Overview of shared e-scooter services

Pre-study: Micromobility Modelling - Preliminary study on knowledge needs and usage patterns

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CTR day - October 19th, 2020
Micromobility - 4th Generation

3rd Generation
- Electronically locking docks
- Telecommunication systems
- Smartcards
- Mobile phone access
- Credit cards

Bike sharing systems promoted by public authorities

4th Generation
- Dockless security systems
- Electric power assistance
- New vehicle: e-scooter (cheaper, lighter, less regulated)

Shared e-scooter services promoted by private companies

Source: NACTO(2018)

Shared e-scooters x2 micromobility trips
Service operation

- Adjustment of prices
- Expensive service

<table>
<thead>
<tr>
<th>City/Company</th>
<th>Fixed fare ($/trip)</th>
<th>Time-dependent fare ($/min)</th>
<th>Time (min) vs. PT</th>
<th>Time (min) vs. Bikesharing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Washington, DC ($) (Lazo, 2019); PT: Metrobus $2 (WMATA); BS: Capital bikeshare $2/30 min (Capitalbikeshare)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bird</td>
<td>1</td>
<td>0.39</td>
<td>2.6</td>
<td>2.6</td>
</tr>
<tr>
<td>Bolt</td>
<td>-</td>
<td>0.30</td>
<td>6.7</td>
<td>6.7</td>
</tr>
<tr>
<td>Jump</td>
<td>-</td>
<td>0.25</td>
<td>8.0</td>
<td>8.0</td>
</tr>
<tr>
<td>Lime, Lyft, Razor</td>
<td>1</td>
<td>0.24</td>
<td>4.2</td>
<td>4.2</td>
</tr>
<tr>
<td>Skip</td>
<td>1</td>
<td>0.25</td>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Spin</td>
<td>-</td>
<td>0.29</td>
<td>6.9</td>
<td>6.9</td>
</tr>
</tbody>
</table>
Trip characteristics

**Distance (km)**
1.85

**Duration (min)**
13.12

**Speed (km/h)**
8.36
Temporal distribution and Trip purpose

- Main peak hour in the **afternoon – evening**, more demand during **weekends**

- Scooters are mainly used for **social life and free time**, 40%
- **Low daily use**, around 5%
- 3 out of every 5 users take scooters **monthly or even less frequently**
What transport mode would you have taken if an e-scooter was not available?
- Walking trips: 40%
- America cities: 40% car-based trips vs. 60% environmental mode-based trips
- European cities: 20% car-based trips vs. 80% environmental mode-based trips
## Environmental Impact

### Global Warming Impact

<table>
<thead>
<tr>
<th>Material</th>
<th>Manufacturing</th>
<th>Transport</th>
<th>Use phase</th>
<th>Collect-Dist Charging</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50% - 80%</td>
<td>20% - 40%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Short lifetime (months)
- Low usage rate (km/scooter-day)
- Type of auxiliary vehicle
- Distance traveled between scooters
- Low usage rate (km/scooter-day)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>e-scooter (g CO2 eq/pax-km)</th>
<th>Displaced mode (g CO2 eq/pax-km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hollingsworth et al. (2019)</td>
<td>125</td>
<td>93</td>
</tr>
<tr>
<td>Moreau et al. (2020)</td>
<td>131</td>
<td>110</td>
</tr>
<tr>
<td>American city</td>
<td></td>
<td></td>
</tr>
<tr>
<td>European city</td>
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</tr>
</tbody>
</table>
Riding and Parking

- Generalized **complaints** for parked scooters and scooters riding on sidewalks
- **Most of riders use bike lanes**, being traffic lanes the main alternative
- **Riders demand more lanes for micromobility**, lack of this type of infrastructure

- **Properly parked**: 81% Chicago, 76% Tucson, 73% Portland
- **Longer disruptions** than cars (taxi, distribution, etc.), 5 minutes vs 2 hours
- **Worst image than studies observe**
- **Esthetic/visual problem**
Service regulation

- **Off-street competition**: maximum number of operators (from 1 to 8) and fleet size limited by operator or city (from 250 – 2000 e-scooters)
- **Permitting fees**: application and/or permission (per operation yearly and/or per vehicle)
- Requirements of efficiency, **expansion or reduction** of fleet size allowed.
- Between 2 and 3 trips per scooter and day
- Boundaries where companies operate and scooters can be parked (geofencing)
Future research

- Understanding this mobility services, their potentialities and market niche
  - Real data from e-scooter services and other transport modes
  - Comparison of e-scooter trips and trips by other modes
  - Survey for users
  - Survey for non-users
  - Swedish case

- Planning level, analysis of policies and regulations
  - Fleet sizing
  - Where e-scooters make the transport system more sustainable
  - Riding and Parking areas, management of urban space
Trip purpose data analysis

- MSc thesis Erik Lansner, soon to finish
- Trip data from Voi, about 3.5 million trips in Stockholm area
  - Start time and position, end time and position, hashed customer id, vehicle id
- Locations from Open Street Map, grouped into categories
- Identifies the locations near the end position of each trip

Heatmap including all activity in the Stockholm area
Thank you for your attention

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