

The Impact of Tram Network Expansion on Passenger Flow Dynamics: A Case Study of Olsztyn

Gross Marta

Department of Land Management, University of Warmia and Mazury in Olsztyn, Olsztyn, 10-719, Poland, marta.gross@uwm.edu.pl

Abstract

This study examines the impact of expanding the tram network in Olsztyn, Poland, on urban mobility and sustainable transport goals. Following the restoration of tram services in 2015 and a significant expansion in 2024, the research evaluates how integrating rail transport influences passenger behaviour and system accessibility. Adopting a case study approach, the research utilizes empirical data from the local Road, Greenery, and Transport Authority. The analysis combines a comparative study of passenger flows before and after the 2024 investment with spatial analysis conducted in a GIS environment. This allowed for the visualization of relationships between new tram lines and shifts in public transport usage. Spatial analyses reveal that the decrease in passenger numbers at certain bus stops correlates directly with the routes of the newly established tram lines. This suggests a successful modal shift, where residents transitioned from cars, taxis, and buses to the more efficient tram system. Furthermore, the investment enhanced urban aesthetics and quality of life through accompanying infrastructure, such as new greenery and pedestrian-bicycle paths. The findings confirm that tram systems are effective tools for reducing private car reliance and supporting sustainable mobility. Olsztyn's experience aligns with European trends where rail transport serves as a pillar of eco-friendly urban development.

Keywords: sustainable urban mobility, tram network expansion, Olsztyn case study, GIS spatial analysis