

TITLE

Dynamics Of Urban Shared Mobility Services: User Demand Patterns, Characteristics, Perceptions, And Future Intentions

ABSTRACT

In a time where the concept of sharing has become more than a social virtue, thanks to evolving technology, shared mobility emerges as a contender, possibly capable of replacing private vehicles, and ultimately helping to alleviate the burdens of urban congestion and pollution. However, public resistance to shared mobility remains a hurdle despite its potential to replace private vehicles and reduce urban congestion and pollution. To that end, the overall goal of this dissertation is to provide an evaluation of shared mobility services in the United States, focusing on e-scooter sharing, bike-sharing, and ride-hailing in varied urban settings. The dissertation is structured around four pivotal research questions: (1) How does usage of bike-sharing and e-scooter sharing differ around campuses, and what impact has the COVID-19 pandemic had on these patterns? (2) What are public perceptions regarding the barriers to and benefits of shared mobility? (3) What are the anticipated future intentions for using shared mobility services post-COVID-19? (4) How does the construction of bike lanes influence the usage of shared mobility services? These questions aim to provide a comprehensive view of usage characteristics, users perceptions, behavioral intentions, and the structural impacts of urban design on the integration of shared mobility into transportation systems.

This study is among the first in comparing e-scooter sharing and bike-sharing in a campus setting—a less commonly studied environment compared to urban settings with well-established micro-mobility services. Utilizing survey data from Purdue University, the study conducts a comprehensive analysis using methods, such as a two-sample Z test, logistic regression, and comparative tests, to examine the impact of COVID-19 on usage patterns. It confirms that micro-mobility significantly enhances campus mobility and suggests proposing infrastructure improvements, such as protected bike lanes and dedicated e-scooter parking areas. Furthermore, the research delves into public perceptions by developing a novel survey instrument to assess perceived benefits and barriers in Indianapolis, employing Latent Class Analysis to segment user

perceptions and suggesting strategies to enhance service attractiveness and overcome fare and safety concerns. Another aspect of the study evaluates the pandemic's influence on shared mobility usage intentions. The study leverages a multi-group Structural Equation Modeling approach using the Theory of Planned Behavior (TPB) to analyze survey data from the same Midwestern cities. It highlights shifts in user expectations and the necessity for adaptive service models. Additionally, the study explores the safety perception aspect of shared mobility by assessing the impact of new protected bike lanes on bike-sharing ridership in New York City. Implementing a difference-in-differences approach, the study indicates significant increases in areas with new infrastructure. These findings suggest robust strategies for urban design and policy to promote shared mobility and sustainable transportation solutions.

The dissertation's contributions extend across several aspects of shared mobility, including service perceptions, intentions to use, and actual usage. It further offers a comprehensive guide to enhance shared mobility systems effectively. By implementing the CYCLES framework, policymakers and operators within the transportation sector can promote greater adoption of shared mobility, contributing to the broader goals of reducing urban congestion, enhancing public health, and preparing for future transportation advancements.