



Research Summary

Connecting Demand Response Transit with Fixed Service Transit



WHAT WAS THE RESEARCH NEED?

Travel behaviors have transformed due to changes in demographic and market trends around the country. This is especially true in low and medium-density areas, where fixed-route transit (FRT) may not be cost-effective nor provide a sufficient degree of service to its dependents. Effective integration of traditional transit with demand responsive services has been considered as a viable approach for avoiding unfavorable scenarios, as it combines the efficiency of public transportation with the ease and flexibility of demand responsive services.

Project Number:
RES2021-03

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Project Term:
September 2020 to May
2022

WHAT WERE THE RESEARCH OBJECTIVES?

The main objectives of this project were as follows:

- Provide a comprehensive review of previous literature and studies available on connecting Demand Responsive Transit (DRT) with FRT.
- Conduct case studies of connections between DRT and FRT in cities with similar geographic or transportation systems.
- Identify areas with low transit coverage and potential areas for a demand responsive connector.
- Develop a sketch tool for connecting DRT with FRT either introducing a dedicated demand responsive service.
- Analyze the operational aspects associated with DRT-FRT coordination.
- Develop an equity-based toolbox to identify the target population for DRT-FRT service.
- Develop an implementation plan for connecting DRT with FRT under various scenarios.

WHAT WAS THE RESEARCH APPROACH?

The research team studied the city of Morristown, TN along with Hamblen County, TN because the area had an established DRT service and a recently established FRT service. Data related to individual trips was collected from East Tennessee Human Resource Agency. The data included information about who purchased tickets along with the purpose for their trip. To create distinct scenarios that represent various combinations of the FRT, DRT, and TNC systems to complete a trip (Integrated Scenario), an agent-based simulation modeling technique was used, reproducing current field conditions using the obtained data. An evaluation of the whole system was done to evaluate the cost, time, and equity to evaluate the effectiveness of different scenarios in terms of accessibility to serving the demand.

WHAT WERE THE FINDINGS?

The key findings of the project are as follows:

- The study successfully analyzed the possibilities of the integration of FRT, DRT, and TNCs from both user and agency perspectives.
- Sixty percent of the trips preferred the “Integrated Scenario” compared to the base case scenario of DRT-DRT given the economic viability.
- Utilizing DRTs and TNCs as a feeder system to FRT is feasible in terms of the total system cost.
- In terms of equity, the integrated scenarios are more equitable than the FRT network in catering to the demand and the system cost.
- Integration is advisable for both the users and agencies for a more equitable and low-cost public transit system.

IMPLEMENTATION AT TDOT

While the study area was limited to a single city, the model is capable of expanding to multiple cities with a defined road network system. The results demonstrate the viability of possible integration and illustrate how the methodology might be broadened for large-scale implementation. While the current model is a fully functional, planning tool, there are several ways in which it might be enhanced and expanded to cover wider areas in the future. The initial path for future initiatives should be to improve the model by gathering additional transit data from new cities and greatly generalizing the model.

MORE INFORMATION

Find the final report here: https://www.tn.gov/content/dam/tn/tdot/long-range-planning/research/final-reports/res2021-final-reports/RES2021-03_Final_Report_Approved.pdf.