Where Do Emerging Travel Modes Fit Into Regional Models?

Liming Wang, Ph.D., Jennifer Dill, Ph.D., Kelly Clifton, Ph.D.

A report from The National Institute for Transportation & Communities (NITC) offers help to planners seeking to incorporate emerging travel modes—including car sharing, bike sharing, ride hailing, and autonomous vehicles—into regional travel demand models. More specifically, it brings these new travel modes into the Regional Strategic Planning Model (RSPM) tool. As more people start taking advantage of new opportunities, like hopping into and out of self-driving taxis, the needs of the roadway system will inevitably change.

THE REGIONAL STRATEGIC PLANNING MODEL

The RPSM is a performance-based planning tool first developed by the Oregon Department of Transportation (ODOT). It was later adapted for use by other states, in the form of the Federal Highway Administration's Energy and Emissions Reduction Policy Analysis Tool (EERPAT) and serves as the underlying basis of the Strategic Highway Research Program's Smart Growth Area Planning software (SmartGAP). Practitioners use it to evaluate the impact of proposed policies on greenhouse gas emissions, vehicle miles traveled, travel delays, and other outcomes.

WHY INCORPORATE EMERGING TRAVEL MODES?

In recent years, vehicle sharing (car and bike), ride hailing, and autonomous vehicles are emerging as policy and travel options throughout the U.S. These modes are only just beginning to be considered in travel modeling applications, and our understanding of their likely impacts on travel behavior is limited.

Given the innate uncertainties of these emerging modes, researchers set out to help bring them into the modeling process. The goal? To enhance the RSPM and use it to consider the effects of emerging modes. This project leveraged combined funding from NITC and ODOT to incorporate these modes into the RSPM tool.

A NATIONWIDE SURVEY: UNDERSTANDING TRADEOFFS AND PREDICTING MODE CHOICE

The research team completed a nationwide survey and collected data from 1,117 valid participants. The data were examined to learn about their recent travel behaviors, attitude, and their stated preferences about using emerging travel modes when presented along with their chosen mode. The team then developed models using the data from the stated preference choice experiments, along with information from the revealed preferences and socio-demographic characteristics of the survey respondents. The purpose of developing these models is two-fold:

1. To allow researchers to understand the tradeoffs that survey respondents are making across different attributes (e.g., costs vs. time) when they choose among travel modes, in particular, along with emerging modes.

2. To enable planners to predict mode shares for existing and emerging modes and subsequent effects under different assumptions of technology availability and policy scenarios.

Researchers have made the code for the new travel models available as an open-source repository on GitHub (see reverse for the URL) in order to facilitate its use by modelers and other academic researchers.

KEY FINDINGS IN EMERGING TRAVEL MODES

- Survey results show that people would shift to AV in droves, provided the cost per ride was low enough. The research team found that per-ride costs for shared AV could be substantially lower than many existing alternatives, especially when parking costs are factored in.

- The proportions of drivers and car passengers who chose to stay with the same modes were highest. It seems drivers and their passengers have the highest inertia and are most likely to stick to their lane.

- For those using car share and carpool/vanpooling, the proportion who stuck to original modes was low, meaning they would be likely to shift to other modes.

- Of the respondents who used a personal bike for their recent trips, 70% chose to still use a personal bike in the hypothetical experiment. Meanwhile, only 40% of respondents who used bike share for their recent trips chose to still use bike share in the hypothetical scenario. This implies that bicycle ownership contributes to adoption of bike modes.

WHAT'S NEXT?

A second phase of the research has received $136,000 in NITC funding, and the team will investigate long-term travel and land use through simulations. The primary aim of the next phase is to identify policy scenarios that can help promote sustainable and equitable future patterns of travel and land use, shaping the evolution of AV technology to help meet these goals.

Phase two will use the information learned in the surveys to formulate a conceptual framework, in order to show how various factors work together in the adoption of AV. Researchers will develop tools to study the travel and community outcomes of AV adoption and the effects of various policy scenarios.

ABOUT THE AUTHORS

The research team consisted of Liming Wang, Joseph Broach, Huajie Yang, Kelly Clifton and Jennifer Dill of Portland State University.

ABOUT THE FUNDERS

This research was funded by the National Institute for Transportation and Communities, with additional support from the Oregon Department of Transportation and the Summit Foundation.

THE FULL REPORT and ONLINE RESOURCES

For more details about the study, download the full report **Incorporate Emerging Travel Modes in the Regional Strategic Planning Model (RSPM) Tool** at **https://nitc.trec.pdx.edu/research/project/881**

Photo by Felix Tchverkin on Unsplash