2004, Otemachi, Marunouchi, and Yurakucho, Tokyo for chilled foods in 2012.

• Joint delivery systems started **for building complex** at Tokyo Midtown in 2007 and Tokyo sky tree town (Soramachi) in 2012.
Benefits and problems of joint delivery systems

• **Benefits**
  - Reducing costs, number of vehicles, number of drivers
  - Improving the environment
  - Reducing level of congestion
  - Increasing the frequency of visits at customers

• **Problems**
  - Confidentiality of customers information
  - Limited delivery time
  - Responsibility of transport
  - Additional cost of urban consolidation centres and unified information and management systems
### Best practices

1. **Motomachi, Yokohama Japan, 2004-**

<table>
<thead>
<tr>
<th>Type</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of carriers</td>
<td>17 (participating carriers)</td>
<td>1 (jointly-owned carrier)</td>
</tr>
<tr>
<td>Total number of vehicle-days</td>
<td>40 vehicles 30 days</td>
<td>20 vehicles 30 days</td>
</tr>
<tr>
<td>Type of vehicle</td>
<td>Diesel truck</td>
<td>CNG truck</td>
</tr>
<tr>
<td>Number of participating stores</td>
<td>-</td>
<td>Almost all stores</td>
</tr>
<tr>
<td>Goods of exclusion</td>
<td>-</td>
<td>Directly delivered goods from manufactures, High-value items</td>
</tr>
</tbody>
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**Diagram:**
- **Eco-cargo station**
- **Delivery with jointly-owned vehicles**
- **Delivery center**
- **Eco-efficient truck**
- **Delivery**
- **Sorting**
- **Motomachi Shopping Street**

*Eiichi Taniguchi, Kyoto University*
Motonchi area (Yokohama)
Structure of joint delivery systems in Motomachi, Yokohama
Outline

1) Started in 2004
   - Pilot project (1999-2001) with financial support by municipality
   - Preparation for sustainable operation of co-operative freight transport without subsidies (find neutral carrier, urban consolidation centre, and parking space)
2) Objectives are reducing CO$_2$ emissions and congestion as well as keeping good atmosphere of streets

3) **No subsidies** are given by public authorities just providing parking space on street

4) Around **85%** of goods are covered by cooperative freight transport systems

5) **Both pickup and delivery** are taken by the system
6) Whole area of Motomachi is covered by the system (500 shops as well as 850 individual homes)

7) Neutral carrier takes part in delivering and collecting goods

8) Motomachi Shopping Street Association financially supports the neutral carrier with 2.4 million yen (17,000 Euro) per year which was earned in other business
9) Each carrier pays the neutral carrier 150 yen (1.1 Euro) per parcel
10) 1,000-1,200 parcels are treated per day
11) Excellent leadership
12) Number of trucks was reduced: 100 (11 companies) to 29 (1 company) for 10 days
Motonachi shopping street
CNG truck for joint delivery systems
Parking area for joint delivery systems
Urban consolidation centre for joint delivery systems
Success factors

• Good leadership and enthusiasm towards achieving goals
• Collaboration in stakeholders --- Public private partnerships
• Business model to maintain joint delivery systems
Role of municipality

• Not giving money, but coordinating stakeholders by finding solutions
• Keeping continuously support the project in anyways, preferably not changing personnel during the project
• Preparing some facilities, including dedicated parking space
• Advising stakeholders on legal issues, including traffic regulation
• Encouraging shop owners and residents to take part in the joint delivery systems
Transferability to other areas

• Possible to transfer the co-operative freight transport systems to other areas

• Required conditions
  • Mind-set of balancing the economic vitality and environment
  • Core organisation (not necessary public sector) for managing joint delivery systems
  • Some amount of goods delivered (over 1,000 parcels per day)
  • Appropriate location of urban consolidation centre nearby the target area
  • Neutral carrier for operating joint delivery systems
  • Blanding the area with joint delivery systems
(2) Tokyo sky tree town (Soramachi)

Integrated Internal Logistics System

1) Improved Customer Service
   (streamline logistics, better use of elevators)

2) Safety and Security
   (no unauthorized person or luggage)

3) CO₂ emission reduction
   (less congestion on public roads)

4) Efficient management of
   loading and unloading bays
   (no illegal parking/waiting on public roads)
Tokyo sky tree town (Soramachi)
Soramachi

Project Area = 36,900 m²

Building Area = 31,600 m²

Floor Area = 230,000 m²

Start Year = 2012

Eiichi Taniguchi, Kyoto University

http://www.tokyo-skytreetown.jp
Urban consolidation centres for Soramachi

Eiichi Taniguchi, Kyoto University
Joint delivery systems for Soramachi

Direct delivery

- Kawaguchi UCC
  - 80 ton truck
- Ariake UCC
  - 420 ton truck
- Shinsuna UCC
  - 200 ton truck
- Direct delivery
  - 2 ton truck
  - 2 ton truck
Soramachi Logistics System
(Urban Consolidation Center)

Operated by Sagawa Express. Co. Ltd.

Support from the developer (T)

Cost (carrier) = 50 – 100 JPY/parcel (0.35-0.7 Euro/parcel)

720,000 parcel and 200,000 vehicles were handled in 10 months

http://www.sg-hldgs.co.jp/, http://www.tobu.co.jp/
4. Conclusion

• City logistics play an important role for creating sustainable and liveable cities
• Efficient urban freight transport management is needed to tackle challenging issues in urban areas
• Joint delivery systems with UCC based on the collaboration of stakeholders can alleviate congestion, and reduce illegal parking and negative impacts on environment