

Does Transit Service Reliability Influence Ridership?

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Introduction

A growing population, rapid urbanization, and rising travel demand intensify the need for public transportation systems and sustainable transportation planning. In spite of the demand for public transportation, bus ridership has not increased significantly due to the fact that current public transportation systems require modernization, expanded service areas, and increased service frequency with more efficiency. Bus transit service reliability is one of the most critical service characteristics from a rider's perspective. While the level of service and customer satisfaction influence ridership, inconvenience, operations uncertainty, and unreliable service diminish the rider's confidence and may ultimately result in an overall decline in ridership. Therefore, providing reliable bus transit service might foster a more significant, satisfied, and committed base of public transportation system riders. The perception of bus transit service reliability among riders is based on on-time arrival/departure

and waiting times. Yet, intra-city bus services often show inconsistencies in on-time arrival/departure at bus stops, possibly because buses share their travel space with other transportation modes, making them vulnerable to recurring and non-recurring congestion. These delays impact the rider's impression of the system. Therefore, this study analyzes the association between bus transit service reliability (BTR) and ridership at bus stop level, considering the effect of temporal indicators (day of the week and time of the day), spatial indicators (direction of travel), and the type of bus stop. Also, the association between BTR at bus stop level by time of the day and day of the week and road network, demographic, socioeconomic, and land-use characteristics were analyzed.

Study Methods

The research team conducted analysis at a bus stop level with bus arrival/departure and ridership data from the Charlotte Area Transit System (CATS).

The road network, demographic, socioeconomic, and land use characteristics were captured within 0.25-mile and 0.50-mile buffers, and Pearson correlation analysis was conducted to understand the association between road network, demographic, socioeconomic, and land use factors and BTR.

Bus transit service reliability has a substantial impact on ridership, and bus transit service reliability is influenced by road, demographic, socioeconomic, and land-use factors within the bus stop's vicinity.

Findings

- BTR has a positive association with ridership during morning-peak and night-time hours of a typical weekday.
- BTR has a positive association with ridership for the inbound direction during morning peak hours, and for the outbound direction during night-time hours.
- BTR has a positive association with ridership at transit centers and bus stops near LRT stations (typically categorized as high-activity bus stops).
- BTR has a negative association with the total number of signalized intersections, and total road network length within the vicinity of a bus stop.
- BTR has a negative association with more populated and high-income areas, and with land use related to commercial/employment purposes within the vicinity of a bus stop.

The methodology is transferable to other regions and can be adopted to identify the significant characteristics of BTR influencing ridership. Also, it can be used to understand underlying external characteristics that may influence BTR.

Policy/Practice Recommendations

The findings of this research serve as insights for public transportation agencies to effectively utilize available resources, to plan, and to provide equitable services to all riders. It is possible that the values placed on reliability and ridership may vary not only based on individual characteristics, but on regional

characteristics as well. Public transportation agencies should expand and implement rider-oriented measures of reliability and satisfaction accounting for regional characteristics.

About the Authors

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To Learn More

For more details about the study, download the full report at transweb.sjsu.edu/research/2118



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