DEPARTMENT OF TRANSPORTATION

OFFICE OF RESEARCH & INNOVATION

TECHNICAL SUMMARY

Questions?
Contact research.dot@state.mn.us.

Technical Liaison:
Andrew Andrusko, MnDOT
Andrew.Andrusko@state.mn.us

Investigator:
Camila Fonseca-Sarmiento,
University of Minnesota

PROJECT COST:
$114,914

Commodity-specific data such as products and destinations could help maximize air cargo transport efficiency.

Commodity Flow Data for Freight Network Infrastructure Planning

What Was the Need?

Minnesota's transportation infrastructure accommodates the movement of goods by all modes of transport, including road, rail, air, water and pipelines. The state's economy depends on a business-friendly atmosphere, including efficient and supported freight transport options. Additionally, some federal funding depends on the state developing a high-quality state freight plan.

The freight transportation network must minimize supply chain disruptions and handle freight needs that may change over time. Accurate data on where and how much cargo is being transported is crucial. Current freight data sets, however, are limited in granularity to discern supply chain patterns or commodity and spatial trends. This deficiency puts MnDOT decision-makers at a disadvantage in managing freight movement within the state.

To ensure freight movement is safe and cost-effective and that it minimizes traffic congestion, MnDOT needed to understand what data sources are currently available and what is needed moving forward to maximize transportation investments that support the movement of goods and services throughout the state.

What Was Our Goal?

The goal of this project was to understand existing data sources to determine which are the most helpful for MnDOT's planning, programming and design of freight network infrastructure.

What Did We Do?

Researchers reviewed the literature on the freight data landscape across the United States, including public and private databases, efforts to model freight flow and practices of other states. They determined the characteristics, advantages and weaknesses of commonly used public and proprietary databases and several software and modeling tools.

A survey of state practices identified what data sources 25 other states are using and the common benefits and challenges of each. Researchers also explored whether freight data is incorporated into transportation plans, how data gaps are addressed and what data is collected. Then they interviewed individuals and groups involved in freight planning in Minnesota, focusing on current and future data needs and their experiences using public and private data sets.

Finally, nine states were selected for in-depth case studies to identify best practices in generating and collecting freight data, including collaborative efforts. This group included other states in the Great Lakes region with economic and demographic characteristics similar to Minnesota's and coastal states with robust freight activity.

What Did We Learn?

Using information gathered from the review of literature and input from other states and stakeholders, researchers compiled a baseline of existing freight data resources and recommendations for generating and collecting freight data.

Minnesota's economy depends on efficient freight movement across the state. To ensure that infrastructure can accommodate cargo transport by all modes, MnDOT needs commodity flow data to plan improvements and minimize supply chain disruptions. An analysis of existing resources and needs will support new tools to optimize investments in freight transport.

Trucks carry more freight than any other mode. Most truck data sources, however, are based on a small sample of truck fleets and do not contain commodity-specific information.

From the case studies, they learned not only about other state freight planning and data collection practices, but also collaborations across sectors and cross-state groups that, among other things, have data cost-sharing arrangements. State freight advisory committees play a variety of roles, address various issues and have member representatives from different sectors. Common concerns expressed by the states included the need for information on commodities across transportation modes and understanding intermodal connectivity.

Researchers summarized advantages and limitations of the most widely used public and private data sources, including two multimodal sources and several single-mode data sets for truck, rail, port/waterway and air transport. Recommendations focus on generating and collecting freight data:

- Use existing data sources to fill data gaps, as findings indicate data are available but underutilized. Additional quantitative and qualitative data would supplement databases, and surveys or stakeholder interviews could inform specific freight-related issues.
- Strategize the purchase of proprietary freight data or analyses, depending on budget constraints and staff capacity. Interagency purchase agreements with other states in the region could reduce data costs.
- Work with the private sector to understand its freight-related challenges and build mutually beneficial relationships.
- Ensure all relevant stakeholders are represented on the freight advisory committee, including federal, state and local agencies; tribal nations; key industry representatives; and academia. Leverage this expertise for specific data needs.

To inform MnDOT's efforts moving forward, Minnesota stakeholders expressed additional freight transportation management needs. Mode-specific data is needed to support efficient water and air transport. Freight planning should address equity considerations, such as how communities are impacted by freight storage or transport. Environmental implications, such as carbon footprints of commodities and sustainability trends in freight transportation, must be factored into infrastructure decision-making.

What's Next?

In addition to ensuring internal resources and staffing are sufficient to use the appropriate data sets and tools, MnDOT will use these findings to advance plans to develop a tool for network freight optimization. This tool, funded by the state Legislature in 2021, will use data and modeling to improve MnDOT's capabilities for freight transportation planning to create an efficient multimodal network for moving goods around the state and lowering supply chain costs.