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CALIBRATION OF HIGHWAY/TRANSIT SPEED RELATIONSHIPS FOR IMPROVED TRANSIT NETWORK MODELING IN FSUTMS

PROBLEM STATEMENT

Emulating different components of transit travel time accurately in demand forecast model to reflect the true traffic condition is important since delay significantly affects the operating statistics. The components of transit travel time include the following:

- dwell time at stops
- travel time between stops
- traffic signal delay time
- general traffic delay time
- recovery time at the end of each trip

The current FSUTMS model uses a set of highway-transit speed curves based on facility type and area type to model the relationship between highway speed and transit speed. This method has a number of limitations, such as the considerable vagueness in the definition of area types and the fact that ridership is not considered. As a result, such an approach is unable to reflect appropriately delays at bus stops due to passenger loading and alighting. An alternative method is, therefore, needed.

OBJECTIVES

The goal of this study is to improve transit travel time estimation by properly considering its individual components. One of the components is *dwell time at a bus stop*, which is highly correlated with the number of boarding and alighting passengers. A higher demand at a bus stop means longer dwell time. In a typical bus operation, passengers may board a bus only through the front door but may have the choice to get off the vehicle either through the front or the rear door. This study is designed to determine the dwell time based on boarding and alighting activities and to develop a transit link travel time model by considering dwell time, acceleration and deceleration of a vehicle approaching or leaving a bus stop, and highway travel time.

FINDINGS AND CONCLUSIONS

This study resulted in the development of a binary logit model that estimates the dwell time by considering the number of onboard, alighting, and boarding passengers at a bus stop and the characteristics of the boarding and alighting activities. The average boarding and alighting time per passenger and the probability of a passenger choosing either the front or rear door to alight

from a bus were estimated using data collected from selected transit routes in Broward County. Researchers found that a passenger's decision of choosing a particular door to alight from a bus was influenced by the total number of alighting passengers, the time of day (AM or PM, peak or off-peak), and whether a bus stop was also a time point.

Based on the results from the boarding and alight activity study, a model was developed to estimate the transit link travel time based on the number of onboard, alighting, and boarding passengers at a stop, time of day, time point (optional), transit vehicle acceleration and deceleration rates, and highway link travel time. The model was implemented as a computer program. The method is easy to understand and can be implemented in the current practice without significant effort. To implement the model in FSUTMS, an iterative process that calculates transit link time based on boarding and alighting data from the previous iteration is necessary, because ridership data are required as input to the door choice model.

The conclusions of this study are based on the analysis of the transit travel time data collected in Broward County, Florida. One limitation of the study is that demographics and climate are not considered in modeling the dwell time. When demographics changes significantly, e.g., when a large portion of the passengers are senior citizens, dwell time may change. Therefore, data may need to be collected for areas with different user characteristics to determine the effects of local conditions and to obtain good estimates of dwell time and, thus, transit travel time.

BENEFITS

The methodology and the computer program developed in this study may be implemented in the FSUTMS model for calculating transit speed based on highway speed and ridership statistics. Implementation of the developed program will improve the accuracy of transit link travel time, which will, in turn, improve the model validation and forecast results.

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