Research Summary

Comprehensive Planning Guidebook for Commodity and Freight Movement in Tennessee

Project Number:

RES2019-14

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Project Term:

December 2018 to
December 2021

WHAT WAS THE RESEARCH NEED?

Commodity flow data allows transportation planning agencies to better understand freight movements and develop regional and state transportation plans for regional and local transportation projects. Research efforts are needed to obtain high-resolution commodity flow data that would allow state Departments of Transportation (DOTs) and regional agencies to have a better understanding of freight movement and plan to provide the adequate infrastructure to meet the growing needs of freight demand and use in the travel demand model for planning and forecasting and policy decision making such as freight diversion studies.

WHAT WERE THE RESEARCH OBJECTIVES?

The objectives of the research included:

1. Collect and compile a geodatabase with all the available freight flow, land-use, and economic activity data for Tennessee.
2. Develop methodologies and tools that can be used to disaggregate freight flows, land-use, and economic activity data in Tennessee and apply those tools.
3. Develop a comprehensive guidebook for the estimation of commodity flows, land-use, and economic activity and their applicability and use in freight planning.
4. Promote collaboration between the Piedmont Atlantic Megaregion states of freight planning, operations and management, and project selection.

WHAT WAS THE RESEARCH APPROACH?

The research team implemented models and developed GIS tools to disaggregate the IHS Global Insight's TRANSEARCH commodity freight database to any jurisdictional level. Infogroup InfoUSA business and consumer contact database was used to obtain disaggregate-level zone economic indicator values. BEA Input-Output Account Supply and Use tables were utilized to link industries that produce with industries that use the commodity and estimate their shares. Three freight flow distribution methods were applied: the Gravity model, the Iterative Proportional Fitting, and Proportional Weighting. The developed ArcGIS tools were grouped into three sets: the preprocessing tools, the disaggregation tools, and the postprocessing tools. Analytical capabilities were achieved by giving users the ability to select the disaggregate flows by some condition or estimate disaggregate zone productions and attractions. The visualization was achieved by providing users with the ability to automate map creation to visualize either disaggregate OD flows or productions and attractions.

WHAT WERE THE FINDINGS?

The key findings of the research are:
- Easy to use ArcGIS tools that were developed can be used with existing or new data to develop commodity freight flow O-Ds at various disaggregation levels.
- New and emerging technologies and development of standardization of data will be key to more accurate freight data and freight demand models.
- Various opportunities for collaboration on freight related projects across states that border with TN were identified including freight travel demand modeling, truck parking, dedicated freight infrastructure, and freight project prioritization.
- A website providing access to all the materials developed as part of this research has been developed to support dissemination (https://sites.google.com/view/res2019-14/home).

IMPLEMENTATION AT TDOT

This research provides TDOT and regional/local agencies in Tennessee with high-resolution (i.e., disaggregated in a finer geography) commodity freight flow data. This data can be utilized to better understand freight movements to plan for adequate infrastructure to meet the growing needs of freight demand, use in the travel demand model for planning and forecasting, and maintain a database of intra- and inter-regional commodity flows. Moreover, it helps obtain the growth and enhance policy decision-making such as expanding freight diversion opportunities, and develop and analyze links between commodity flows, economic activity, and land use. This research will also support freight planning by documenting and analyzing the strengths and limitations of emerging new freight flow, land-use, and economic activity data and their potential applications in freight planning and modeling.

MORE INFORMATION

Find the final report here: https://www.tn.gov/content/dam/tn/tdot/long-range-planning/research/final-reports/res2019-final-reports/RES2019-14_Final_Report_Approved.pdf.