Impacts of Information and Communication Technology on Urban Logistics System

Ryuichi Yoshimoto
Shippers (S)

Logistics service providers (L)

Consumers (C)

Governments (G)

Fig. 1 Stakeholders in logistics system
Fig. 2 ICT and urban logistics system

Internet (mobile)

ITS

B2B, B2C transaction (e-commerce)

S2L, L2L transaction (e-logistics)

Logistics operations (e-fleet mgnt)
Fig. 3 Mobile communication media between drivers and dispatchers in Trucking Carriers
B2C 824 billion yen 135% up

B2B 21,600 billion yen 50% up

Mobile commerce 59 billion yen 1300% up

E-commerce 22,400 billion yen 52% up

Fig. 4 E-commerce in Japan in 2000
Tracking i-mode

Shipping charge estimation
Fig. 9 Impacts of ICT on urban logistics system

Internet & ITS

**e-commerce**
- More efficient transaction
  - Internet EDI (B2B)
  - Cyber mall (B2C)
- More customized products
  - Information sharing (B2B)
  - One-to-one marketing (B2C)
- New business model
  - Reverse auction (C2B)
  - Auction (C2C)

**e-logistics**
- More efficient transaction
  - Logistics EDI (S2L)
  - Courier, 3PL, 4PL (L2S)
- More efficient logistics operation
  - Optimized routing (L2L)
  - Cargo tracking (L2S)

**e-fleet management**
- Advanced logistics market
  - Matching cargoes and trucks (S2L, L2L)
  - Shipping charge estimation (L2S)

Freight-ton
- More value
  - Added products
- Substituting
  - Shopping time
- Global procurement
- Direct delivery

Ton-km
- JIT delivery
- Outsourcing logistics
- Urban consolidation
- Optimizing routing

Vehicle-km
- Vehicle-km in urban area

2001
Table 2 Modal shares by trip purpose in Tokyo in 1998

<table>
<thead>
<tr>
<th></th>
<th>trip purpose</th>
<th>modal share (%)</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>rail</td>
<td>bus</td>
<td>car</td>
<td>two-wheeler</td>
<td>foot</td>
</tr>
<tr>
<td>Tokyo Metropolitan Area</td>
<td>commuting</td>
<td>46</td>
<td>2</td>
<td>32</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td>(34 million pop)</td>
<td>shopping, leisure</td>
<td>13</td>
<td>3</td>
<td>34</td>
<td>21</td>
<td>29</td>
</tr>
<tr>
<td>Central Tokyo (8 million pop)</td>
<td>commuting</td>
<td>73</td>
<td>2</td>
<td>9</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>shopping, leisure</td>
<td>23</td>
<td>3</td>
<td>12</td>
<td>23</td>
<td>39</td>
</tr>
</tbody>
</table>
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Freight-ton

Ton-km

Vehicle-km

Vehicle-km in urban area
Table 3  Freight traffic in terms of vehicle-km, ton-km and ton in Japan

<table>
<thead>
<tr>
<th>Year</th>
<th>Freight traffic in vehicle-km (billion v-km)</th>
<th>Share of commercial trucks (%)</th>
<th>Share of private trucks (%)</th>
<th>Freight traffic in ton-km (billion t-km)</th>
<th>Freight traffic in ton (million ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>141</td>
<td>19.0</td>
<td>81.0</td>
<td>178</td>
<td>5,317</td>
</tr>
<tr>
<td>1985</td>
<td>146</td>
<td>23.7</td>
<td>76.3</td>
<td>205</td>
<td>5,048</td>
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<tr>
<td>1990</td>
<td>170</td>
<td>28.4</td>
<td>71.6</td>
<td>274</td>
<td>6,113</td>
</tr>
<tr>
<td>1995</td>
<td>182</td>
<td>33.0</td>
<td>67.0</td>
<td>294</td>
<td>6,016</td>
</tr>
<tr>
<td>1998</td>
<td>179</td>
<td>35.2</td>
<td>64.8</td>
<td>300</td>
<td>5,819</td>
</tr>
<tr>
<td>1999</td>
<td>181</td>
<td>36.2</td>
<td>63.8</td>
<td>307</td>
<td>5,863</td>
</tr>
</tbody>
</table>
Share of freight transport vehicle-km by commercial and private commercial truck and private truck.
Share of intra-prefecture* freight transport vehicle-km by commercial and private, small and ordinary

*Note: there are 47 prefectures in Japan.
Fig. 9 Impacts of ICT on urban logistics system
Fig. 6  Sharing information on delivery status with Internet Mobile Phones
Access to the Web server

Select from pull down menu and send a message

Vehicle ID
Delivery Status
Delivery Order

1:Send 0:End

Waiting
Loading/unloading
Departure

Fig. 7 Interface of i-mode phone
配送状況一覧

<table>
<thead>
<tr>
<th>パートナー</th>
<th>車両コード</th>
<th>行先A</th>
<th>行先B</th>
<th>行先C</th>
<th>行先D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001</td>
<td>P</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>1002</td>
<td>P</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>1003</td>
<td>P</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>1004</td>
<td>P</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>1005</td>
<td>P</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>1006</td>
<td>P</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>2001</td>
<td>P</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
</tbody>
</table>

年：2001 月：3 日：5
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**Vehicle-km in urban area**
Figure 8 Traffic Information on Tokyo Metropolitan Expressway
(Source: ATIS, i-mode, 2001)
Table 5 Policies on City Logistics

<table>
<thead>
<tr>
<th>Infrastructure provision</th>
<th>Regulations/guidelines</th>
<th>Economic instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Land use</strong></td>
<td><strong>Transportation</strong></td>
<td><strong>Information</strong></td>
</tr>
<tr>
<td>Digital map, GPS</td>
<td>Zoning for logistics activities</td>
<td>Property tax</td>
</tr>
<tr>
<td><strong>Transport networks</strong></td>
<td><strong>Ring roads, Direct links to ports &amp; airports, Underground freight system</strong></td>
<td><strong>Road traffic information system, Electronic toll collection</strong></td>
</tr>
<tr>
<td><strong>Terminals</strong></td>
<td><strong>(Urban logistics platform)</strong></td>
<td><strong>(Berth guidance system)</strong></td>
</tr>
<tr>
<td><strong>Loading/unloading</strong></td>
<td><strong>On-road parking space, (Off-road parking space)</strong></td>
<td><strong>(Reservation on loading spaces, Loading time)</strong></td>
</tr>
<tr>
<td><strong>Cargoes</strong></td>
<td><strong>(Cargo tracking, Order entry system)</strong></td>
<td><strong>(EDI, AIDC)</strong></td>
</tr>
</tbody>
</table>

Note: ( ) expected to be introduced by the private sector
Conclusions

1. Increase of e-commerce and mobile-commerce

2. Direct home delivery increases vehicle-km

3. Vehicle-km reduced by e-logistics and e-fleet management

4. Internet Mobile Phones and Intelligent Transport Systems work

5. Information infrastructure by the governments