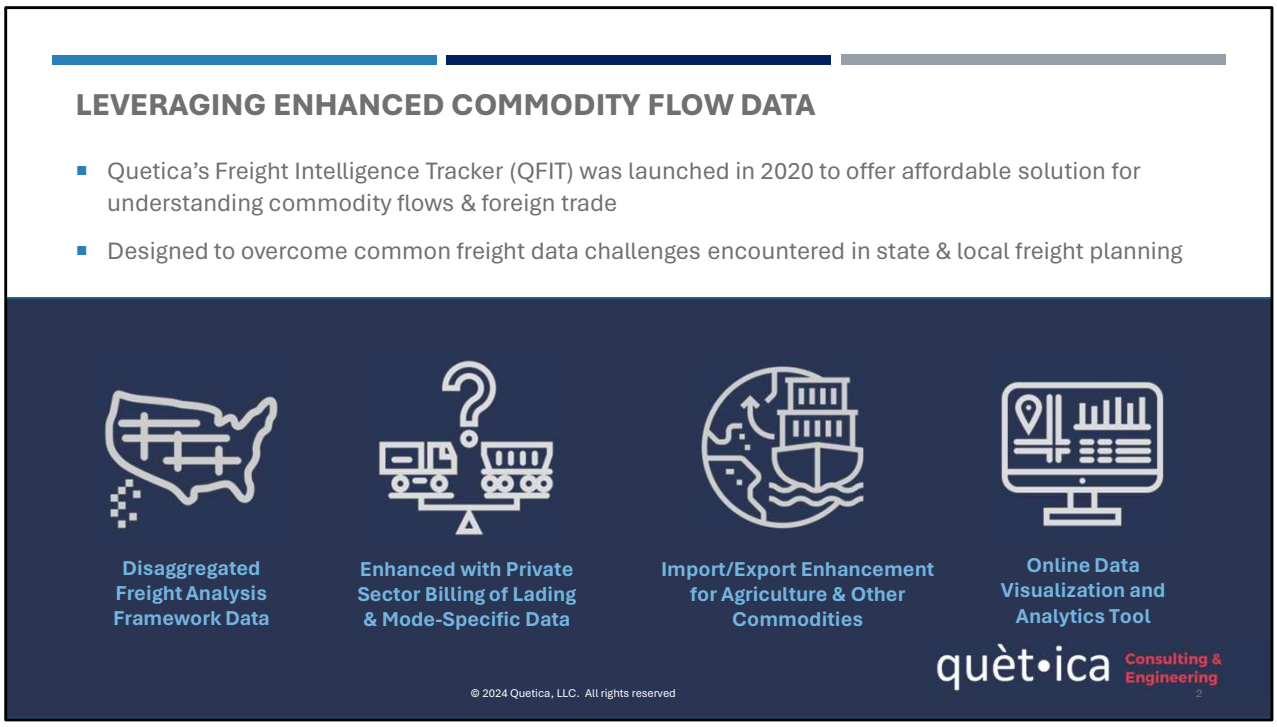
International commerce plays a key element in Minnesota's economy. Several recent reports from the Minnesota Chamber of Commerce suggest that Minnesota's export economy is falling behind relative to other states and the nation. The 2023 Business Benchmarks report from the Minnesota Chamber of Commerce compares Minnesota to other states on a variety of benchmarks. The report states that in 2021 Minnesota ranked 33rd among all states in exports and slipped 13 spots in the ranking over 2020.

While COVID-19 likely contributed to Minnesota export trends in recent years, the importance that exports play in our state economy warrants that we seek ways of lowering export barriers and lowering export supply chain costs as a good place to start. Quetica's integration of public and private freight data has been a hallmark of our innovative work in supply chain network optimization. And in a broad sense, good data – better than what is currently available – is critical to addressing the supply chain and economic growth challenges facing our region. As a nation and as a state, we continue to make public policy and economic decisions based on poor, outdated information, as much of the data used to support public freight planning efforts is several years old.

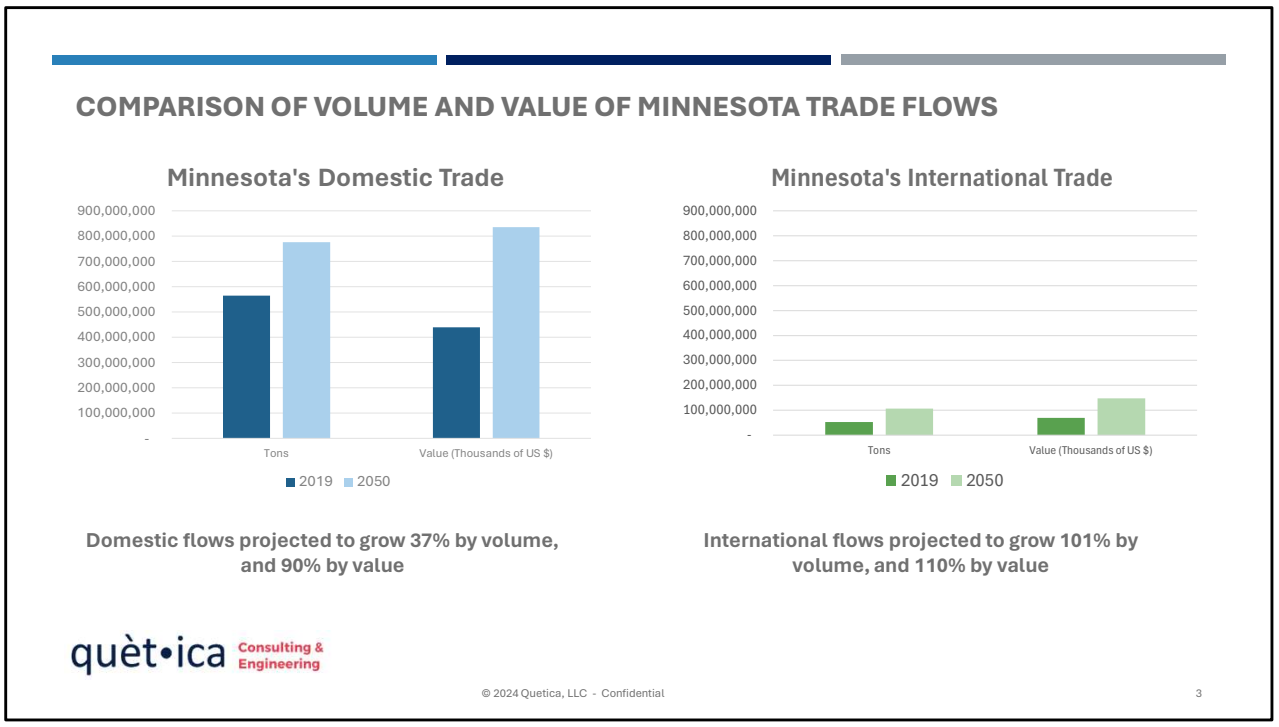
During COVID-19, the country faced a significant number of supply challenges. For example, the *Bull Whip Effect* – remember all the ships stacked up outside the LA/LB Ports? In response, the White House formed a Supply Chain Taskforce led by Retired General Steven Lyons. The Task Force found that distortions in product flows, especially in Asian trades lanes, could be resolved primarily from better access to timely data. As a result, USDOT launched the Freight Logistics Optimization Works (FLOW) program and many Minnesota businesses were early participants (e.g., C.H. Robinson, Land O' Lakes). FLOW is a great example of how using better, real or near real-time data was used to solve supply chain problems.



As we look to the future of trade, we need to consider how we can incorporate real time data into AI technologies, like network optimization, to not only lower supply chain costs, but also make supply chains greener and more robust when disruptions occur. Several years ago, Quetica needed better data in order to develop multimodal network optimization tools for public sector agencies, so we launched our own data product that integrates existing public data sources with private sector shipping records.

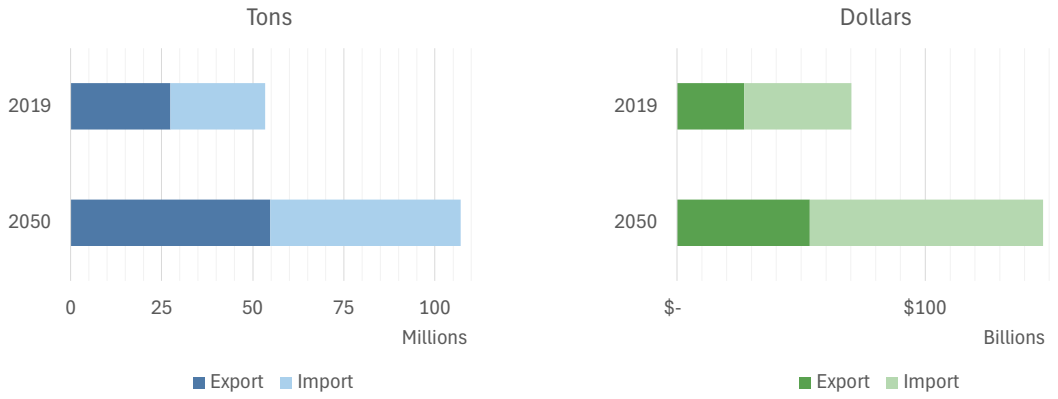
While we believe our QFIT data has been a big step forward, the next target is how to incorporate real time data – from sources like what we will hear about later in the program, into adaptive optimization technologies – or Digital Twins.

A digital twin is a virtual representation of a physical object or system. It's like having a digital clone that mirrors the real-world counterpart. The key features of a digital twin include: 1) Connectivity: the digital network representation is connected to the actual physical network through data feeds; 2) Real-time-data: a digital twin relies on real-time data to simulate and analyze the behavior of the physical system. For example, a digital twin of medical supply chains would receive shipment data like location, temperature, travel speed in real time; and 3) Simulation and Decision-Making: digital twins allow for simulations and predictive analysis. By running scenarios in the virtual environment, planners and supply chain managers can make informed decisions about routing, staging, and avoiding congestion or network outages due to incidents or disruptions.



Recently, the Minnesota Department of Transportation purchased a QFIT-International dataset. The database provides domestic county-to-county flows of product movements in 41 commodity categories and six modes. The database also provides flows from all Minnesota counties to 41 foreign destinations. The base year of the data is 2019 (pre-COVID) and a forecast year of 2050. The forecast data suggests that foreign trade will grow faster than domestic trade in Minnesota.

MN QFIT: MN TOTAL FOREIGN TRADE BY VOLUME AND VALUE



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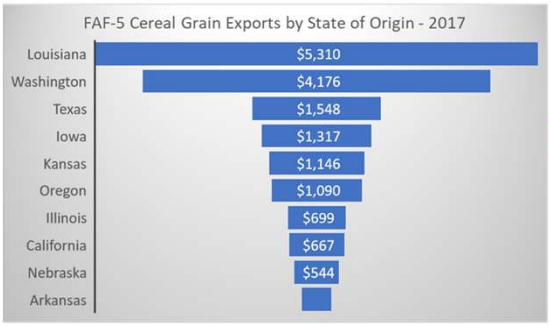
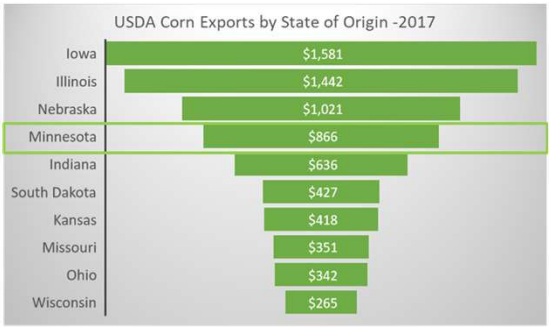
Overall, foreign trade in Minnesota is pretty evenly split between imports and exports, in both volume and value; however, forecasts suggest a trend toward a higher level of import trade.

QFIT INTERNATIONAL: ENHANCED TRADE DATA

- Because exporters are allowed to complete documentation at a point of consolidation or processing, gateway port states receive credit for exports originating in the Midwest.
- The same anomaly occurs for air cargo shipments consolidated at the largest international air hubs





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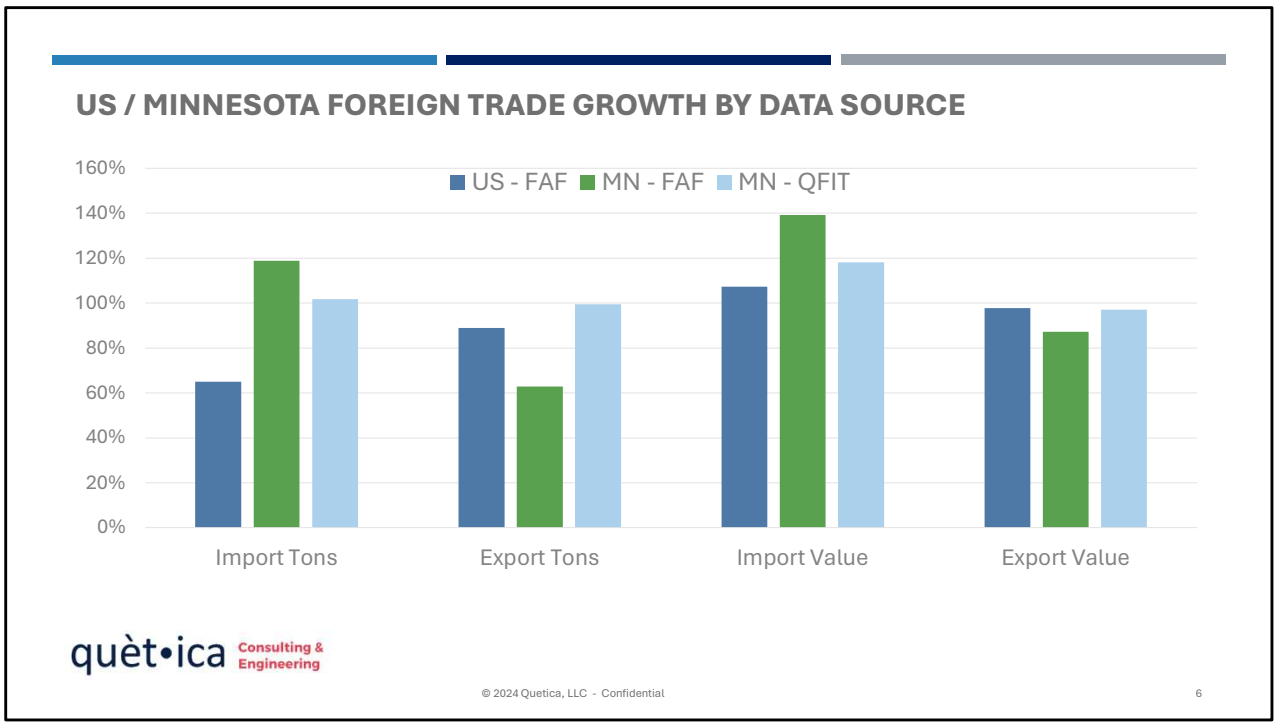
During the last ICM Forum, Cathy Petersen discussed biases that are introduced into foreign trade data through allowable reporting practices. Under U.S. Customs rules, shippers may declare exports at a point of processing or consolidation. This chart shows the impact of that reporting bias. The graph on the left is taken from an online data tool at USDOT. The query asked for Cereal Grain exports by state of origin.[1] Most corn and wheat in the U.S. are either railed or barged to deep water ports where they are consolidated in large elevators and transloaded to ocean going ships. Because many grain shippers declare the export at the coastal consolidation point, states like Louisiana, Washington and Texas get credit for the nations grain exports.

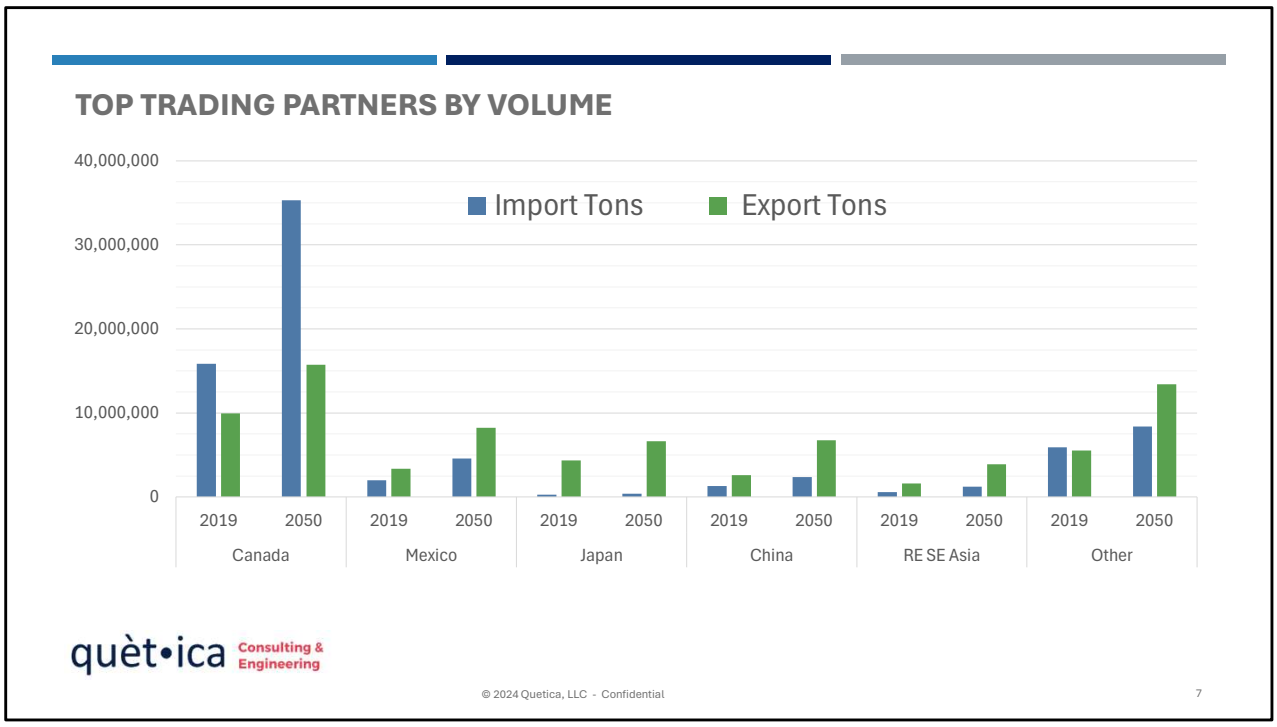
The graph is based on USDA data that QFIT uses to adjust Cereal Grain exports. The adjustment made to US Census data on Minnesota exports was 22.6% higher overall that what was reported for Minnesota in 2019. QFIT-International Cereal Grain exports increased over 350% over U.S. Census data!

1. Note: Cereal Grains include corn, wheat, rye, and barley, but excludes soybeans which fall under another commodity class.

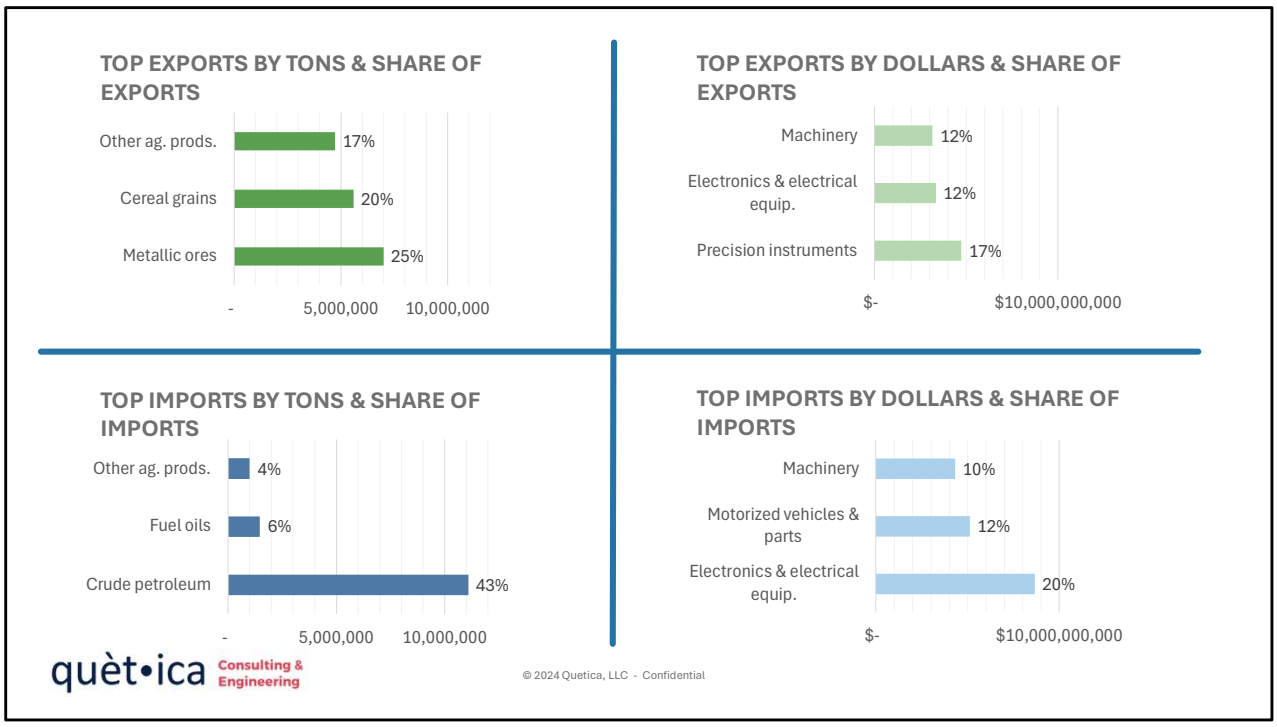


As was discussed during the last ICM Forum, international trade data has a number of reporting biases that result from the U.S. Customs policy of allowing businesses to document exports at the point of consolidation or processing. As a result, information about exports and export forecasts can vary significantly based on the data source.

This chart shows how Minnesota's foreign trade (in green and light blue) is projected to grow as compared to the nation shown in dark blue. Existing federal data from the Freight Analysis Framework suggests that Minnesota will lag behind the nation in both export tonnage and export value. Quetica's QFIT, corrected for import/export biases, suggests Minnesota will slightly exceed or match the nation's growth in exports.



Another export issue pointed out in the Minnesota Chamber of Commerce 2030 report is the concentration of Minnesota exports to a few major trade partners.



Here are some additional charts drawn from the Minnesota QFIT-International dataset.