RESEARCH SUMMARY

AN INTEGRATED FRAMEWORK FOR MODELING FREIGHT MODE, AND ROUTE CHOICE

Problem

Freight mode choice is a critical component of travel demand modeling. If ignored or analyzed with rule based approach it could lead to inaccurate estimation. With a number of national and international freight related initiatives it is important for Maryland to develop a freight mode choice model for policy analysis and planning purposes.

Objective

This research objective was to develop a freight mode choice model for use in statewide freight travel demand modeling, using only open source databases.

Description

Freight Analysis Framework (FAF) was the only open source data available for analyzing freight mode choice with limited aggregated commodity flow data. Relevant factors for the mode choice were examined to provide implications for freight planning and decision making. A multivariate logistic model was developed with aggregate shipment data. Model formulation, empirical analysis and model application were discussed. The model was designed to explore the relationship between truck share and origin and destination zone characteristics. Maryland (MD) was used as the study area.

With the available data, a set of three groups of commodities (lower truck percentage –less than 40%, medium truck percentage – between 40% and 80%, and higher truck percentage – more than 80%) were proposed as a super set of 46 FAF commodity types. Further, separate models were developed for "to MD" and "from MD" shipments. It is reasonable to expect that bulk of "within MD" shipments will be transported via truck. Therefore, they do not require further modeling. In addition, three FAF zones within MD is not a reasonable data set for modeling freight mode choice within MD.

Results

Mode choice models for trucks and rail were developed for "from MD" and "to MD" shipments. Other modes did not contain sufficient data for model estimation. The results found that trucks and rail carried more than 95% of the commodities. Truck share is highly influenced by the distance between origin and destination. The number of distribution centers, highway/rail coverage, and the number of transportation-related employment are also significant in the model. For the commodities with low truck share, the number of truck and rail centers will influence the percentage of tonnage shipped by truck. For the commodities with medium truck share, the percentage of truck tonnage only depends on the characteristics of the opposite zones. Variables such as highway and rail coverage in MD and the number of transportation-related employment in MD are not relevant. The model can be applied to estimate the average change of the truck share or other modes under future planning scenarios for Maryland. The State Highway Administration can use the developed model with appropriate modifications in the Maryland Statewide Transportation Model (MSTM). The research also specified the need for detailed data for developing discrete choice models to achieve better results. With more data on zonal land use property, relevant factors can be analyzed for useful implications. Including factors such as value of time, accurate shipping costs for each mode, stated preference or revealed preference surveys among the shippers will improve better estimation of freight shipment mode choice.

Report Information

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