Data Collection to Support Urban Goods Movement Analysis

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World Conference on Transportation and Land Use Research - July 28, 2011
Outline

- Why collect urban goods movement data?
- Urban goods movement data examples from the Toronto Area
- Urban goods movement data applications
# Goods Movement Data examples

<table>
<thead>
<tr>
<th>Commodity Flows</th>
<th>Vehicle Flows</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Urban</td>
<td></td>
</tr>
<tr>
<td>Commodity flow surveys</td>
<td>Truck GPS data</td>
</tr>
<tr>
<td>Shipper based surveys with carrier/driver follow through</td>
<td></td>
</tr>
<tr>
<td>- Interurban</td>
<td></td>
</tr>
<tr>
<td>Commodity flow surveys</td>
<td>Roadside intercept surveys</td>
</tr>
</tbody>
</table>

Other specialized one-off surveys (web-based SP surveys, parking inventories, etc.)
Shipper-based surveys in Peel, Durham and (in spring 2012) the Toronto Area

Mail-out / Mail-back surveys
1) Shipper survey
2) Driver survey

- GPS installed in truck(s)
- No GPS

50% (In Peel)
50%

Peel 2007, n=600
Durham 2010, n=400
Toronto Area 2012 n≈1000

(Funding: Peel Region, Durham Region, MTO, Metrolinx)
Shipper survey design

Firm attributes
- Employees
- Industry
- Floorspace
- Approximate shipments per year by mode
- Opinions about the transport system as it affects the firm

1. In your opinion, which one issue affects your business operations the most?
   - Traffic Congestion
   - Truck Route Restrictions
   - Vehicle Type Restrictions on Roadways
   - Just in Time Delivery Demands
   - Dwell Times
   - Shipping and Receiving Delays
   - Other
   - Please Specify

2. How many employees work at this location?
   Exclude contractors or owner operators
   NUMBER OF EMPLOYEES

3. How many employees in your firm work in the following categories:
   Please choose the category that best applies to each employee.
   a) Professional/Managerial/Technical
      NUMBER OF EMPLOYEES
   b) Retail Sales/Retail Service
      NUMBER OF EMPLOYEES
   c) Manufacturing/Construction/Trades
      NUMBER OF EMPLOYEES
   d) Truck Drivers
      NUMBER OF EMPLOYEES
   e) Warehousing/Logistics
      NUMBER OF EMPLOYEES
   f) General Office
      NUMBER OF EMPLOYEES
Shipper survey design

Total commercial vehicle trip generation

Private fleet ownership

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**Shipper survey design**

**Total commercial vehicle trip generation**

**Private fleet ownership**

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### How many commercial vehicles arrived and departed from your business establishment today:

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>Arrived</th>
<th>Departed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pickup or Cube Van</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single Unit Trucks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tractor Only</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tractor and One Trailer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tractor and Two or more Trailers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Please Specify</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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### Fill in the following table for the commercial vehicle fleet that is currently owned or leased by your business establishment:

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>Number Owned/Leased</th>
<th>Number of Vehicles Equipped with GPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pickup or Cube Van</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single Unit Trucks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Containers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trailers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Please Specify</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Shipper survey design

Shipments / services to and from the firm over 24 hours

<table>
<thead>
<tr>
<th>Name of Destination Shipment/Service</th>
<th>Address of Destination for Shipment/Service</th>
<th>Shipment or Service?</th>
<th>Mode(s) of Transportation Please check all mode(s) used</th>
<th>Is Shipment or Service Time Sensitive?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>For Shipments ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Shipment</td>
</tr>
<tr>
<td>Commodity Weight</td>
</tr>
<tr>
<td>Commodity Type</td>
</tr>
</tbody>
</table>

- **Food Products**
- **Non-Food Products**
- **Oil, Gas**
- **Manufactured Products**
- **Textiles**
- **Chemical Related**
- **Metal and Products**
- **Mixed**
- **Other (if other, please specify)**
The truck driver describing the stops and shipments made over 24 hours.
GPS supplement

Route tracker collects time-stamped location and engine data.
National Roadside Survey / Commercial Vehicle Survey

- Roadside Truck Driver Interview
- Provincial and federal government collaboration
- Conducted every 5-6 years
- Trip, commodity, vehicle, company, driver information collected
- In 2005-2007, 80,000 surveys at 106 survey sites in Ontario
- 2011 survey underway in Ontario

Some innovations implemented in the last round

GIS address locator          Route verification

Centre for Urban Freight Analysis (Launched Nov 25, 2009)

- Detailed GPS Speed and Routing data
- Engine data
- Fuel consumption
- Etc…

- Use this detailed information more widely for policy analysis, operations, and practical tools
System architecture

Links multiple systems

Engine

Bluetooth

GPS

Ethernet

Fibre

Ministry of Transportation

“Real-time” traffic summaries

Real-time traffic visuals and data

Logistics Managers

Once a day

“Real-time” truck speed / position

“Real-time” traffic summaries

Once a day

“Real-time”
Roadside Access Point Placement
Data Applications in Toronto Area

Agent-based Demand Simulation

- Vehicle Type Choice
- Shipment Size
- Stop Duration
- Tour Formation

Congestion Monitoring

- Historical Truck Speed Monitoring
- Real-time Truck Speed Monitoring

Urban Goods Movement Data

- Roadside Interviews
- Shipper Surveys

Aggregate Demand Models

- Durham Region
- Greater Toronto Area
- Greater Golden Horseshoe

Micro Traffic Simulation

- Toronto Waterfront Model
- Toronto Freeway Model
Policy Applications

Urban Goods Movement Data
- Roadside Interviews
- Shipper Surveys
- GPS

Aggregate Demand Models
- Durham Region
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Micro Traffic Simulation
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Policy Analysis
- GTA to Niagara Corridor Environmental Assessment
- GTA West Environmental Assessment
- Continental Gateway Strategy
- Evaluation of truck-only freeway lanes
- Air Quality Analysis of Green Commercial Vehicle Subsidies
- Evaluation of truck-only freeway lanes
Ongoing Challenges

- Putting the data pieces together
- Keeping the private and public sectors involved
- Dealing with heterogeneous firms
- Forecasting in a fast changing business environment
End!