Diversity, Equity, and Inclusion (DEI) Implications of Transport Automation

TOMNET Transformative Technologies in Transportation (T4) Survey

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Diversity
Equity
Inclusion
(DEI)

We are experiencing the most transformative changes in transportation (automation, electrification, and shared economy), and it is very critical to consider DEI at early stages.

Source: All abroad! Victor Rubin PolicyLink, 2009
TOMNET Transformative Transportation Technologies Survey
https://tomnet-utc.engineering.asu.edu/t4-survey/

- Phoenix, Atlanta, Austin, and Tampa
- Summer and Fall 2019 (pre-pandemic)
- Random address-based sample
- Online instrument
- Inclusion of attitudes, stated preference questions, and perceptions and choices of Mobility-on-Demand and Autonomous Vehicles

<table>
<thead>
<tr>
<th></th>
<th>Phoenix, AZ</th>
<th>Atlanta, GA</th>
<th>Austin, TX</th>
<th>Tampa, Fl</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Size</td>
<td>1,027</td>
<td>944</td>
<td>1,127</td>
<td>260</td>
<td>3,358</td>
</tr>
<tr>
<td>%</td>
<td>30.6%</td>
<td>28.1%</td>
<td>33.6%</td>
<td>7.8%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Survey Team

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Study of Disadvantaged Groups
(T4 survey sample=3,358)

Race and Ethnicity
777 non-White respondents (29% of the sample)
440 Hispanic respondents (17% of the sample)

Income
886 low-income (less than $50,000) respondents (38% of the sample)

Disability
514 respondents with limitation in driving during day or night (18% of the sample)
AV Familiarity

Minorities are reflecting significantly lower familiarity toward AVs (N=3284).

They remained more neutral to other AV perception and choice questions.
AV Purchase

Low-income are less willing to buy. Driving-limited people are more willing to be early adopters. (N=3,284)

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Likelihood of making additional trips with availability of AVs

AV can provide mobility for unmet travel needs of the disadvantaged groups.

Driving-limited people are reflecting willingness to increase their travel more than the rest of the sample (n=3284).
## Ridehailing Use for Commute:

Where system is available and among familiar people

<table>
<thead>
<tr>
<th></th>
<th>Non-White</th>
<th>Hispanic</th>
<th>Income&lt;50K</th>
<th>Limitation in Driving Day or Night</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I use it less than one day a month</td>
<td>77%</td>
<td>5%</td>
<td>2%</td>
<td>6%</td>
</tr>
<tr>
<td>I use it 1-3 days a month</td>
<td></td>
<td>7%</td>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td>I use it 1-2 days a week</td>
<td></td>
<td>8%</td>
<td>5%</td>
<td>4%</td>
</tr>
<tr>
<td>I use it 3 or more days a week</td>
<td></td>
<td>2%</td>
<td>5%</td>
<td>1%</td>
</tr>
<tr>
<td>Available but I never use it</td>
<td></td>
<td>2%</td>
<td>4%</td>
<td>8%</td>
</tr>
</tbody>
</table>

×2

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Ridehailing Use for **Commute**: Ordered Probit Model

**Response Variable**: Level of ridehailing use for commute (never used[base], rarely, monthly, 1-2 times/week, 3+ times/week)

$R^2 = 0.09$ (N =2833)

The model highlights the significance of low-income and driving-limited and born outside US in a positive direction

* I prefer to live close to transit, even if it means I’ll have a smaller home and live in a more densely populated area.

** Public transit is a reliable means of transportation for my daily travel needs.

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>t-stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold: 1</td>
<td>2</td>
<td>0.57</td>
</tr>
<tr>
<td>Threshold: 2</td>
<td>3</td>
<td>1.17</td>
</tr>
<tr>
<td>Threshold: 3</td>
<td>4</td>
<td>1.79</td>
</tr>
<tr>
<td>Threshold: 4</td>
<td>5</td>
<td>2.24</td>
</tr>
<tr>
<td>Male</td>
<td>0.19</td>
<td>2.76</td>
</tr>
<tr>
<td>Age: 18-30 yrs</td>
<td>0.30</td>
<td>3.32</td>
</tr>
<tr>
<td>Age: 31-40 yrs</td>
<td>0.22</td>
<td>2.07</td>
</tr>
<tr>
<td>Age: 41-50 yrs</td>
<td>0.11</td>
<td>1.09</td>
</tr>
<tr>
<td>Driver</td>
<td>-0.37</td>
<td>-3.36</td>
</tr>
<tr>
<td>Low-Income (&lt;$50,000)</td>
<td>0.15</td>
<td>1.95</td>
</tr>
<tr>
<td>High-income (&gt;=$150,000)</td>
<td>0.22</td>
<td>2.48</td>
</tr>
<tr>
<td>Born Outside-US</td>
<td>0.22</td>
<td>2.49</td>
</tr>
<tr>
<td>Driving-limited</td>
<td>0.41</td>
<td>4.53</td>
</tr>
<tr>
<td>HH Vehicles: 1</td>
<td>-0.28</td>
<td>-2.00</td>
</tr>
<tr>
<td>HH Vehicles: 2+</td>
<td>-0.59</td>
<td>-4.37</td>
</tr>
<tr>
<td>Transit Advocate*</td>
<td>0.31</td>
<td>4.39</td>
</tr>
<tr>
<td>Transit Reliable**</td>
<td>0.16</td>
<td>1.98</td>
</tr>
</tbody>
</table>
Ridehailing Use by Disadvantaged Groups

- Low-income and driving-limited groups are using ridehailing services *weekly for commute* twice more than the rest of the sample.
- Race, ethnicity, and income disadvantaged groups
  - Feel *higher price burden* of ridehailing services
  - Chose *shared mode* (vs. private mode) twice more than the rest of the sample
  - More willingness to use ridehailing for *transit connectivity*
- Disadvantaged groups are using ridehailing services generally more for *essential purposes* compared to leisure and airport travel for the rest of the sample
Conclusions

• Studied disadvantaged groups are less familiar with AVs.
• Low-Income are less and mobility-limited people are more interested in buying AVs.
• Disadvantaged communities are potential places for successful shared AV adoption similar to current ridehailing use patterns.

FUTURE

For automation to be equitable, we need effective business models, reduced digital gap, and integrated multi-modal transport systems for a well-served society!
Thank you!

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For more information:

https://tomnet-utc.engineering.asu.edu/t4-survey/
**Key Takeaways**

- Define equitable policy with clear regulation and enforcement.
- Meet disadvantaged communities' transport needs through focused on-demand mobility services rather than trying to make the entire fleet equitable and accessible.
- Address payability-digital gap.
- Consider deliveries on top of passenger deliveries (food deserts).
- Affordability: To what extent can we subsidize? Better get advantage of sharing and transit connectivity using integrated mobility platforms.
- How to get advantage of automation beyond its driverless benefit to improve communication and efficiency and therefore accessibility and mobility.