SPR RESEARCH PROGRAM
SECOND-STAGE PROPOSAL SUMMARY

PROBLEM NUMBER AND TITLE

25-67: Unlocking Freight Mobility Insights: Analyzing Telematic Data for Oregon's Commercial Vehicle Traffic Solutions

PROBLEM SUMMARY

ODOT stands to benefit from the detailed insights that freight telematics probe data can provide. This data would afford a more granular perspective of commercial vehicle activities on highways, which is crucial for the enhancement of travel demand models. In addition, telematic data could provide valuable insights into route preferences, adaptive routing during disruptions, and the influences of weather on travel patterns. By collecting granular data on truck movements and patterns through this research, ODOT stands to benefit from enhance decision-making capabilities, particularly in addressing traffic bottlenecks, toll impacts, and in prioritizing efficient freight movement projects (which help addressed key issues and challenges stated in the Oregon Freight Plan).

ODOT OBJECTIVES

To address the challenges identified in enhancing Oregon's transportation system's understanding and management of commercial vehicle traffic, this proposal outlines a streamlined set of research objectives focusing on leveraging freight telematics data for comprehensive insights and improvements to: 1)enhance transportation modeling and decision-making, 2) support sustainable and efficient freight movement, 3) develop in-depth analysis and enhance stakeholder collaboration, and 4) implement a monitoring and evaluation framework for continuous improvement.

BENEFITS

ODOT could see considerable cost savings and time efficiencies, stemming from optimized freight movements and reduced congestion. Enhanced decision-making capabilities through improved data models can lead to a more effective transportation system, aligning with ODOT's Research Priorities of economic vitality and environmental sustainability. Conversely, not conducting the research could leave ODOT without critical insights for advancing infrastructure and policy, potentially resulting in missed opportunities for efficiency and sustainability improvements in line with statewide transportation goals.

SCHEDULE, BUDGET AND AGENCY SUPPORT

Estimated Project Length: 24 months.
Estimated Project Budget: $210,000
ODOT Support: Becky Knudson, Senior Transportation Economist, rebecca.a.knudson@odot.oregon.gov, Others: Erik Havig, ODOT-PDAD, John Boren, Freight Program Mgnr-ODOT, Sylvan Hoover, Climate Office, Chris Melson, TPAU

FOR MORE INFORMATION

For additional detail, please see the complete STAGE 2 RESEARCH PROBLEM STATEMENT online at:
https://www.oregon.gov/odot/Programs/ResearchDocuments/25-67.pdf

SPR RESEARCH PROGRAM
SECOND-STAGE PROBLEM STATEMENT
FY 2025

PROBLEM NUMBER AND TITLE

25-67: Unlocking Freight Mobility Insights: Analyzing Telematic Data for Oregon's Commercial Vehicle Traffic Solutions

RESEARCH PROBLEM STATEMENT

Oregon's transportation system faces a key challenge due to the limited insights from traditional Automatic Traffic Recorders (ATR) regarding commercial vehicle behavior, a gap that the Oregon Department of Transportation (ODOT) recognizes. Therefore, ODOT stands to benefit from the detailed insights that freight telematics probe data can provide. This data would afford a more granular perspective of commercial vehicle activities on highways, which is crucial for the enhancement of travel demand models. In addition, telematic data could provide valuable insights into route preferences, adaptive routing during disruptions, and the influences of weather on travel patterns. By collecting granular data on truck movements and patterns through this research, ODOT stands to benefit from enhance decision-making capabilities, particularly in addressing traffic bottlenecks, toll impacts, and in prioritizing efficient freight movement projects (which help addressed key issues and challenges stated in the Oregon Freight Plan). Additionally, the research will seek to include planning for medium and electric trucks, focusing on charging infrastructure and parking logistics. Leveraging the telematics data from Robinsight1 ODOT is poised to enrich its travel demand models and inform policy, aiming to make data-driven improvements in its transportation system. This research represents a significant step in ODOT's efforts to transcend the constraints of traditional ATR counts and drive progress towards a more efficient, sustainable, and responsive transportation network.

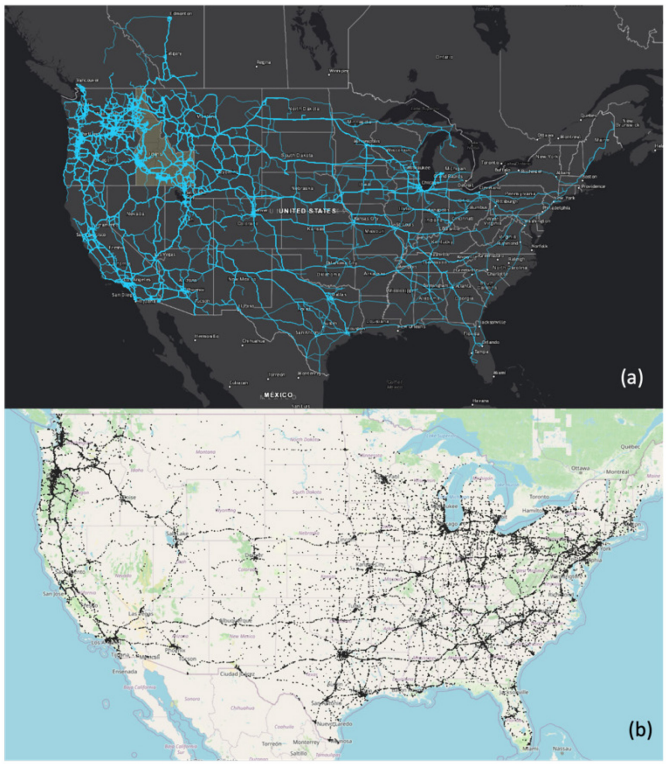

Figure 1. (a) Large Truck Freight Telematic Routes and, (b) Parking clusters where the driver rested for 30mins or more

RESEARCH OBJECTIVES

To address the challenges identified in enhancing Oregon's transportation system's understanding and management of commercial vehicle traffic, this proposal outlines a streamlined set of research objectives focusing on leveraging freight telematics data for comprehensive insights and improvements:

1. **Enhance Transportation Modeling and Decision-making:** To utilize telematics data to refine and improve travel demand models, offering a more detailed understanding of commercial vehicle

[1] https://www.robinsight.com/: The PI has Used this data in a previous study SPR821 *Develop New Methods to Use ODOT Weigh-in-Motion Data for Predicting Freight Flow and/or Commodity Patterns*

movements, behaviors, and preferences. This objective aims to bolster ODOT's capacity for making informed decisions, particularly in addressing traffic bottlenecks, assessing toll impacts, and optimizing freight movement across the state.

2. **Support Sustainable and Efficient Freight Movement:** To employ insights from freight telematics to inform infrastructure and policy development that supports the efficient and sustainable movement of goods. This includes planning for the integration of medium and electric trucks into Oregon's transportation ecosystem, focusing on the development of charging infrastructure and logistical support for parking facilities, thereby contributing to environmental sustainability and economic vitality (Jessup et al., 2020).
3. **Develop In-Depth Analysis and Enhance Stakeholder Collaboration:** To conduct comprehensive analyses of telematics data to generate actionable insights into freight movement patterns, seasonal travel behaviors, and infrastructure needs. Additionally, this objective encompasses developing strategic engagement plans to foster collaboration among ODOT, industry partners, and other stakeholders, ensuring that decision-making is supported by a broad consensus and that findings are effectively disseminated and implemented.
4. **Implement a Monitoring and Evaluation Framework for Continuous Improvement:** To establish a robust monitoring and evaluation framework that leverages real-time data insights from telematics. This framework will assess the impact of implemented transportation solutions against the state's priorities, including safety, equity, sustainability, and efficiency through identifying (proposal developed) key performance indicators utilizing the telematic data. The goal is to ensure continuous improvement in Oregon's transportation system, aligning with the objectives of the Oregon Research Advisory Committee and facilitating the practical implementation of research findings to enhance infrastructure and services.

WORK TASKS, COST ESTIMATE AND DURATION

To address the updated research objectives, the specific tasks to be undertaken are as follows:

***Task 1: Comprehensive Literature Review [2 months*]:** The research team will conduct a literature review to better establish the extent of previous or parallel research on the topic of freight mobility where telematic data was utilized.

Task 2: Comprehensive Data Acquisition and Integration Framework [4 months]: The team will gather and integrate freight telematics data with existing transportation databases, ensuring compatibility. This involves identifying data needs, sources, and integration methodologies to facilitate continuous improvement in transportation modeling and decision-making processes. Collaboration with ODOT and other data providers will be essential to secure a comprehensive dataset for analysis.

Task 3: Advanced Behavioral Analysis and Pattern Recognition [6 months]: Utilizing the integrated telematics data, the team will conduct an in-depth analysis of commercial vehicle movement patterns, including responses to disruptions and weather impacts. This task involves employing advanced analytics to understand current trends, predict future behaviors, and identify optimization opportunities for traffic flow and safety. The findings will inform subsequent tasks related to infrastructure planning and policy development.

Task 4: Optimizing Freight Movement and Preparing Infrastructure for Future Needs [5 months]:
This part of the research will utilize the data-driven insights from telematics to enhance the prioritization and efficiency of freight movement initiatives including charging stations and smart parking solutions, to support emerging transportation technologies. The efforts aim to align with Oregon's sustainability and efficiency goals, ensuring the transportation system is adaptable and ready for future advancements.

***Task 5: Monitoring and Evaluation Framework Development with (proposed) Key Performance Indicators [4 months]*:** The team will develop a Monitoring and Evaluation (M&E) framework to assess Oregon's transportation system performance by establishing clear and measurable (proposal developed) Key Performance Indicators (KPIs). These indicators will serve as benchmarks for assessing various aspects of the freight transportation system, including safety, efficiency, sustainability, and equity (Hernandez et al., 2023).

Task6: Final Analysis, Recommendations, and Reporting [3 months]: The final task consolidates all research findings, analyses, and recommendations into a comprehensive report. This includes a detailed assessment of the monitoring and evaluation framework's impact, optimization strategies, and future-proofing initiatives. The report will be prepared for review and acceptance by the project's technical advisory committee, with a summary 'Research Note' submitted to ODOT Research for publication.

Key Deliverables:

The research project will yield a series of concise, strategic deliverables: a foundational literature review on freight mobility and telematics; an integrated data acquisition and integration framework; a detailed behavioral analysis report identifying commercial vehicle movement patterns and responses to external factors; proposed strategies for freight movement optimization; a Monitoring and Evaluation framework with (proposal developed) Key Performance Indicators; and a final comprehensive report with recommendations for improving freight mobility, infrastructure readiness for medium and electric trucks, and a publishable 'Research Note' summarizing the findings. These deliverables are designed to equip ODOT with the tools and insights necessary for advancing their transportation system in alignment with contemporary needs and future developments.

Estimated Project Length: 24 months.
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IMPLEMENTATION

The research findings for ODOT will be implemented through the integration of data-driven recommendations into current policies and practices for TPAU and more broadly the agency. Key findings will be disseminated to stakeholders via presentations. The Advisory committee will guide the adoption of new strategies, ensuring that telematics inform traffic management and infrastructure planning, leading to enhanced operational efficiency and readiness for future freight transportation developments.

POTENTIAL BENEFITS

If the research is undertaken, ODOT could see considerable cost savings and time efficiencies, stemming from optimized freight movements and reduced congestion. Enhanced decision-making capabilities through improved data models can lead to a more effective transportation system, aligning with ODOT's Research Priorities of economic vitality and environmental sustainability. Conversely, not conducting the research could leave ODOT without critical insights for advancing infrastructure and policy, potentially resulting in missed opportunities for efficiency and sustainability improvements in line with statewide transportation goals.

PEOPLE

ODOT champion(s): Becky Knudson, Senior Transportation Economist

Problem Statement Contributor (s): Sal Hernandez, Associate Professor of Transportation Engineering, Oregon State University

REFERENCES

1. Jessup, E., Hernandez,S. Anderson, J,Galinato, S., (2020). Idaho Statewide Freight Data and Commodity Supply-Chain Analysis. ITD, RP 272.

2. Hernandez, S., Han, L. (2023). Generating Reliable Freight Distribution Measures with Freight Telematics Data. Center for Freight Transportation for Efficient and Resilient Supply Chain (FERSC), No. 69-A3552348338

STAFF REVIEW PAGE

TRID&RIP

☒ A review of TRID & RIP databases found no existing research that answers the research question.

Technology & Data assessment

☒ No Identified T&D output

☐ At the end of this project, the implementing unit(s) within ODOT will need to coordinate the adoption of new technology or data in order to realize the full potential of this research.

However, this proposal seeks to optimally validate and calibrate existing data and technologies currently in use by ODOT for continuous Freight Traffic Volume Estimation improvement to enhance system accuracy and reliability in our traffic modeling. By conducting this research, ODOT can gain vital insights for advancing infrastructure and policies for efficient and sustainable improvements aligned with statewide transportation goals.

Cross-agency stakeholders

- List ODOT partners or impacted units: PDAD, TPAU, Traffic Counts, Climate, Equity, Communications and Information dissemination to the public (senior ODOT leadership, statewide implications).

- Identify any issues of concern raised by an ODOT partners. Note expected mitigation that addresses these concerns: TPAU and ODOT statewide senior leadership has a need to understand commodity flows and how the lack of these goods flowing to markets may affect local economies and communities across the state in the wake of a road closure, disaster recovery event, or other unforeseen emergent scenarios that may arise. This also would aid in informing freight infrastructure planning needs for communities statewide. Conversely, not conducting the research could leave ODOT without critical insights for advancing infrastructure and policy, potentially resulting in missed opportunities for efficiency and sustainability improvements in line with statewide transportation goals.