THE CHOICE OF CAR SHARING IN THE CITY OF TURIN: A CASE STUDY ON A SURVEY PROPOSED AT POLITECNICO DI TORINO

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Car sharing in Italy and in Turin

- Service appeared firstly in Milan in 2001
- 5,700 cars circulating in around 30 big and medium sized cities (2016)
- Average increase of number of journeys in semester September 2016 – February 2017: +35% (Urbi)

**Turin**

- First station-based provider in November 2002
- 610 vehicles available in the city (February 2017)
- Highest increase of journeys (+54%) despite -8% fleet size (Sep 2016 – Feb 2017)
Goal of the study: car sharing in a mobility management perspective

- Few studies on the role of car sharing in a mobility management perspective
- Interest in considering commuting patterns of an academic community: large number of young people usually interested in new technologies and sensitive to cheaper and more sustainable means
- Identify different groups of students and staff on the basis of their interest and use of car sharing ➔ categorical target variable:
  - Early adopters
  - Interested
  - Not interested
  - Unaware
- Check if such group membership can be associated to given sociodemographic, commuting trip characteristics or travel satisfaction patterns
- Exploratory perspective (clustering approach) rather than modelling to better understand how the combination of different features is more frequently encountered within some groups
Case study: Politecnico di Torino

- **36,000 students**, 1,700 personnel (professors, researchers, administrative staff), 6,000 other **figures** (Ph.D. candidates, research assistants, consultants and other professionals)

- Around **25,000 people daily** reaching the campus using different modes

- Online **survey** proposed in autumn 2016 to investigate:
  - mobility to the campus
  - interest in **car sharing** service

- **Main focus**: people living in the city, in “Prima cintura”

- **1314 respondents**: 1125 students, 189 personnel (administrative staff, professors, researchers)

XXII SIDT National Scientific Seminar, 14 – 15 September 2017
Modal choices and multimodality

- Responses to “Which mode (or modes) of transport do you usually use to reach Politecnico?”: more than one mode could be chosen as option
- Most used: car (personnel), mainly as unique mode, and PT (students)
- Shared modes mainly chosen by students
- Car sharing and bike sharing used not as “unique” choice, but as multimodal option (ex. car sharing alternative to PT or active modes when it rains or in case of disruptions)

XXII SIDT National Scientific Seminar, 14 – 15 September 2017
Target variable: car sharing interest and use

“Would you be interested in registering for a car sharing service?”

<table>
<thead>
<tr>
<th>Already using</th>
<th>Yes</th>
<th>No</th>
<th>Service unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel</td>
<td>17 (9%)</td>
<td>55 (29%)</td>
<td>90 (48%)</td>
</tr>
<tr>
<td>Students</td>
<td>309 (27%)</td>
<td>437 (39%)</td>
<td>256 (23%)</td>
</tr>
</tbody>
</table>

- Service less attractive for staff and already used mainly by students
- Main motivation behind the actual use: “To move in the city” (12/17 among personnel and 277/309 among students)
- Motivations behind interest: “Economical convenience”, “Near home parking”, “To connect with other means”
- 92% of students would chose it for “Economical convenience”, while this percentage decreases to 80% for personnel
Methodology (I)

1. **Separately** consider each group of **clustering variables** to create **clusters** of respondents (three series of clusters)

   - Socioeconomics variables (E)
     - Residence
     - Age range (pers.)
     - Enrolment year (stud.)
     - Gender

   - Commuting trip characteristics (T)
     - Distance
     - Duration
     - Means used

   - Commuting trip satisfaction (S)
     - Journey cost
     - Journey duration
     - Parking availability

   **Co-clustering**: creation of **clusters** (groups of respondents) using association measures **without** providing previously the **number** of clusters desired, as in traditional clustering algorithm

   Clus_E_1
   Clus_E_2
   Clus_E_3

   Clus_T_1
   Clus_T_2
   Clus_T_3

   Clus_S_1
   Clus_S_2
2. Study each series of cluster to check the proportion of respondents falling into each of the 4 categories of the target variable.

3. Identify clusters where one category is predominant and analyse distribution of clustering variables.

Clus_E_1: Early adopters
Clus_E_2: Interested
Clus_E_3: Not interested
Clus_S_1: Unaware
Clus_T_1
Clus_T_2
## Results: socioeconomics variables

<table>
<thead>
<tr>
<th>Clus_E</th>
<th>Personnel</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early adopters</td>
<td>Living mainly in <strong>Turin city</strong>, preferring <strong>active modes</strong>, <strong>satisfied</strong> with travelling cost and time</td>
<td><strong>Second year and older</strong> students, males, living in Turin using <strong>bike sharing</strong> and <strong>active modes</strong>, satisfied with cost and time</td>
</tr>
<tr>
<td>Interested</td>
<td>Mainly <strong>female</strong> living <strong>outside “Prima cintura”</strong>, commuting by <strong>car</strong> and <strong>PT</strong> on <strong>longer</strong> distances</td>
<td>-</td>
</tr>
<tr>
<td>Not interested</td>
<td>Older <strong>men</strong> living in “Prima cintura”, travelling mainly by <strong>car</strong> and <strong>satisfied</strong> with <strong>parking</strong></td>
<td>-</td>
</tr>
<tr>
<td>Unaware</td>
<td>Older people living in Turin rather not <strong>satisfied</strong> with <strong>parking</strong></td>
<td><strong>Freshmen</strong> (mainly “freshwomen”), usually living in “<strong>Prima cintura</strong>”, using <strong>PT</strong> and <strong>personal vehicle</strong></td>
</tr>
</tbody>
</table>

- People already using car sharing shows a more **multimodal** and **sustainable** behaviour (active modes used too)
- Having car parking affect **negatively** the interest in car sharing
- Marketing actions towards personnel **interested** or **unaware**, promoting complementarity of car sharing with PT in a “**last mile**” mobility approach
Results: travel related variables

<table>
<thead>
<tr>
<th>Clus_T</th>
<th>Personnel</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early adopters</td>
<td>Using mainly active modes and car less than average, rather not satisfied with parking</td>
<td>Commuting for shorter trips, using mainly active modes, good satisfaction for journey time</td>
</tr>
<tr>
<td>Interested</td>
<td>Using more car and less active modes and coming from outside the city</td>
<td>-</td>
</tr>
<tr>
<td>Not interested</td>
<td>-</td>
<td>Using mainly PT and individual modes, bike sharing least used, low satisfaction for cost, time and parking availability</td>
</tr>
<tr>
<td>Unaware</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

- Awareness raising campaigns could be targeted to last cluster of students, focusing on the **low satisfaction** rates and on their **multimodality** attitude

- Such approach could allow the identification of target groups for car sharing marketing actions on the basis of **passively collected** or **anonymised** data (available with smartphones and apps)
## Results: satisfaction related variables

<table>
<thead>
<tr>
<th>Clus_S</th>
<th>Personnel</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early adopters</td>
<td>-</td>
<td>Living in Turin, using active modes, good satisfaction level</td>
</tr>
<tr>
<td>Interested</td>
<td>Mainly living outside “Prima cintura”, commuting by car or PT on longer distances, with low satisfaction rates</td>
<td>-</td>
</tr>
<tr>
<td>Not interested</td>
<td>People living in Turin, using mainly active modes and satisfied with journey characteristics</td>
<td>-</td>
</tr>
<tr>
<td>Neutral</td>
<td>-</td>
<td>People living outside the city, commuting by car or PT on longer distances, low satisfaction rates</td>
</tr>
</tbody>
</table>

- As previously, focus on **low satisfaction** rate of people coming from outside the city to **promote** car sharing (interested personnel, or neutral students)

- Travel-related satisfaction ratings could be quickly elicited through **instant polls** while people are travelling
Conclusions

- Car sharing is likely to be **adopted** by people showing more **multimodal** behaviours, usually correlated to a larger use of **active means** and a smaller use of the **personal car**

- **Students** seem more **prone** to car sharing adoption:
  - targeted actions could include **integration** of all smart cards and tickets related to different mobility services in their personal **university card**

- Car sharing **less appealing** for people having **parking** place near home and/or workplace (mainly senior **staff** in our dataset):
  - revision of **parking policies** inside the campus to promote more **environmentally sustainable mobility** behaviours that would benefit the whole metropolitan area
Discussion and future work

• Car sharing **marketing actions** should aim at **minimising** the use of private cars and **maximise** the complementarity with public transport and active means.

• Car sharing within a mobility management perspective must be **judiciously** conducted in order to avoid **unwanted secondary effect**, such as substituting trips done by public transport or through active means.

**Future work on this dataset**

• Add other **variables** to deepen the knowledge of habits and characteristics of respondents in clusters.

• Preliminary work to the **implementation** of a model, mainly on students dataset.
Data collection activities presented were part of a collaboration between Politecnico di Torino and General Motors Powertrain – Europe with the scope of investigating the general interest in a Car Sharing system among the people working and studying at the campus.