Learning from case studies: Last-mile delivery, digitalisation and consolidation centres

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Workshop II on Urban Freight
Berlin, 20 Sep. 2017
Objectives of case studies on freight transport operations

- To inform on cases in urban or long distance context
  - Trials and demonstrations of technical feasibility and economic profitability
    - Sustainability
    - Decarbonisation
    - Profitability
    - Social acceptance
  - Impacts estimates or assessments
  - Expectation/assumption: Other businesses are going to replicate and scale up the solution on the market
  - Sources, references
  - Contacts, networking
Emporia Malmö Shopping Centre Consolidation Case

Large shopping centre with many tenants
- 75 000 sqm shops & restaurants
- 200 tenants
- Long distances in the building

Large freight flows and high values
- 300 deliveries/day
- 500 internal transports/day to/from tenants
- Highly valuable goods

Large waste flows
- 20 ton waste/day
- Very high environmental ambitions

En partner som ansvarar för helheten!
Goods handling process in Emporia

1. Control, receipt, sorting and registration of the goods in our goods management system. Automated info to the tenants via e-mail/sms

2. Joined transport

3. Internal deliveries are made by adjusted equipment

4. Goods are delivered and signed for by the tenant, in the store
Electric vehicles and depot for retail deliveries in Central London: The case of Gnewt Cargo
Objectives

• To introduce/understand EV developments in goods transport with an in-depth case of Gnewt Cargo

• To evaluate the previously existing Office Depot deliveries to postcodes EC 1 - 4 (City of London) using diesel vans

• To compare this with the new Gnewt Cargo logistics system implemented using Cargocycles and electric vans for final delivery

• To evaluate the impacts on:
  – Total distance driven in London and in delivery area
  – Road space occupancy during parking while making deliveries
  – Energy use and greenhouse gas emissions
“Before” and “after” delivery system

• Original diesel van delivery system studied Feb-March 2009 -before the trial went live.
• In the original system diesel vans departed from a suburban depot to make deliveries to postcodes in central London (EC1, EC2, EC3 & EC4)
• New Cargocycle and electric van delivery system studied Nov 2009 - May 2010
• New delivery system was implemented incrementally:
  – Initially an intermediate system was used which involved Cargocycles, electric and diesel vans (Nov 2009-March 2010)
  – The new system using only Cargocycles and electric vans was fully implemented in May 2010
• In the new system a diesel truck is used to transport goods from the suburban depot to the City of London for onward delivery by Cargocycles and electric vans
Logistics system for deliveries by diesel vans

Logistics system for deliveries with cc
Actors‘ analysis UCC set-up

• Local logistic Operators
  – What to do?
  – How to earn money, not loose?
  – What conditions I need to have?

• Local Authority
  – How to set up new access rules?
  – Obligation to use clean vehicle to access?

• Shopping mall owner
  – Is is obligation or free for shops to receive deliveries via a Shopping centre consolidation
  – ...

• National Government
  – Supportive rules for local governments
  – Organise stakeholder consultation
  ...

Transport and Climate Change Week
Focus 2017: Urban Mobility
18 - 22 September 2017
How did the Start-up started?

- Start-up with 2 owners
- Business decision from Office Depot (OD)
- Private equity financing (no bank loan)
- Purchase of a clean fleet
- Rent of a small depot of 240 m²
- 150-900 parcels a day in Central London
- All equity was paid back after one year
- Regular payments from first big client
How to calculate the benefits and impacts?

• Apply a standard methodology for urban freight?
  – Not available yet
• Case specific adaptation of energy, distance and CO₂ calculation for freight transport
• Adding criteria that are relevant for cities
BEFORE: Standard 3.5t diesel van: Capacity of 1270 kg and 9 m³
Electric van: Capacity of 445 kg and 3 m³
Cargocycle: Electrically assisted tricycle with a capacity of 180 kg and 1.5 m$^3$
Progressive impacts of fleet replacement by Cargocycles and electric vans

Before:
- 7 vans, no cycles
- November 2009

After:
- 4 vans, 6 cycles, 1 electric van, 1 truck
- 0 vans, 6 cycles, 3 electric vans, 1 truck
- March 2010, May 2010

-62% CO₂

Miles per day for all trips:
- Before: 350 miles/day
- After: 150 miles/day

kg CO₂ per parcel:
- Before: 0.18 kg CO₂
- After: 0.06 kg CO₂
### Impact of vehicle length on kerbside parking occupancy during one day, assuming identical stopping points

<table>
<thead>
<tr>
<th>Category</th>
<th>BEFORE 7 vans, no cycle</th>
<th>AFTER 6 cycles, 3 elec vans</th>
</tr>
</thead>
<tbody>
<tr>
<td>All diesel vans stops/day</td>
<td>140</td>
<td>0</td>
</tr>
<tr>
<td>All Cargocycles stops/day</td>
<td>0</td>
<td>80</td>
</tr>
<tr>
<td>All electric vans stops/day</td>
<td>0</td>
<td>60</td>
</tr>
<tr>
<td>Parking length requirement: Metres for all diesel vans/day</td>
<td>799</td>
<td>0</td>
</tr>
<tr>
<td>Parking length requirement: Metres for all Cargocycles/day</td>
<td>0</td>
<td>188</td>
</tr>
<tr>
<td>Parking length requirement: Metres for all electric vans/day</td>
<td>0</td>
<td>199</td>
</tr>
<tr>
<td>Parking length requirement: Total metres for all vehicles/day</td>
<td>799</td>
<td>387</td>
</tr>
<tr>
<td>Parking length requirement index of all vehicles/day</td>
<td>100</td>
<td>48</td>
</tr>
<tr>
<td>Reduction Parking length requirement for all vehicles/day</td>
<td>-</td>
<td>52%</td>
</tr>
</tbody>
</table>

Vehicle length: Diesel van: 5.71m; Electric van: 3.32m, Cargocycle: 2.35m
Outlook: Business growth
New depot 2014-2017, 2500 m² and 60-100 vans
**Business model** *(1 of many)*

**BEFORE starting using Gnewtcargo**

- LSP Depot Enfield
- Zara LSP depot
- Pull & Bear LSP depot
- Farndrop depot

- Street 1
- Street 2
- Street 3

**AFTER starting using Gnewtcargo**

- LSP Depot Enfield
- Zara LSP depot
- Pull & Bear LSP depot
- Farndrop depot
- Gnewt Consolidation Centre

- Street 1
- Street 2
- Street 3

**Key**
- Diesel van round, peak
- Electric van round, peak
- Truck trip off-peak

Retail logistics: single-carrier deliveries
Testing new vehicles
Congestion, traffic & mileage reduction
Impacts when using a central depot (UCC)

Before: Hermes delivery trip, depot in Enfield

After: Hermes trip to Gnewt Cargo UCC

Of which 22-24 miles on major road link at peak time
11-12 miles on return trip is run empty

On this road 7 trucks are replacing 50 diesel vans
+ 1 truck daytime (off-peak) return trip for returning empty rollcages
Benefits and impacts of electric vehicle use in London

- Micro-consolidation centre and replacement of the diesel van fleet by electric vans and tricycles
- Reduction of 20-70% in the total distance driven by vehicle per parcel delivered, depending on the clients
- The total CO\textsubscript{2} equivalent (CO\textsubscript{2}e) emissions per parcel delivered was 54% lower in May 2010 than in October 2009 before the trial. In 2015 the last mile CO\textsubscript{2} reduction is 85-90% per parcel. In 2016/17 for TNT the CO\textsubscript{2} reduction is 100%, the distance/parcel is -67%.
- Use of electric vehicles using fuel generated from renewable, carbon-free sources in the City of London.
- Start-up company was profitable after 3 months
- Strong growth and upscale now to 100 vehicles & 3 depots
- 3 million parcels were delivered 2016 in Central London

Sources: www.gnewtcargo.co.uk; www.bestfact.net
Trade Fair Delivery Management System in Basel

An access regulation support system for trade fair deliveries

→ Situation improved with introduction of time slots due to better planning of capacities

→ The efficiency of all logistic processes at the fair grounds improved according to feedback

→ The acceptance was high, 90% of 7,000 trips were pre-registered for the first fair
Traffic situation on the Trade Fair grounds

Before

After
Benefits of the new Trade Fair Basel solution

- Reduction of traffic congestion on major national and transnational routes (inner city roads and motorway access). For peak delivery and pick-up days related to major fairs, 15km of congestion were measured due to trucks blocking the highway exits in order to reach the checkpoint.

- The use of automated IT supported processes at the check point allows the handling of 95% of all arriving transports within less than 3 minutes (target: <1 min).

- Automation of billing and invoicing related to all logistics activities

- Efficiency gains are reflected in time gains within the occupancy schedule on the fair grounds. Through consolidation additional events can be held at the fair grounds: increased capacity utilisation and increased revenues.
Como trial
“Before” situation
3.5t diesel van
Delivery round starts from Arco Spedizione 10 km away from “pedestrian” City Centre Area
“After” delivery round starts from Merci in Centro depot
## Como trial: impact results

### Distance per parcel = -37%

<table>
<thead>
<tr>
<th>Logistics</th>
<th>Units</th>
<th>km/day diesel vans</th>
<th>km/day diesel trucks</th>
<th>km/day electric vans</th>
<th>km/day total all vehicles</th>
<th>Distance in km per parcel</th>
<th>Index distance per parcel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before: Diesel vans starting at Arco depot</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After: Electric vans + UCC Via dei Mulini</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### CO₂ per parcel = -39%

<table>
<thead>
<tr>
<th></th>
<th>Energy</th>
<th>CO₂ equivalent</th>
<th>Index</th>
<th>Reduction in CO₂e/ parcel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Litres diesel/ day</td>
<td>kWh/day</td>
<td>kgCO₂e/ parcel</td>
<td>kgCO₂e/ parcel</td>
</tr>
<tr>
<td>Before</td>
<td>4.1</td>
<td>0</td>
<td>13</td>
<td>0.222</td>
</tr>
<tr>
<td>After</td>
<td>2.5</td>
<td>2.6</td>
<td>8</td>
<td>0.136</td>
</tr>
</tbody>
</table>

### Costs = +6%

<table>
<thead>
<tr>
<th></th>
<th>Staff</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of staff</td>
<td>Index number of staff</td>
</tr>
<tr>
<td>Before</td>
<td>1.2</td>
<td>100</td>
</tr>
<tr>
<td>After</td>
<td>1.6</td>
<td>130</td>
</tr>
</tbody>
</table>
Como trial impacts on air pollutants
Points for discussion

• Learning from innovative solutions
• Learning from cases
• How to adapt a solution to your own business?
• How to develop a case study yourself?
• Using a powerful, simple assessment method:
  • Description of case (who, what, where, how); Benefits and costs; Barriers; Success factors; Contacts
• What did you expected when starting your case study?
• What are your main findings and results on the case?
• What are you missing?