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Latent Active Transportation Methodology

Maria Chierichetti, PhD
Fatemeh Davoudi Kakhki, PhD

Project 2309
April 2025

Introduction

To create better sidewalks, bike lanes, and other infrastructure and to design better policies, it is important to understand how many people would walk or bike if safe and convenient options to do so were available to them—this is called "latent demand." Unlike traditional demand models that focus on observed trips, latent demand estimation tries to measure the unrealized potential for active travel caused by barriers such as inadequate infrastructure, safety concerns, or lack of connectivity. Latent demand estimation for active transportation has gained significant attention in transportation research and planning because of its role in identifying unrealized travel potential. Traditional travel demand models have often underestimated walking and cycling trips due to data limitations and infrastructural constraints. Recent efforts have tried to refine methodologies for estimating latent demand using spatial modeling, behavioral analysis, and multimodal integration. This study develops a comprehensive latent demand model for California, integrating geospatial analysis and multimodal accessibility assessments.

Study Methods

The Latent Demand Method quantifies the potential, yet unrealized, demand for walking and cycling trips and assesses its impact on transportation systems. This approach estimates the number of trips that could occur within a given area if optimal pedestrian and cycling infrastructure were in place. Using a GIS-based corridor analysis, the methodology analyzes how easy it is to reach places on foot or by bike, estimating potential demand based on distance and accessibility. The model assumes that the closer a road is to key destinations, the more people will want to walk or bike there, with demand decreasing as distance increases. Key factors incorporated into the analysis include employment density, population distribution, school and university enrollments, and proximity to parks and trails, which help estimate the likelihood of walking and cycling trips.

To further refine the model, cyclists are classified into four behavioral categories: strong and fearless, enthused and confident, interested but concerned, and no way, no how. These classifications help account for different levels of willingness to cycle based on

perceived safety and comfort. The methodology has been tested in Douglas City, El Centro, and downtown San Jose, demonstrating its applicability across urban, suburban, and rural environments, highlighting how different settings influence latent demand for walking and biking.

Findings

Findings show that employment centers and commercial areas are major drivers of bicycle demand, while schools and recreational spaces significantly influence pedestrian activity. The methodology assigns a Latent Demand Score to highway segments based on potential active transportation traffic, considering factors such as work commutes, shopping trips, school enrollments (including colleges and universities), and proximity to parks and trails. For each of the three case studies in California—San Jose (Downtown), El Centro, and Douglas City—three highway segments were identified where active transportation infrastructure would have the greatest impact on both pedestrian and cycling traffic. These locations represent priority areas for investment in walking and biking facilities, where improvements would likely result in the highest increase in active transportation trips.

Overall, the method serves as a valuable tool for estimating the effectiveness of new pedestrian and cycling infrastructure. However, urban planners are encouraged to consider existing and planned infrastructure before making new investments. By integrating these insights with broader transportation planning efforts, cities can maximize the benefits of active transportation projects, ensuring that new facilities are placed where they will have the greatest impact on mobility and accessibility.

Policy Recommendations

The results emphasize the importance of strategically improving active mobility infrastructure to convert latent demand into actual walking and cycling trips. The findings highlight specific areas where people are likely to walk or cycle if safer, more convenient, and well-connected pathways were available. This supports the justification for investing in bike lanes, pedestrian-friendly streets, and other active transportation facilities that enhance accessibility and safety. By identifying locations where new or improved infrastructure would have the most significant impact, the method helps state and local governments prioritize investments effectively. Instead of implementing projects without clear data on demand, planners can use these insights to ensure that limited transportation funds are allocated to areas where they will yield the highest return in terms of increased pedestrian and bicycle traffic. Additionally, integrating these findings into broader transportation and land-use planning efforts can promote sustainable mobility, reduce congestion, and encourage healthier, more active lifestyles.

Overall, these results serve as a valuable tool for decision-makers, helping them design and implement infrastructure projects that maximize the benefits of active transportation, fostering more walkable and bike-friendly communities.

About the Authors

Dr. Maria Chierichetti is an Associate Professor in the Department of Aerospace Engineering at San José State University. Her current research interests focus on integrating machine learning to current analysis tools to improve the safety of transportation systems.

Dr. Fatemeh Davoudi is an Associate Professor in General Engineering and (by courtesy) in Electrical and Computer Engineering at Santa Clara University. Dr. Davoudi is currently leading the Machine Learning & Safety Analytics Lab.

To Learn More

For more details about the study, download the full report at transweb.sjsu.edu/research/2309

MTI is a University Transportation Center sponsored by the U.S. Department of Transportation's Office of the Assistant Secretary for Research and Technology and by Caltrans. The Institute is located within San José State University's Lucas Graduate School of Business.