Minnesota is the fourth-largest producer of biofuel in the country and home to a growing livestock industry. These market forces, along with changes in the grain supply chain, are directly influencing the way grain producers and wholesalers navigate their local freight networks. To better understand these changes and their impacts, researchers in the Humphrey School of Public Affairs have collected data and developed new spatial analysis tools, ultimately aimed at informing freight transportation policy and infrastructure investment decisions.

As funding gap grows, how do we pay for transportation infrastructure?

While people generally support investing in transportation infrastructure, they fiercely oppose increases in user fees or taxes to support this investment. This funding problem is further compounded by the opaqueness of transportation revenue mechanisms such as the gas tax, which makes it difficult for the traveling public to easily discern how much they pay for infrastructure and what value they derive from it.

In the opening session of CTS's 2017 research conference, Joung Lee, policy director at cts.umn.edu

Evolving grain markets, supply chain affect transportation system

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“Ensuring efficient grain freight movement is not only necessary for the livelihoods of
New modes of transportation have recently seen explosive growth, with companies leveraging digital technologies to offer a variety of mobility services on demand. Among the most successful are transportation network companies (TNCs) such as Lyft and Uber that match drivers with riders through online digital platforms.

“TNCs offer a flexible model that has some key advantages over traditional transit, including the ability to provide on-demand transportation without the costs of physical assets or dedicated drivers,” says Saif Benjaafar, a professor in the Department of Industrial and Systems Engineering (ISyE).

The success of TNCs has led several U.S. transit agencies to begin exploring opportunities to join with them in public-private partnerships. In a new report published by the Minnesota Council on Transportation Access, U of M researchers examine these partnerships through five detailed case studies, draw lessons and takeaways from these case studies, and identify opportunities for TNC partnerships in the Twin Cities and greater Minnesota region.

For the study, researchers selected five U.S. case studies to highlight unique and distinctive features of the corresponding partnerships and categorized them along three key dimensions: the type of transportation fulfilled, the type of payment, and the type of TNC service provider. The case studies fulfilled various transportation needs, but most fell into one of four categories: first mile/last mile transportation, general transit, rural transit, and paratransit.

In addition, researchers looked at partnerships that have targeted other types of needs. For example, a program in Pinellas County, Florida, offers low-income residents free nighttime rides, and a program in San Diego offered vouchers for UberPool to and from designated points during a busy weekend when the city hosted two major events.

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Next, researchers used the case studies to identify opportunities for public-private partnerships between transit agencies and TNCs in the Twin Cities and the greater Minnesota region. These opportunities included transit for seniors, first mile/last mile transportation, general transit for routes with particularly low ridership and high cost per rider, transit for low-income communities, and paratransit.

“The Twin Cities paratransit service currently uses three different independent contractors, rides must be booked at least one day in advance, and users are advised that a five-mile ride that may take only 10 to 15 minutes in a personal automobile may take up to 50 minutes,” Benjaafar says. “These limitations could potentially be addressed by partnering with a TNC to supplement the current system while ensuring the continued availability or even expansion of the service to all existing service areas.”

Three key takeaways emerged from this project: public-private partnerships between transit providers and TNCs can extend the reach of public transit, serve as an alternative to traditional transit, and enable on-demand transportation for seniors and persons with certain disabilities.

One limitation of these case studies, Benjaafar notes, is that access for persons with disabilities, compliance with regulations, and protection of civil rights were not clearly articulated in these pilot programs, and greater understanding of these areas is needed.

The case studies also highlighted other challenges of these partnerships. These include the marketing and outreach investments needed to explain the programs to users; a need to experiment with different models, pricing, service regions, and contractual agreements; quality-of-service monitoring and enforcement; overcoming technology and payment mode barriers; and mitigating the long-term risks of outsourcing transit services such as lost negotiating leverage.

The final report was authored by Moira Blodgett (ISyE student), Alireza Khani (assistant professor, Civil, Environmental, and Geo-Engineering), Diana Negoescu (assistant professor, ISyE), and Benjaafar.
Minnesotans who work in the agricultural sector, it’s also crucial to the state’s economy,” says Travis Fried, a Humphrey School graduate research assistant and Master of GIS student. His work is part of research funded under the U’s Transportation and Economic Competitiveness (TPEC) Program; TPEC director Lee Munnich and researcher Tom Horan are the lead investigators.

Traditionally, trucking moves cereal grain—especially corn—to domestic market sites, Fried says. These sites include smaller country elevators, feedlots, and ethanol plants. Rail and Mississippi River barges are primarily responsible for moving bulk grain products to ports on the coast. But changes in the market for grain mean more grain is staying within Minnesota’s borders.

Ethanol in particular has rapidly transformed the corn market and supply chain, Fried says. “Last year refineries processed 5.54 billion bushels of corn—roughly a third of the state’s total corn supply. While newer plants are being equipped with rail-serving capabilities, most refineries rely on steady shipments of corn feedstock carried via truck.”

Larger feed lots and farm acreages also point to continued growth in grain production and truck traffic. “Expanding dairy farm operations in southern Minnesota have the potential to greatly impact grain feed flow, adding to the wear-and-tear of rural roads and major highway connectors,” he says.

At the same time, federal deregulation policies have given large railroad companies greater freedom to consolidate less-profitable short lines and adjust rate incentives. As a result, Fried says, large grain elevators served by major rail companies—referred to as “shuttle elevators” for their ability to quickly load 100- to 150-car trains (shuttles) at a time—now often out-compete smaller country elevators and short lines. This effect has producers upping truck fleets and bypassing local elevators in favor of larger, more distant consolidation points.

Overall, Fried says, “today’s evolving grain supply chain has roads progressively assuming a larger responsibility for connecting farmers to the marketplace.”

For this reason, the research team modeled grain flow patterns across key trucking corridors and shifting supply chain conditions. One of the challenges was the lack of freight data availability. “A large part of the study involved exploring different proprietary and publicly available datasets that can be used to create a more complete picture of grain commodity flow across Minnesota roads,” Fried says. In addition, the team interviewed local grain producers and freight operators.

Fried also built an original computational model that simulates local corn movements. Using the new algorithm, the TPEC team approximated corn production sites in two counties and modeled how each shipment volume of corn moves along the road network given competitive pricing of nearby markets. “Our model captures fine-tuned grain movement and shows how producers assess contracts and trucking options to determine their most profitable markets,” Fried says.

“This is exceptional work,” says Bruce Abbe, president & CEO of the Midwest Shippers Association. “It is really good to get data, especially at the local level. Minnesota’s ag transportation supply chains, particularly for corn and grain products that are exported worldwide, are continually changing in response to global market forces—and often dramatically so—due to trade disruptions. Minnesota needs to maintain and strengthen the efficiency of its diverse ag shipping infrastructure—highway trucking, bulk and container rail, river barge, and Great Lakes options. Ag shippers need to be nimble in these evolving markets.”

The TPEC team created an interactive story map—titled Amber Roads of Grain—that walks users through the study and its findings. The map is available on the TPEC website: tpec.umn.edu.

28 PERCENT
of all freight on STATE ROADWAYS
is grain related.
—MnDOT
In August 2015, the Los Angeles County Metropolitan Transportation Authority (L.A. Metro) embarked on an ambitious experiment. Could a new department with an extraordinary name bring about dramatic changes in transportation policy and innovation to a large government agency in a short period of time?

In the luncheon presentation at CTS’s 2017 Transportation Research Conference on November 2, L.A. Metro’s Chief Innovation Officer Joshua Schank described the creation of the Office of Extraordinary Innovation (OEI), designed to manage public-private partnerships (P3s) and strategic planning for the agency.

“Innovation is often misunderstood,” began Schank. “It’s not really about technology, and we are not superheroes swooping in to save the day. Innovation is about three things: policy, resource allocation, and determination. At a large public agency like ours, you need all three. That’s the only way you’re going to get it done.”

During its first two years, the OEI frequently encountered fierce resistance. “We often hear that there is no time or money to do something, but that’s not true,” said Schank. “You always have time and money—it’s just a matter of determining where you want to allocate your resources.”

To better determine where those resources should be allocated, the OEI was charged with developing the Metro Strategic Plan, which will be released in January 2018 and will clearly define the mission, vision, and goals for the agency. “You can’t be innovative if you don’t know what you are trying to accomplish,” Schank said. “You need a plan that says here are our goals, here are the objective measures we are going to use to see whether we are accomplishing them, and here are the innovative initiatives we are going to use to meet our goals.”

The OEI was also tasked with spearheading a new unsolicited proposal process designed to encourage private-sector ideas for delivering L.A. Metro projects and services. Eleven of these unsolicited proposals have already been brought to the implementation phase, and several “megaproject” proposals have the potential to be game-changers in getting much-needed projects—including a light-rail corridor, express lanes, and a transit pass through a geographical bottleneck—delivered in innovative ways by the private sector much more quickly.

“We’ve told the private sector that we are open to their ideas, and this has brought people from across our departments together to solve problems and think as an organization about how to evaluate ideas by considering costs versus benefits instead of only seeing the obstacles,” Schank said.

According to Schank, the key to the OEI’s success has been thinking of its effort as a bold experiment. “We try something, and if that doesn’t work we try something else. The thing we have that others don’t is permission to do that from our CEO. If you don’t have top-down support saying that innovation is okay, that failure is okay, that we are going to test stuff, then it can’t succeed.”

Through its efforts, the OEI has begun to shift the culture and organizational mindset within L.A. Metro. “Our goal is not to get more people to use transit services, and it is not to make our jobs more efficient,” said Schank. “Our priority has to be serving our customers, giving them more and better options, and getting more people where they are going faster.”

READ Catalyst ONLINE for links to research reports and other resources.
Experts discuss innovation and Minnesota’s transportation network

Following the conference luncheon presentation, a panel of local experts built on the theme of innovation in a question-and-answer session. Panelists offered insights on how innovative technologies and policy approaches could affect Minnesota’s transportation network now and in the future.

What is your approach for planning for the future given that so much is uncertain?
“We want new technology and innovations to happen with us and for us and not to us,” said Jenifer Hager, director of transportation planning and programming with the City of Minneapolis. “We’re thinking about how the regulations, policies, and framework can be put together now so we’re ready for these new things to work for us when they come into our city and region.”

“For us, innovation comes in two ways,” said John Levin, director of strategic initiatives at Metro Transit. The first is in operating the agency’s core services safely, effectively, and efficiently, and the second relates to recognizing and filling gaps. “There’s innovation that we can do in terms of understanding needs, such as the exact time someone wants to make a trip, how we design the network, and how we deliver service really effectively,” Levin said.

Where does the room for failure come in?
“There’s no such thing as failed research, just a new way to ask the question,” said Frank Douma, director of the State and Local Policy Program at the Humphrey School of Public Affairs. In terms of policy, the key is identifying the failures we want to beware of and then finding solutions before those failures become a reality, he said. “The real question is how do we anticipate the worst-case scenario and create incentives to get to a different result?”

How can research support practitioners as they plan for the future?
Brendan Murphy, lead researcher at the U of M’s Accessibility Observatory, explained that his research can help practitioners understand the impact to people of a proposed change in the transportation network. For example, the Observatory can produce data and diagrams that evaluate whether a proposed network structure change will have a positive impact on accessibility. “These tools provide a high degree of value to practitioners,” Murphy said. “They let us analyze plans to inform the practice.”

Levin said a wide range of research is directly linked to Metro Transit’s operations, planning, vehicle development, and more. He also stressed the importance of research for gathering and analyzing data. “Data is lubrication for innovation,” Levin explained. “Doing the research to see patterns and understand what it’s telling us is essential to the work we’re doing in both delivering current services and planning for the future.”

What are the issues and trends you’re paying attention to?
Douma said he’s motivated by the increased activity in the private sector, especially related to the sharing economy. “What opportunities does this mean for new innovative policy? Where do we see the potential for market failures? How do we work to get the price right, and what questions arise if our focus is on a more equitable outcome?”

In Minneapolis, equity is also “a huge underlying theme,” Hager said. For example, equity is a component of the city’s changing approach to street design. “We have much more of a laser focus on people rather than cars. We want to build a sense of community and livability for all,” she said.

Murphy said he’s seeing an increasing focus on mixed-used, transit-oriented development in many cities. “It’s creating more walkable spaces, as long as we provide streetscapes and safety factors. We also need to pay attention to affordable housing, access to health care, and equitable destinations.”
the American Association of State Highway and Transportation Officials (AASHTO), examined the latest direction in infrastructure funding at the federal level, offered examples of innovation happening at the state level, and discussed policy and political considerations when it comes to transportation revenue and financing tools.

“Currently, there is no political appetite to provide stable long-term funding for the Highway Trust Fund; however, the path we are on is simply not sustainable,” Lee explained. “The difference between the money going in and the money going out hasn’t matched since 2008, and in the last few years we’ve led a hand-to-mouth existence with general fund transfers. On top of that, the gas tax has lost significant purchasing power due to inflation—the price of nearly everything has increased, but the gas tax rate hasn’t been adjusted since 1993, which is the longest it has ever gone without being adjusted.”

During the 2016 presidential election, the Trump campaign had indicated support for a new $1 trillion infrastructure package, and since taking office that vision has become clearer. Trump administration officials have said they want to make targeted federal investments, encourage self-help, and leverage the private sector. “What they are essentially talking about is reducing the role of the federal government when it comes to transportation investment. They are also looking at infrastructure as a whole—everything from air traffic control to oil exploration—and not just transportation,” Lee said.

AASHTO has been working with state DOTs to advise the administration on an ideal package. “We are reminding the administration that state and local governments currently provide the largest share of transportation investment,” Lee said. “We are encouraging them to fix the Highway Trust Fund, direct a sustainable share of the federal funding to transportation infrastructure, provide direct funding and not just financing tools, focus on projects with long-term benefits and not just shovel-ready projects, streamline the project delivery process, and rely on the existing program framework rather than a top-down structure where the federal government picks projects.”

The good news, according to Lee, is that there are many ways to pay for transportation infrastructure, and states are beginning to get creative with transportation funding. “The universe is vast when it comes to technically

Examining the future of transportation funding at the state and local level

Following Joung Lee’s opening presentation at CTS’s 2017 research conference, a panel of Minnesota leaders and experts shared their perspectives on transportation infrastructure funding.

Tracy Hatch, Deputy Commissioner, Minnesota Department of Transportation

“We have had federal continuing resolutions and short-term reauthorization, but we know that longer periods work better for getting big projects in the queue. The other challenge is that there is only so much capacity with our existing staff. When thinking about construction, folks tend to think only of actual payments to contractors, but there is so much more needed to get big projects out the door in terms of engineering, administration, planning, and right-of-way purchase—meaning the project delivery pipeline is only so big. If we want to take on big projects quickly, we need to increase the size of that pipe, because in Minnesota we are maxed out in terms of what we can deliver quickly.”

Jeffrey Heilstedt, Vice President, Transportation Regional Business Line Leader, Midwest Region, AECOM

“While there has been a lot of criticism of public-private partnerships (P3s), there are also significant benefits. Using the design-build process, we can potentially see projects happen much more quickly with significant cost savings.”
feasible ways to pay for transportation investments—we’ve identified more than 50 ways currently being used at the state level,” Lee said. “When considering funding strategies, it’s important to be mindful of realistic yield, because it is difficult enough to increase existing [tax] rates, and new levies can be even more challenging.”

To shift the conversation about transportation investment, Lee advocates clarifying transportation’s value. “We need to do a better job communicating the benefits of the transportation system,” he said. “People have no idea what they are paying for state forward, and while rural areas need roads, we all need investment in the metro area to keep those engines going. If rural areas lose their young folks to metro areas, we want to lose them to the Twin Cities—not to Denver, Portland, or Phoenix. Keeping local Minnesotans here brings stability, long-term vision, and leadership, so we need to work together and focus on building bridges and connections with stakeholders who have specific visions and can help move everyone forward.”

Jim McDonough, Commissioner, Ramsey County
“We need to work on bridging the urban and rural divide in our state. Hennepin and Ramsey Counties are the economic engines that move the transportation funding. In this country, data related to transportation money exists, but is not easily accessible—it is scattered and fragmented. Our research pieces together and aggregates data from many sources, making it possible to research how the whole system works for the first time. By breaking down where transportation money comes from at the state, local, and county level, we’ve created a tool that is tremendously helpful for state and local decision making.”

Jerry Zhao, Associate Professor, Humphrey School of Public Affairs
“At the Humphrey School, we have created the Minnesota Transportation Finance Database to provide data related to this challenge of...
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PUBLIC-PRIVATE PARTNERSHIPS offer opportunities for TRANSIT IMPROVEMENTS.

NEW DEPARTMENT PURSUES CHANGE AND INNOVATION at L.A. Metro.

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