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GLOBAL TRADE & LOGISTICS



## A STATE of LOGISTICS

Iowa uses sophisticated  
supply chain modeling  
to map future  
freight transportation  
infrastructure



**M**ost states approach transportation within their borders mode by mode—highways, railroads and ports. When Paul Trombino, director of Iowa’s Department of Transportation, looks at a map of his state with its widespread highway system, rail network and river ports, he instead sees a vast supply chain.

It was shortly after his appointment as the state’s top transportation official in May 2011, and with support from the governor, that Trombino became determined to find a holistic, data-driven approach to freight planning and development for Iowa in order to attract and retain shippers, third-party logistics providers and carriers by reducing their transportation costs and increasing their operational efficiency within in the state.



**Trombino**

“If there’s an inefficiency in the system that shippers can see and I don’t, then show me so that I can try to fix it,” Trombino said in an interview. “That’s what we’re supposed to do as a DOT.”

As a longtime member of the American Association of State Highway and Transportation Officials (AASHTO) and Transportation Research Board, Trombino had heard about an outstanding supply chain analytics presentation delivered



**Langer**

by Richard Langer, principal of consulting firm Quetica, at the 2012 Transportation Research Board meeting in Washington, D.C., and wanted to learn more.

When Langer visited the Iowa DOT’s offices in Ames later that year, Trombino asked him point blank: “Can you do a supply chain optimization design on the state of Iowa?”

Langer, who traces his roots to the development of the former U.S. Bank’s freight payment system, PowerTrack, in the 1990s, which later became part of Syncada, a Visa subsidiary, in 2009, had conducted supply chain analytics for many companies over the years, but never anything as complex as a U.S. state. However, he was willing to give it a shot.

Data gathering for the so-called State-wide Freight Transportation Network Op-

timization Strategy for Iowa began in early 2014. A committee composed of members from Iowa DOT, the Iowa Economic Development Authority and Quetica started meeting monthly in Ames. Their goal was to capture transportation network elements and commodity-flow data, which includes goods transported, origin and destination of the movements, freight tonnage and transportation mode used. Besides the state’s shipment data and its own, Quetica sourced national-level data from the Freight Analysis Framework, a collaboration of the Federal Highway Administration and Bureau of Transportation Statistics, multimodal transportation network data from Iowa DOT, and import and export clearance data from U.S. Customs and Border Protection, as well as proprietary commodity data from the private sector.

Once the massive set of freight data was collected, it was scrubbed and sorted through complex algorithms in Quetica’s optimization module. Trombino recalled early in the freight optimization analysis there was so much data being entered into Quetica’s information system that it crashed and additional servers had to be brought on line.

Quetica used the data to simulate commodity shipments and conduct a detailed analysis to benchmark the transportation costs within the state by specific traffic lanes and transport mode. This allowed Quetica to identify Iowa’s current freight transportation costs and pinpoint network constraints. Further refining of the data showed state officials where to reduce costs and how to best improve their infrastructure to benefit both taxpayers and businesses.

Too often, state DOTs focus their attention on highway vehicle traffic volumes and from there modify or add lanes at tremendous cost to taxpayers and not truly get at the root causes of escalating transportation costs to shippers, 3PLs and carriers operating within their borders.

“Our data shows that you don’t just expand a road because it’s congested,” Langer said. “We have developed a quantitative model that justifies investments in multimodal infrastructure that reduces costs

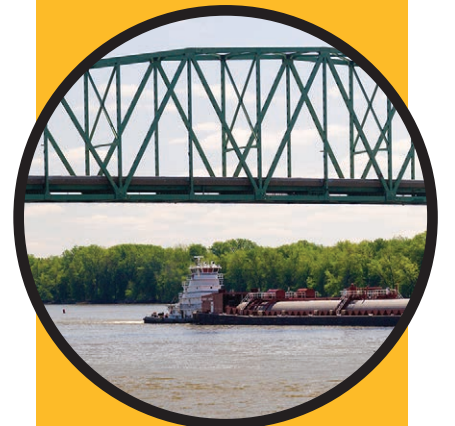
to the shippers, benefits the carriers and reduces unnecessary trucks on the road.

“We’re not guessing at what’s the right plan. We’ve developed a quantitative path to get the right plan,” he said.

**Producer State.** Located in the U.S. heartland, Iowa is known for its agricultural production. The state is ranked No. 1 in corn and No. 2 for soybeans, and leads the country in hog and egg production. There are about 92,200 farms, which occupy 30.7 million acres or 92 percent of the state’s land.

Yet, according to the Iowa Economic Development Authority (IEDA), the state’s burgeoning manufacturing sector now contributes three-times more revenue than agricultural commodities to its economy, or \$31 billion a year. Manufacturing represented 18.8 percent of Iowa’s GDP in 2015.

The state’s more than 4,000 manufacturers employ about 215,000 Iowans,



representing 13.5 percent of the state's total employment. Some of the biggest manufacturers with operations in Iowa are 3M, Alcoa, CNH, John Deere, HNI, Pella, Rockwell Collins, Vermeer and Winnebago. IEDA estimates that in 2015 about \$13.1 billion worth of manufactured and value-added goods were exported from the state.

To move these goods beyond its borders, Iowa relies on a network of 10,000 miles of highways, with Interstate-80 being the primary truck corridor; 3,825 miles of tracks used by 18 large and small railroads; and 491 miles of navigable inland waterways bordering the state, namely the Mississippi and Missouri rivers.

Despite this seemingly healthy and abundant freight transportation network, Quetica's data showed that it was not being used to its fullest potential, and even confirmed what officials in the state had long suspected about how some goods were being handled.

For example, for years cereal grains harvested in Iowa were being shipped north to Minnesota for processing into animal feed and then returned to Iowa for sale to feedlot operators. Quetica's analysis showed, in fact, that about 12 million tons of Iowa grain was transported to Minnesota only to be returned to Iowa in the form of animal feed at a higher cost, of which 26 percent was wrapped up in transportation expenses. "This was a clear indicator based on actual data that we didn't have before," Trombino said.

For Debi V. Durham, IEDA's director, the Statewide Freight Transportation Network Optimization Strategy's results offer a powerful new tool for the organization when courting companies to set up operations in Iowa.



Durham

"It's provided us with sophisticated supply chain intel, which we can then use as a calling card to a company interested in doing business in our state," she said. "It's not just a study. It's dynamic, it's modeling."

"Like the private sector, Iowa is constantly changing," Langer said. "We're always doing large data refreshes for the state."

Quetica said its freight network optimization has helped Iowa DOT and IEDA to:

- Identify infrastructure and economic constraints that affect businesses' freight transportation performance and point out where improvements can be made.
- Quantify investments that help lower freight transportation costs.
- Recommend specific freight network

optimization strategies.

- Find ways to improve business supply chains and reduce those costs.
- Develop a framework that can support future analyses as market conditions change.

"It's one thing to give a company land and tax breaks to come to Iowa, improving landed cost is a much bigger incentive," Langer said. "Iowa has long had success in bringing companies into the state, but now they can say 'we can reduce your transportation costs between 10 and 20 percent' by using this data.

"Even if the data shows a company shouldn't locate to Iowa, then the state

knows better where to build logistics facilities to bring in that company in the future," he said.

**Cedar Rapids.** One of the key recommendations from Quetica's network optimization study is to develop a logistics park in the Cedar Rapids area that will offer companies cross-docking, intermodal, transloading and warehousing services.

"We have had an intermodal facility at Council Bluffs on the west side of the state for years, but we didn't have one on the east side," Trombino said.

Cedar Rapids is located within a four to five hour drive to and from the nation's large-

## Evaluating energy supply chains

BY CHRIS GILLIS

Consulting firm Quetica's Statewide Freight Transportation Network Optimization Strategy for Iowa has led to the development of a new line of business—helping the energy sector avoid shortages.

That was the case during the extremely cold winter of 2013-2014 in the Midwest when Iowa experienced a crisis-level shortage of propane. In big agricultural states like Iowa, propane is not only used by farms and rural communities for household heating, it also plays a significant role in drying corn before it's placed into the storage silos.

In addition to the winter weather, Iowa's propane access was further constrained by the closing of the Cochin pipeline for maintenance during the peak 2013 demand for propane, as well as rail disruptions and limited truck capacity.

Without sufficient propane, Iowa's homeowners, businesses and schools risk freezing during cold days and farmers cannot properly store their corn in a dry, mold-free environment before the winter.

"Although these events seem like an anomaly, ongoing changes in the propane supply chain in Iowa and nationally present risks in 2015 and beyond," Quetica warned in a recent report. "With changing infrastructure (e.g., reversal of Cochin pipeline, increases in export capacity), globalization of the market and increasing price competition, there is no guarantee that propane supply will be available to meet all domestic residential and agricultural demand in Iowa in the future."

At the direction of the Iowa Depart-

ment of Transportation, Quetica set up a computer simulation model to represent current and forecasted propane demand, as well as transportation and inventory capacity for this commodity, explained Holly Zimmerman, Quetica's chief operating officer, who led the analysis.

Recommended actions based on the analysis, which was completed earlier this year, called for:

- Monitoring market conditions and infrastructure changes.
- Communicating and educating the propane industry and consumers about changes, risks and recommendations.
- Making behavioral changes, such as encouraging multiple driver shifts during peaks and early fills of storage tanks.
- Incentivizing infrastructure investments, such as improving farm and residential storage and developing a terminal load reservation/scheduling system.
- Implementing a "data strategy" to monitor current and future market conditions for propane.

Iowa DOT is now exploring ways to implement the recommendations by cooperatively working with the propane industry and its customers, Zimmerman said.

Quetica's work in this area has also perked the interest of other power generation and energy businesses. The company has recently been approached to conduct a supply chain optimization study in Iowa's burgeoning bioenergy industry. Biomass is used as feedstocks for the production of a broad range of industrial bio-based products including fuels, chemicals, polymers and materials.

est Midwest freight transportation hubs of Chicago, Minneapolis and Kansas City, Mo.

Quetica's study found of the 480,000 long-haul, dry-van truck moves that start or end in Iowa each year, 77 percent or about 370,000 of those moves are within a 100-mile radius of Cedar Rapids. Since most of these truckloads travel in excess of 750 miles to and from other states, the study forecasts a strong market in Cedar Rapids for a logistics park that specializes in intermodal or truck-to-rail freight services.

"Approximately 60 percent of the 370,000 annual truckload shipments in the model are concentrated in the top 10 intermodal lanes. This provides nice shipment density for the proposed logistics park in Cedar Rapids," Quetica said in its findings.

The data also showed the annual cost savings for shippers who use a cross-docking service at Cedar Rapids to be about \$852 million. "A business case developed for a midsized cross dock in Eastern Iowa shows approximately \$22 million to \$34 million in total annual transportation cost savings, with a payback of approximately one year (after the cross dock is fully operational and freight volume has ramped up)," Quetica said.

Similarly, significant transportation cost savings were discovered in the analysis for a transload facility in the Cedar Rapids logistics park. Transloading is the movement of cargo from one mode to another, such as unloading grain from a truck trailer into a railcar. Through transloading, shippers



**American Shipper  
Extras**

**Quetica: Optimizing Public Sector Freight Networks to Promote Economic Growth**

**Quetica: Contingency Planning for Energy Supply Chains**

**IEDA: Iowa Transportation and Infrastructure Overview**

**To learn more about this topic go to [AmericanShipper.com/extras](http://AmericanShipper.com/extras)**

get the benefit of shorter truck hauls and lower rates for the long-haul portion of their freight moves by rail.

Quetica found that shippers across Iowa could save about \$35 million by trucking their goods to Cedar Rapids for transloading into railcars. It projected that a payback period for a fully operational transload facility at the logistics park to be 1.7 to 2.7 years.

The firm's analysis also suggested the logistics park could operate a yard to supply ocean containers to shippers with interna-

tional freight, as well as offer warehousing and 3PL services.

Iowa DOT and IEDA officials have recently selected a 75-acre site for the Cedar Rapids logistics park. The state estimates the total cost of the facility will be about \$40 million, and it has applied for a \$24 million FASTLane grant from the U.S. Department of Transportation.

FASTLane (Fostering Advancements in Shipping and Transportation for the Long-term Achievement of National Efficiencies) is one of the early results of the Fixing America's Surface Transportation (FAST) Act, which was enacted in December and established a \$4.5 billion discretionary grant program over five years for large multimodal projects. Congress earmarked \$500 million of the total for non-highway mode improvements. In late February, DOT announced the availability of \$800 million for FASTLane grants.

Trombino is confident that the Cedar Rapids logistics park will be awarded a FASTLane grant. "It's jobs. It's sustainability. But it also has a huge economic impact. [With the Quetica data], we can justify the cost," he said.

The logistics park is also expected to further benefit by being located directly south of the Smith-Dows railyard which is operated by Alliant Energy Transportation's Cedar Rapids and Iowa City (CRANDIC) Railway Co. Before the logistics park site was even picked, Alliant Energy Transportation's parent—utility company Alliant



**The CRANDIC railroad, owned and operated by Alliant Energy Transportation, would expand its Smith-Dows railyard once Iowa's planned Cedar Rapids logistics park nearby moves forward.**

PHOTO CREDIT: ALLIANT ENERGY TRANSPORTATION

Energy—was already in the process of securing more than 1,000 acres of land options from surrounding farms for an economic development site.

Alliant Energy Transportation believes it also stands to benefit from participating in the Cedar Rapids logistics park.

“Utilities and railroads in the upper-Midwest are looking for ways to grow earnings and this logistics park will help in that effort,” Jeff Woods, manager of marketing and business development at Alliant Energy Transportation, told *American Shipper*. “We’re going into this with the thinking that we will have input into operating the facility.”



**Woods**

In addition to connecting with the Canadian National and Union Pacific railroads at Cedar Rapids, CRANDIC Railway makes connections with all the large Class I railroads operating in the Midwest at hubs such as the Quad Cities, Chicago, and Council Bluffs via the Iowa Interstate Railroad, a regional carrier that operates nearly 600 miles of track that crosses Iowa and Illinois.

The Cedar Rapids logistics park has even gained the attention of coast-to-coast trucking company Schneider National and its supply chain services operation Schneider Logistics. The company foresees a strong business case to increase its presence in Iowa.

The Quetica data, as well as Schneider’s own research, “allows us to be far more prescriptive about where the demand is, not only now but where it will be down the road,” said Michael Kukiela, vice president and general manager of Schneider Logistics.



**Kukiela**

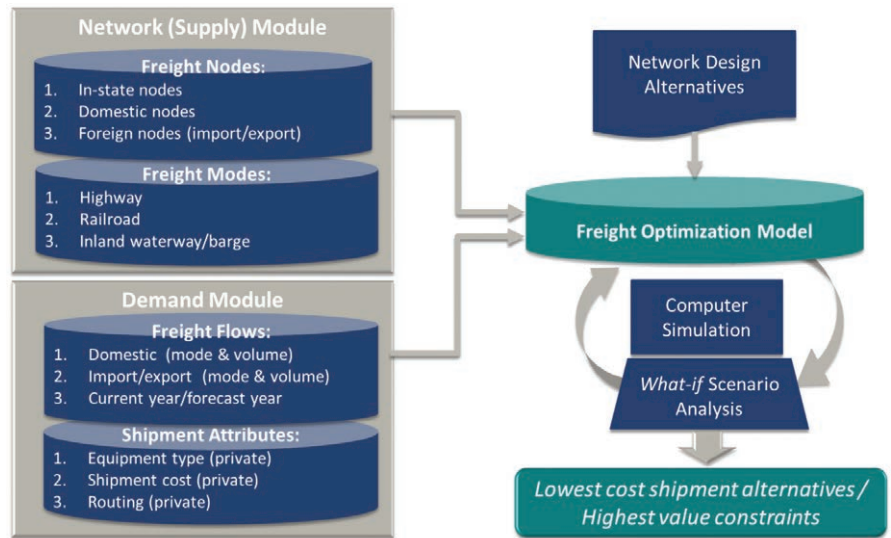
“The data often drives you to the right answer,” he added, referring to the Cedar Rapids area.

Schneider envisions not only increasing its long-haul trucking presence in Eastern Iowa via the Cedar Rapids logistics park, but offering final-mile, dedicated intermodal and supply chain services. “We are going to invest more in resources, human capital and technology [in Iowa],” Kukiela said.

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**Changed Mindset.** Trombino, who holds a degree in civil engineering, has spent the majority of his career in public service. Prior to becoming director of Iowa DOT, he worked 17 years at Wisconsin DOT

## High-level overview of the freight optimization model components and processes



Source: Quetica.

where he held several positions, including regional operations director of the highway division; director of the bureau of transit, local roads, rails and harbors; director of the bureau of statewide infrastructures; and manager of highway bid lettings.

Iowa DOT is comprised of 2,700 employees who oversee planning, design, construction, and operations of the state’s highways and bridges; modal programs involving transit, rail, and air transport; motor vehicle services; and motor carrier services and enforcement. Like most states, the majority of Iowa DOT’s \$1.2 billion annual budget goes toward highway programs.

When asked if the freight transportation network optimization model has had an impact on the state’s DOT staff, Trombino said “it’s changed their jobs.”

“It used to be if you talked to anyone in transportation about infrastructure, they would say it’s about economic development, which in reality means jobs, but this is technically the wrong answer,” he explained. “It should be about transportation economics. If we do transportation economics well, we’ll make better decisions about infrastructure.”

Within Iowa DOT “people are now on board with it because they’re doing things that they wouldn’t have done before,” he said.

The importance of an efficient freight transportation system in Iowa even resonates to the governor’s mansion.

“Through a combination of private and public infrastructure investments, the state of Iowa is able to reduce costs and grow businesses, jobs and the economy,” said Gov. Terry Branstad in a statement to *American Shipper*. “Iowa is the first state

in the nation, in fact, to use this kind of freight optimization modeling. And, that strengthens our value proposition and gives us a competitive advantage. Leveraging smart investments from Iowa Department of Transportation for economic development is a very strategic initiative for Iowa.”

“Gov. Branstad wants us to work together and be focused on what his goals are—creating jobs and wealth in the state,” Trombino said. “He’s open to doing things that have never been done before.”

“If you’re a farmer and didn’t innovate, you wouldn’t survive. The work that we’re now doing fits with that culture of the state,” he added. “We expect to change the system and do it in an effective way. Many states still seek complacency when it comes to their transportation programs and that should be your biggest aspect to change.”

As the 2015-2016 president of AASHTO, Trombino is now sharing Iowa’s experiences of the freight transportation network optimization analysis with other state DOTs and metropolitan planning organizations. He will showcase the state’s achievements in freight transportation during AASHTO’s annual spring conference to be held in Des Moines on May 23-26 and the National Governors Association’s summer meeting, which will also be hosted by Iowa on July 14-17.

Quetica has recently been approached by other state governments and metropolitan planning organizations to conduct similar freight transportation studies on their behalf.

“We expect this interest from other states and MPOs to take off. These types of analyses will keep us busy for years to come,” Langer said. ■