ABSTRACT

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Degree Received: December 2017
Title: Assessing the First and Last Mile Problem in Intercity Passenger Rail: Effects on Mode Choice and Trip Frequency
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Passenger rail service is an integral part of intercity transportation networks, especially in areas where residents do not have access to a car or there are not any other options for intercity travel. In the United States, some areas have experienced a decline in passenger rail service, including reductions in the frequency or entire abandonment of service. To improve the current situation of intercity passenger rail service, two alternatives can be considered. The first one is to improve the rail service itself (frequency, infrastructure, among others), and the second one includes improvements to the accessibility of the stations, which might be cheaper and overall, more cost effective. Improvements in the accessibility could impact a wider area and can play a key role in determining if the railway is chosen as a travel alternative. In view of the above, the main objective of this thesis is to explore how to enhance access to medium (between 3 to 5 hours of travel or more than 50 miles from home to the furthest destination, according to BTS) distance intercity passenger rail by identifying the factors that affect mode choice, level of usage, and evaluating different strategies to reach a station.

The Hoosier State Train (HST), a short-distance intercity passenger rail that travels between Chicago and Indianapolis four days a week, was chosen as a case of study. The HST has four intermediate stops located in Indiana. For some of those intermediate stops, the HST is the only intercity public transit service offered to reach either Chicago or Indianapolis. An on-board survey that explored opportunities to increase the HST ridership was conducted in November and December 2016. The survey findings indicated that there are riders who travel from counties further away from a county with a station to take the train. Moreover, it was found that most of the respondents drove, rented a car, or were dropped off to reach a train station in Indiana. These findings suggested that there is a possible gap in the first and last mile travel options for intercity rail riders. The first and last mile of a trip has been used to describe passenger travel with regards to getting to and from transit stops/stations. Solving the first and last mile (FMLM) problem
extends the access to transportation systems and enlarges the number of passengers from a remote community, such as rural areas. The FMLM problem has been addressed in different public transit contexts, mainly within urban areas. However, limited research efforts have been undertaken to examine the FMLM problem of intercity passenger rail. This research fills this gap and further, explores the best strategies to address the FMLM problem of short distance intercity passenger rail (i.e., corridors that are less than 750 miles long according to the Passenger Rail Improvement and Investment Act, 2008).

Using the data collected on board the HST in Indiana, this thesis estimates a multi-attribute attitude model to assess how transportation mode preferences for intercity travel and factors considered in mode choice decision vary among people with different levels of access to an intercity passenger rail line. Furthermore, this thesis estimates an ordered probit model to investigate how passenger characteristics as well as factors associated with both access to a rail line and mode choice decisions relate to frequency of travel by intercity rail. Additionally, this thesis discusses the results of an accessibility analysis for the state of Indiana in a bid to identify the areas in need of first/last mile service where there are no public transportation services and it is expensive to reach a station from a desired origin. To that end, a cost surface for the different modes available in the area of study was created to determine the average travel cost to the nearest station. The analysis was carried out in ArcGIS using origin-destination data from the on-board survey, transportation network information from Bureau Transportation Statistics, and general transit feed specification data.

The results of this study can assist Amtrak and state transportation agencies identify which aspects of rail service can be enhanced to attract more ridership and promote the use of intercity passenger rail in the U.S. Additionally, the results have far-reaching implications for planning the strategies that will provide access to the passenger rail stations. While the inferences are case-study specific, the methodology proposed in this work could be used to identify areas where accessibility can be improved, not just in Indiana but also in other U.S. states or countries with similar characteristics.