

**Title:** Optimizing TransBorder Freight Operations in North America

**Subtitle:** A CRISP-DM Powered Data Analysis for Efficiency, Sustainability, and Cost Optimization

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**GitHub Repo:** <https://github.com/Debv122/transborder-freight-analysis.git>

**Source:** Bureau of Transportation Statistics (BTS), 2020

**Structure:** Monthly CSVs by state, commodity, mode, value, weight

**Preparation Steps:**

- Loaded with glob
- Standardized columns
- Converted currency/weight columns
- Engineered features like value per ton
- Cleaned duplicates and anomalies

**Key Analytical Questions:**

- What are the top ports of entry/exit for trans-border freight, and how do they compare in terms of trade volume and value?
- Which modes of transportation dominate trans-border freight, and how does their usage vary by region or commodity?
- What are the leading commodities traded across U.S. borders, and how do their trade values and volumes change over time?
- How do trade flows and values fluctuate throughout the year? Are there clear seasonal patterns or anomalies?
- Where are the inefficiencies in freight flows, such as shipments with high value but zero or low reported weight, or underutilized routes?
- What actionable recommendations can be made to improve efficiency, sustainability, and cost-effectiveness in trans-border freight operations?

### **Methodology: CRISP-DM Framework**

- Business Understanding: Improve cross-border freight operations.
- Data Understanding: Monthly CSVs from BTS (2020).
- Preparation: Cleaned, merged, engineered key features (trade balance, value per ton).
- Modeling & Analysis: Aggregated by state, port, mode, etc.
- Evaluation: Visualized trends, anomalies, inefficiencies.
- Deployment: Insights, recommendations, and exports shared via GitHub.

### **Key Findings:**

- Trucking leads but isn't sustainable
- Texas & Laredo dominate trade
- Data shows room for optimization
- COVID had visible trade effects

### **Actionable Recommendations:**

To Improve Efficiency & Sustainability:

1. Invest in rail infrastructure
2. Promote green logistics & carbon neutrality
3. Optimize underutilized vessel routes
4. Use AI for real-time freight optimization
5. Harmonize US-Canada-Mexico trade policies
6. Improve data reporting standards

### **Conclusion**

This project demonstrates the power of using open data and CRISP-DM to improve cross-border logistics, addressing inefficiencies and laying out pathways for sustainable growth.