The Off-Hour Deliveries NYC Project

José Holguín-Veras,
William H. Hart Professor
Director of the Center for Infrastructure, Transportation, and the Environment
jhv@rpi.edu
Thanks for supporting a new idea

❖ USDOT
  ❖ Mr. Caesar Singh, Commercial Remote Sensing and Spatial Information Technology Application Program

❖ New York City Department of Transportation
  ❖ Commissioner Janette Sadik-Kahn
  ❖ Mrs. Stacey Hodge, Mr. Tom Maguire, Mr. David Woloch, Mr. Bruce Schaller

❖ Industry participants

❖ Project partners
  ❖ Prof. Kaan Ozbay and his team, Rutgers University
  ❖ Prof. Alain Kornhauser and his team, ALK Technologies
  ❖ Mrs. Marta Panero and her team, New York University

❖ …my students…that went beyond the call of duty…
The role of economic interactions
The experience with time of day pricing

▶ Theory and empirical evidence agree that cordon time of day pricing are of limited effectiveness in moving urban delivery traffic to the off hours

▶ 2001 Port Authority of New York and New Jersey Time of Day Pricing Initiative
  ▶ 20.2% of carriers changed behavior, though mostly by increasing productivity (not by reducing facility usage)
    ▶ Only 9.0% of the sample increased rates, increases were relatively small, about 15%
  ▶ 69.8% of the carriers that did not change behavior indicated it was due to “customer requirements”
    ▶ Almost no change in facility use

▶ The same was found in London
The decision about delivery time

- Is made jointly between receivers and carriers
  - 40% receivers, 38% receivers+carriers, 22% carriers
- Let’s take a look at the payoff matrix
  - The first sign represents the impact on carrier and the second the impact on receiver

<table>
<thead>
<tr>
<th>Carrier</th>
<th>Strategy</th>
<th>Receiver</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Regular hours</td>
<td>Regular hours</td>
<td>Off-hours</td>
</tr>
<tr>
<td>Regular hours</td>
<td>(−, +) (I)</td>
<td>(−, −) (II)</td>
<td></td>
</tr>
<tr>
<td>Off-hours</td>
<td>(−, −) (III)</td>
<td>(+, −) (IV)</td>
<td></td>
</tr>
</tbody>
</table>

(Theses are non-feasible solutions)

(This is the solution preferred by most receivers)

The fact that more than 90% of deliveries are made in the day hours clearly show who has the power…

(This is the solution preferred by most carriers)
There is a market failure

- Markets typically find the most efficient outcome
- When they do not, there is a market failure
  - rationale for public sector intervention
- Off-hour deliveries are beneficial to Society
  (+) Huge environmental impacts due to less pollution
  (+) Carriers / Regular hour travelers (cars, buses, trucks) benefit
  (-) Increased noise at night could be easily mitigated
  (-) However, receivers accrue additional costs

- The market failure: carrier savings are not large enough to compensate for the receiver costs

- The solution is to either:
  - Compensate the receivers for additional costs, or
  - Develop technologies/systems to allow receivers to do OHD at lower costs (so that compensation could work)
Interlocking components

- Behavioral/economic components
  - Analyses of most promising industry segments
  - Incentives to receivers of cargo willing to do OHD

- Technology component
  - GPS to assess performance (cell phones, own systems)

- Network modeling component
  - Mesoscale traffic model to assess local impacts
  - Regional model to assess networkwide impacts

- Industry/Agency outreach component
  - To get feedback from all involved

- Small scale pilot test component
  - To assess real life impacts...
### Deliveries to Manhattan by SIC

<table>
<thead>
<tr>
<th>SIC</th>
<th>SIC Description</th>
<th>Estimated number of deliveries in Manhattan</th>
<th>Estimated number of deliveries in NYC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Sector</td>
<td></td>
<td>27,408 (24.24%)</td>
<td>65,854 (25.63%)</td>
</tr>
<tr>
<td>50 Wholesale Trade - durable Goods</td>
<td></td>
<td>28,984</td>
<td>58,809</td>
</tr>
<tr>
<td>51 Wholesale Trade - non-durable Goods</td>
<td></td>
<td>22,968</td>
<td>46,453</td>
</tr>
<tr>
<td>59 Miscellaneous Retail</td>
<td></td>
<td>5,689</td>
<td>9,479</td>
</tr>
<tr>
<td>23 Apparel And Other Finished Products Made From Fabrics</td>
<td>3,668</td>
<td>6,192</td>
<td></td>
</tr>
<tr>
<td>56 Apparel And Accessory Stores</td>
<td></td>
<td>1,489</td>
<td>2,506</td>
</tr>
<tr>
<td>57 Home Furniture, Furnishings, And Equipment Stores</td>
<td>1,047</td>
<td>2,099</td>
<td></td>
</tr>
<tr>
<td>55 Automotive Dealers And Gasoline Service Stations</td>
<td>820</td>
<td>4,476</td>
<td></td>
</tr>
<tr>
<td>53 General Merchandise Stores</td>
<td></td>
<td>554</td>
<td>3,076</td>
</tr>
<tr>
<td>36 Electronic And Other Electrical Equipment, Except Computer Equipment</td>
<td>392</td>
<td>713</td>
<td></td>
</tr>
<tr>
<td>25 Furniture And Fixtures</td>
<td></td>
<td>141</td>
<td>657</td>
</tr>
<tr>
<td>27 Printing, Publishing, And Allied Industries</td>
<td>5,161</td>
<td>7,201</td>
<td></td>
</tr>
<tr>
<td>17 Construction Special Trade Contractors</td>
<td>2,747</td>
<td>20,054</td>
<td></td>
</tr>
<tr>
<td>15 Building Construction General Contractors And Operative Builders</td>
<td>2,202</td>
<td>5,187</td>
<td></td>
</tr>
<tr>
<td>34 Fabricated Metal Products, Except Machinery And Transportation Equip.</td>
<td>1,078</td>
<td>2,303</td>
<td></td>
</tr>
<tr>
<td>37 Transportation Equipment</td>
<td></td>
<td>1,077</td>
<td>1,739</td>
</tr>
<tr>
<td>39 Miscellaneous Manufacturing Industries</td>
<td>453</td>
<td>898</td>
<td></td>
</tr>
<tr>
<td>22 Textile Mill Products</td>
<td></td>
<td>415</td>
<td>763</td>
</tr>
<tr>
<td>59 Miscellaneous Retail</td>
<td></td>
<td>5,689</td>
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</tbody>
</table>

### Food Sector

- About 82% of ALL deliveries are in Food and Retail sectors:
  - Shifting 5% to off-hours = 4,200 deliveries/day
  - Shifting 10% to off-hours = 8,400 deliveries/day
  - Shifting 20% to off-hours = 16,800 deliveries/day

### It is estimated that, for every person living in NYC:

- 3 kg of food
- 6 kg of construction materials
- 12 kg of consumer goods
- 21 kg of petroleum products (transport, heat, electricity) are transported on the average day (with container weight)
Where do these deliveries go?
Key Results:
Pilot Test of Off-hour Deliveries
Pilot Test

- Initial efforts delayed by Wall Street collapse, skepticism on the part of the industry... initially a huge challenge because of lack of precedents
- Original plan: Sysco and Whole Foods
- Foot Locker/New Deal Logistics asked to join test
- Three separate stages to accommodate them:
  - Foot Locker (10 stores)/NDL (Oct. 2 - Nov. 14, 2009)
  - Whole Foods (four stores) (Dec. 28, 2009 - Jan. 31, 2010)
  - Sysco (twenty one stores) (Dec. 21, 2009 - Jan. 23, 2010)
- About 35 receivers, 20 trucks/vendors
  - Half doing staffed OHD
  - Half doing unassisted OHD
Participants in Pilot Test
Regular vs. Off-Hour Deliveries (1 of 2)
Regular vs. Off-Hour Deliveries (2 of 2)
Typical results from satisfaction surveys

- Scale: 1 = Very favorable, 5 = Very unfavorable
- Whole Food Vendors: 1.55
- Participating drivers:
  - Travel speeds = 1.33
  - Congestion = 1.11
  - Parking = 1.11
  - Stress levels = 1.11
  - Time to deliver goods = 1.38
  - Time to complete the route = 1.44
  - Driver’s feeling of safety = 1.86
Sysco’s customers:

- Impression of off-hour deliveries = 1.50
- How likely are you to off-hour deliveries = 1.42
- If all liability issues were addressed, would you be interested in receiving unassisted deliveries (e.g. driver places goods in a secure location at your establishment)? = 2.17
More than twice as fast
Average service times

More than three times as fast
After the end of the pilot

- All of the receivers doing staffed OHD reverted back to the regular hours
- Almost all the receivers doing unassisted OHD remained in the off-hours
  - The reason: reliability of OHD
  - “Our locations will continue to receive ‘night drops’ even though this program has ended as our managers now favor the dependability of night drops vs. late day time deliveries. Thanks again for the program.” Nick Kenner, Managing Partner, Just Salad LLC
The Economic Bottom Line
Economic Impacts

- Implementing various forms of off-hour delivery policies in Manhattan leads to:
  - Travel time savings to all highway users of about 3-5 minutes per trip
  - Travel time savings to carriers that switch to the off-hours of about 48 minutes per delivery tour
  - Savings in service times (per tour) could be in the range of 1-3 hours

- Depending on the extent of the policies, economic savings are between $100 and $200 million/year in travel time savings and pollution reduction
Not surprisingly, a lot of press...

- **USDOT:**

- **Wall Street Journal:**
  - http://online.wsj.com/article/SB10001424052748704334604575339292960610492.html

- **New York City Department of Transportation:**

- **Journal of Commerce:**
  - “New York Delivers at Night” Journal of Commerce Issue 10 Vol. 35

- **Blog Coverage**
  - http://www.crainsnewyork.com/article/20100701/FREE/100709981#
  - http://www.theepochtimes.com/n2/content/view/38422/
  - http://transportationnation.org/2010/07/02/pilot-study-off-hours-deliveries-save-time/

- **Among many others...**
Off-Hours Pilot Targets NYC Congestion

(Continued from p. 1)

Off-hours deliveries also produced a "sharp reduction" in parking tickets and fines, which for the eight carriers in the pilot program can exceed $1,000 a month per truck, according to the analysis. The off-hours experiment was created by researchers at Rensselaer Polytechnic Institute in Troy, N.Y., which worked with the Office of Freight Mobility.

"What we found through the pilot is that the receivers really hold the key to making the whole thing work," said John Karna, a project manager in the Office of Freight Mobility.

Other programs aimed at relieving metropolitan congestion have not lowered traffic counts much, Karna said. Truck drivers, for example, may like such incentives as lower tolls for off-peak travel, but receivers, not truckers, determine delivery patterns, Karna said.

In the New York pilot project, participating truckers and receivers not cash incentives receive from

Fleets Say They Discovered Time, Cost Bonanza Through New York's Night-Delivery Experiment

By Michele Fuetsch  Staff Reporter

When Joe Killeen heard that New York City needed participants for its trial off-hours delivery program, he did more than volunteer his Kearny, N.J., trucking firm, New Deal Logistics. Killeen persuaded eight Foot Locker stores he supplies in Manhattan to volunteer, which meant the retail outlets agreed to substitute night deliveries for the daytime shoe shuttles New Deal normally runs under the Hudson River.

"Instead of leaving here at 7 o'clock in the morning and spending an hour and a half trying to get through the Holland Tunnel, [trucks] were on the other side... in 25 minutes," Killeen said of the night trips.

For carriers in the pilot program, which lasted from October 2009 through January 2010, the results were dramatic.

Off-hour deliveries improved average travel speeds by as much as 75%, according to the analysis submitted to one of the program funders, the Research and Innovative Technology Administration, or RITA, of the U.S. Department of Transportation.

Adding to the off-hours benefit, data generated by Global Positioning System devices on the trucks showed that trucks delivering between 7 p.m. and 6 a.m. averaged 30 minutes at a receiver's site, compared with an average of 100 minutes during the day on streets clogged with traffic and lacking space to park.

More than 100,000 truck deliveries, like this one above, are made in New York City every day. A pilot program tested night deliveries.
NYC adopted off-hour deliveries as part of its sustainability strategy.
Next steps

- **USDOT/RITA** provided funds for a larger implementation project focusing on:
  - **Unassisted deliveries:**
    - Technologies/systems that enable OHD without the need for staff of the receiving business would produce the same benefits as regular OHD, at minimal cost
    - To address the liability concerns of receivers
  - **Large Traffic Generators:**
    - Large buildings/establishments generate hundreds of truck trips per day
      - About 80 such buildings → 4% of the truck traffic
      - Adding large establishments → 8% of truck traffic
    - They could implement OHD very cost effectively and without inconveniencing the receivers
Chief conclusions

- Removing the constraints imposed by receivers (either by providing financial incentives, or using un-assisted OHDs) works as it is
  - More effective than freight road pricing
  - A truly win-win-win-win-win policy:
    - Benefits regular hours travelers
    - Benefits the environment, improves quality of life
    - Benefits the business community, enhances economy
    - Noise impacts could be easily mitigated → electric trucks, low-noise truck technologies/practices
    - Benefits participants in OHD
  - Political appeal, implementable as a voluntary program
References, project website

Off-hour delivery project final report: http://transp.rpi.edu/~usdotp/OHD_FINAL_REPORT.pdf

Project related papers:

Behavior:

Theory:
Thanks!

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