Chapter 5

The Effects of Micromobility on Public Transportation Systems

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ABSTRACT

This study explores the integration potential of micromobility (e-scooters and e-bikes) within public transport systems, focusing on the first- and last-mile challenge in urban mobility. Based on a 2025 survey of 501 users in İzmir's Bornova district shows that 92.8% access stops on foot, typically within 4-10 minutes and 500-1,000 meters. Although micromobility use is limited, 58% of respondents would consider it under better conditions. Main barriers include adverse weather, long distances, limited coverage, high costs, and safety concerns. The preferred range for micromobility is 1-5 km, indicating strong potential for medium-distance connections. Statistical analyses reveal significant relationships between micromobility adoption and access variables (mode, distance, time, and waiting; p> 0.01). Policy recommendations emphasize integrated fare systems, safe lanes, wider coverage, and strategic station placement within 500-750 meters of transit stops. Overall, micromobility can complement public transport sustainably by improving accessibility and supporting urban mobility.

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INTRODUCTION

With the acceleration of urbanization, transportation systems have become one of the most significant and complex urban challenges due to issues such as traffic congestion, increasing vehicle ownership, air pollution, energy consumption, and greenhouse gas emissions. The growing population and the deepening of these problems have made the need for sustainable, efficient, and accessible transportation solutions more evident than ever (Monteiro, 2024; Chapman, 2007). It is now widely recognized that transport is not merely physical mobility; rather, it constitutes an integral part of urban life with social, economic, and environmental dimensions. Accordingly, sustainability, accessibility, energy efficiency, and inclusiveness rank among the primary priorities in transport system planning (Litman, 2021; Creutzig et al., 2015).

In this context, public transport systems one of the most environmentally friendly modes play a critical role in reducing cities' carbon footprints, alleviating traffic loads, and enhancing urban quality of life (Newman & Kenworthy, 2015). However, one of the key factors limiting the potential efficiency of public transport is the set of access difficulties users face when reaching stops and traveling from stops to final destinations what is commonly referred to as the "first and last mile problem (FLM)".

This access issue, particularly in low-density settlements with inadequate pedestrian and cycling infrastructure, makes it difficult for users to reach public transport and consequently leads to a shift toward private car use. Numerous studies have demonstrated that the "first and last mile" distance is decisive in public transport choice (Bösch et al., 2017; Kamargianni et al., 2016). In recent years, alternative travel modes that can help address this problem have come to the fore; among these, micromobility has emerged as an innovative solution.

Micromobility is defined by the Institute for Transportation and Development Policy (ITDP) as small, lightweight, individual vehicles operating at speeds below 25 km/h, generally used for short trips up to 10 kilometers (ITDP, 2021). These vehicles include bicycles, electric bicycles (e-bikes), electric scooters (e-scooters), skateboards, and similar personal mobility solutions. Owing to advantages such as energy efficiency, low carbon emissions, flexibility, and accessibility, micromobility has the potential to complement public transport systems, particularly for short-distance trips (Shaheen & Cohen, 2019).

In advanced economies, micromobility has spread as a solution that enhances the efficiency of public transport networks, facilitates access to stops, and reduces dependence on private cars. In European cities such as Paris, Berlin, Lisbon, and Stockholm, bicycle-sharing systems and e-scooter networks have been digitally integrated with metro and bus systems, becoming key components of multimodal transport (Reck et al., 2022; Sanders et al., 2020). This integration shortens access