



TPEC | TRANSPORTATION POLICY AND ECONOMIC COMPETITIVENESS PROGRAM

**2013–2017
PROGRESS REPORT**

Building a foundation for analysis and decision making



HUMPHREY SCHOOL
OF PUBLIC AFFAIRS

UNIVERSITY OF MINNESOTA

CENTER FOR
TRANSPORTATION STUDIES

UNIVERSITY OF MINNESOTA

A Valuable Source for Knowledge and Insight

Does Minnesota's transportation infrastructure meet industry needs? Is Minnesota prepared to realize the benefits of self-driving vehicles? What revenue streams could supplement the fuel tax?

These questions may seem unrelated, but they're all part of a bigger context: the relationship between transportation policies and economic competitiveness.

Public policies create the playing field that sustains economic growth. Whether by prioritizing road construction or planning transit service, transportation agencies influence business matters ranging from supply chains to site location. Business decisions, in turn, affect the demand for transportation infrastructure. Businesses innovate constantly to stay competitive—and government needs to keep pace to support their needs and create opportunities for job growth and prosperity.

At the same time, technology innovations in areas such as vehicle automation are coming rapidly and will affect both public and private sectors. For example, self-driving vehicles could mean fewer jobs for truck, taxi, and bus drivers; families might join a car-sharing fleet service instead of buying vehicles and paying for parking; people who cannot currently drive might achieve new levels of mobility and access. The implications could be vast for employment, urban form, tax collection, and household budgets.

The Transportation Policy and Economic Competitiveness (TPEC) Program was created to provide a better understanding of the impacts of transportation policies and innovations on Minnesota's economy. Housed in the State and Local Policy Program (SLPP) of the Humphrey School of Public Affairs, TPEC creates objective knowledge to inform decision making and, ultimately, strengthen our region's economic competitiveness and foster a high quality of life.

TPEC research is practical yet forward-thinking. Our team examines current policies to create a baseline of knowledge and looks ahead to find solutions and opportunities. The tools we create, such as a finance database and a national freight atlas, are a valuable resource for policymakers, not just in the Twin Cities metro but throughout the state and region.

Our work is also collaborative and engaged. We bring leaders in government and industry together to gather feedback, guide our work, and share our findings and tools.

An efficient and innovative transportation system is critical for economic vitality. This report tells you how TPEC is building a foundation to make that system a reality.

Lee Munnich, TPEC Director

Frank Douma, SLPP Director



A Quick Look at TPEC

TPEC was formed in 2013 when the Minnesota Legislature directed the Minnesota Department of Transportation (MnDOT) to fund research at the University of Minnesota on transportation policy and economic competitiveness.

TPEC focuses on three overarching topics:

- **Finance** – developing a comprehensive transportation finance database for Minnesota and examining finance alternatives and sustainable revenue streams.
- **Industry clusters and freight infrastructure** – improving knowledge of the state’s key industries and their supply chains and infrastructure needs.
- **Technology** – examining policy issues involving new and emerging technologies such as self-driving vehicles.



TPEC creates resources and tools:

- The **Minnesota Transportation Finance Database** shows transportation funding sources and expenditure allocations over time.
- The **National Freight Economy Atlas**, an online platform, allows users to analyze the freight infrastructure at the national, regional, state, and metropolitan/combined statistical areas.

TPEC studies the issues:

- Who wins, who loses: How is Minnesota’s **transportation funding redistributed?**
- Changes in **grain supply chains** are affecting local roads and communities.

TPEC brings people together:

- A **Self-Driving Vehicle Task Force** explores policies to ensure equitable access for the transportation disadvantaged.
- **Interviews with Minnesota business leaders** reveal their infrastructure needs to compete and thrive.



Finance

Identifying revenue streams and examining finance alternatives

There's broad agreement that existing financing and revenue-generation methods are no longer adequate to fund transportation. In particular, the fuel tax—the revenue workhorse for decades—is under increasing pressure as fuel efficiency improves and inflation reduces purchasing power. What's not clear, however, is how to pay for transportation now and in the long term. To shed light on these issues, TPEC researchers compiled a database of Minnesota finance mechanisms and examined financing alternatives.

Minnesota Transportation Finance Database

TPEC researchers created the Minnesota Transportation Finance Database (MNTFD) to provide a comprehensive, objective source of transportation finance information. It serves as a solid foundation for understanding transportation finance issues in Minnesota and for promoting informed decision making.

The MNTFD is a longitudinal and spatially integrated database for Minnesota transportation finance—in other words, data were collected over time and for different parts of the state. The database compiles data about Minnesota's current transportation finance mechanisms and shows the change of transportation spending over time. It is composed of annual data from transportation funding sources as well as transportation expenditure allocations (see page 4).

The database project and related analyses have drawn interest from state leaders. By request, TPEC researchers Jerry Zhao and Adeel Lari presented their analysis of Minnesota funding redistribution to several legislators and legislative staff. Lari also presented the work to MnDOT District 6 Rochester staff at their request.

“An independent and robust source of transportation finance information can help policy leaders better understand the issues and discuss what’s needed to build and maintain a world-class transportation infrastructure for a competitive Minnesota economy.”

—Lee Munnich, TPEC Director



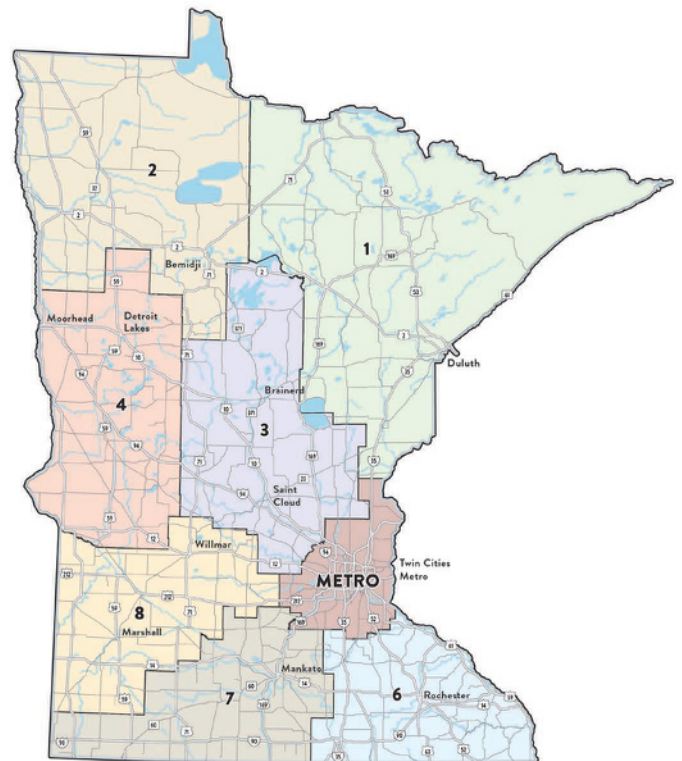
MNTFD downloadable datasets	Data type	Data timeline
Minnesota highway user tax revenue	State level	1975–2014
State of Minnesota revenue and expenditures for transportation purposes	State level	2005–2013
Local highway finance report – all cities	State level	2004–2013
Local highway finance report – all counties	State level	2004–2013
Local highway finance report – all townships	State level	2004–2013
Minnesota county governmental fund data	County level	2004–2013
Minnesota city governmental fund data	County level	2008–2013
Minnesota township governmental fund data	County level	2008–2013
Daily and annual vehicle-miles traveled by route system for each county	County level	2001–2013
Centerline miles and lane miles used by route system for each county	County level	2002–2014
Operating and capital funding sources of Minnesota urban transit system	Agency level	1991–2009
Operating expenses, service supplied and consumed by Minnesota urban transit system	Agency level	1991–2010
Expenses of Minnesota rural transit system	Agency level	2007–2012
Minnesota expenditures in trunk highway and trunk highway funds	State level	2002–2013
Minnesota motorization trends	State level	1980–2013
State and local government finance	National	2000–2013

Spotlight: Finance Analyses

TPEC researchers use the database to perform analyses of finance issues. Examples follow.

Funding redistribution: contributions and allocations

This analysis, completed in 2017, shows that transportation funding in Minnesota comes from the joint effort of federal, state, and local government, with a combination of many general or special revenue sources. It also illustrates how transportation funding in Minnesota is allocated—either through state direct expenditures or through intergovernmental grants to local government—across counties. Examining data between 2009 and 2013, the analysis found that the state’s Metro district (which includes eight counties in the Minneapolis–Saint Paul area) contributes about 48% of federal and state transportation revenues and receives about 51% of federal and state transportation expenditures. Other districts show different patterns.



Spending comparison with other states

This project developed a cost-adjusted approach to systematically compare highway expenses among states. Researchers found that while Minnesota spends more than average on highways, its spending level ranks low when controlling for the effects of some major cost factors, such as demographics and natural weather conditions. A lower winter temperature is associated with higher highway expenditures.

Accumulated capital stocks

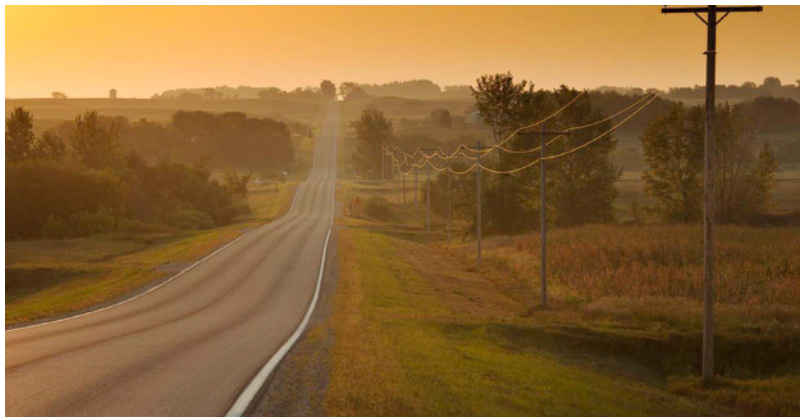
What matters in transportation improvement is not just the money spent in one single year, but also the accumulated amounts invested over a long period of time. TPEC researchers developed two measures of long-term accumulated transportation capital stocks in Minnesota counties during the period of 1995–2011, taking into consideration annual spending, depreciation, and the fluctuation of highway construction costs.

Investment and economic development in counties

This analysis found that investments in local roads and trunk highways show positive returns in property tax values in Minnesota counties. With the information, a county could develop a historical view of the trends of transportation development within its boundaries and then compare its stocks to those of other counties or comparable or competing peers.

Local efforts for roadway expenses

A common belief is that roadway expenses are mainly paid by federal and state fuel taxes. In fact, local property tax has been the largest single source of transportation revenue in Minnesota. With 2010 data, a TPEC analysis found that local efforts—mostly with property tax—pay for 65% of total local road expenses across cities, townships, and counties in Minnesota. For the whole roadway system, including state trunk highways and local roads, the share of local efforts would be about 52%, while the remaining 48% comes from federal and state special revenues. State fuel taxes, in particular, account for only about 16% of the total funding.



Future work will link
transportation
investment to
employment growth.



Value Increase and Value Capture: TH 610 Case Study

The current transportation funding system emphasizes user fees, but there is growing interest in alternative funding strategies. One promising strategy is value capture, which aims to recover the value of benefits received by property owners and developers as a result of infrastructure improvements.

In a TPEC-related study, researchers applied their expertise from previous work to a real-world scenario, with impressive results. The research, sponsored by MnDOT, focused on the planned development of Trunk Highway 610 (TH 610) in Maple Grove, Minnesota—a stretch of planned state highway delayed for years by state transportation funding shortages. Researchers examined how the value of the enhanced accessibility provided by the planned improvements could be predicted and captured to help fund the project's completion.

“Typically, trunk highway funding is provided solely by MnDOT, and any enhanced value that comes from transportation improvements are windfalls enjoyed by property owners and developers or—to a lesser extent—local property tax gains,” says TPEC researcher Jerry Zhao. “However, by estimating the value of transportation improvements and implementing strategies to capture that revenue, we can supplement project financing and expedite project completion.”

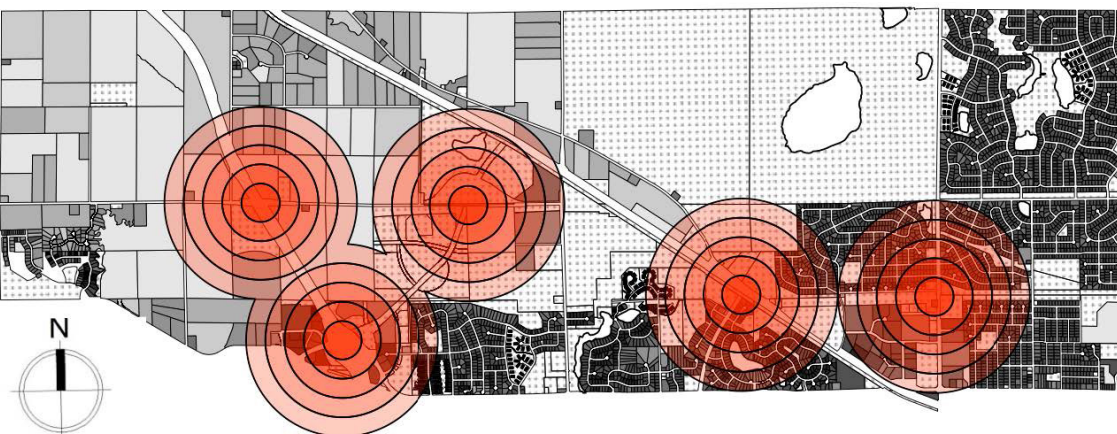
To accomplish their goal, researchers first defined a study area of about 10 square miles surrounding the unfinished highway segment. Then, they modeled property values based on five factors using parcel-level data. This model was designed to isolate the so-called “highway premium” by controlling for other factors that affect land value including water views, open space, railroads, transit stops, and existing highway exits. Using this model, researchers found significant evidence of a highway premium.

“We discovered that the completion of this highway would lead to a more than \$17 million increase in property value for the study area,” Zhao says. “The revenue potential of this increase using various value capture strategies ranges from about \$12 million to about \$37 million.”

Researchers expect these findings to have significant benefits. “We have demonstrated a way to estimate the value of transportation projects and communicate that to the public,” Zhao says. “This method can greatly assist transportation agencies and stakeholders as we work to solve our nation's transportation funding shortage.”

“U of M research has been very beneficial in helping policymakers and transportation professionals better understand value capture tools and techniques.”

—Brad Larsen, Director, MnPASS Policy and Planning Program, MnDOT



Property values are projected to increase significantly in five zones within 0.5 kilometers of new TH 610 exits.



Industry Clusters and Freight Infrastructure

Improving knowledge of the state's key industries and their supply chains and infrastructure needs

Dynamic and innovative industry clusters are critical for the success of a regional economy. But questions remain: Which industries are growing? How do clusters affect transportation systems and local communities? Where is transportation investment most needed? To fill this information need, TPEC researchers created new analysis tools, studied Minnesota's industry clusters, and engaged regional business and policy leaders.

National Freight Economy Atlas

To better understand freight flows and foster the growth of freight infrastructure, TPEC researchers created a new online platform—the National Freight Economy Atlas. The atlas allows users to analyze the freight infrastructure at the national, regional, state, and metropolitan/combined statistical areas. It incorporates data from the US Census Commodity Flows Survey, the Federal Highway Administration Freight Analysis Network, and the Bureau of Economic Affairs.

“We use unique methodological approaches to analyze the freight infrastructure,” says Tom Horan, TPEC visiting research scholar. “In particular, we incorporate the use of the location quotient to better understand commodity movements between regions.”

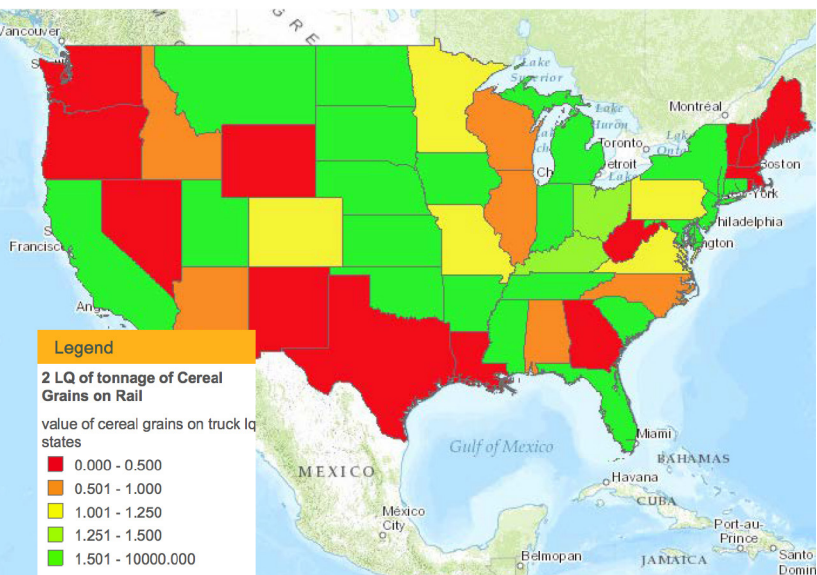
The location quotient (LQ) is an economic formula used to compare various regional attributes to the national average. It can quantify how concentrated a particular industry or cluster is and reveal what distinguishes a particular region. “Using this formula, our research team developed an LQ for freight flows, which helps to understand the spatial location of certain types of freight flows,” he says.

Why are industry clusters important?

Industry clusters are geographically concentrated groups of interconnected companies, universities, and related institutions. As a critical mass, clusters promote efficiencies that individual businesses or industries cannot, and they tend to have a large economic impact on a region.

The atlas displays information in a series of interactive maps. National and regional maps provide detailed analysis of freight and economic clusters. These interactive applications allow users to maneuver between different regions, pick various attributes to display, and adjust to different levels of data.

Industry cluster maps provide freight economy information geared to specific characteristics of industry clusters, such as cereal grains or base metals. “For example, users can see the proportion of cereal grains sent on rail compared with the national average,” Horan says.



Story maps provide insights into supply chains enhanced by freight transportation. “A story map is a strategy that uses a graphic organizer to help users provide a narrative of elements or a topic through a story,” Horan explains. “Many different types of stories can be geographically organized and easily understood using the story map graphic organizer. One example on the atlas is a story map of the transport of agricultural products originating in Minnesota and distributed across the Great Northern Corridor.”

The atlas was a combined effort of TPEC, Esri (a geographic information systems company), and the Center for Information Systems and Technology at Claremont Graduate University. Additional funding for the project was provided by BNSF Railway.



Minnesota is the fourth largest agricultural exporting state in the country (Minnesota Department of Agriculture, 2015).

Industry Clusters in Minnesota Regions

TPEC worked with MnDOT, the Minnesota Department of Administration, and U of M Extension to develop and implement a unique approach linking economic development and transportation planning. Their work has focused on getting manufacturers’ perspectives on transportation issues as part of regional transportation decision making.

The team identified competitive industry clusters in MnDOT operations districts. U of M, MnDOT, and local economic development staff interviewed manufacturers and their carriers within these clusters to better understand the transportation and logistics issues these companies face. The team also asked how MnDOT could make improvements to its operations and systems to help alleviate or minimize these issues.

A pilot study in MnDOT District 8 was completed in 2014. Since then, projects have been conducted in District 4 and District 2, with another project under way in District 1. Plans are being made to conduct projects in District 6 and in the Twin Cities metro area.

Topics covered in the interviews have included district operations and maintenance, communications, infrastructure, and policy questions. MnDOT has incorporated results of the studies into its statewide freight planning.



Minnesota ranks as the number one health technology cluster in the world, according to Medical Alley Association.

“TPEC’s ability to select businesses through the use of industry clusters has been vitally important to the success of the Manufacturers’ Perspectives on Transportation initiative. This effort, now statewide, continues to be a highly effective means to dialog with manufacturing-related businesses in all regions of the state.”

—Jon Huseby, District Engineer, MnDOT District 8

Spotlight: Industry Cluster Analyses

Greater Minneapolis–Saint Paul (MSP) region

This study, completed in 2014, revealed that some important new clusters—water technology, robotics, 3D printing, and biorenewables—are emerging in the region from existing competitive clusters.

Northwestern Minnesota

One industry particularly important to northwestern Minnesota is recreational vehicle production. Recreational vehicle manufacturing has two main players: Arctic Cat and Polaris. These are two very competitive firms in one of the most sparsely populated areas of the state, and both face major transportation issues related to inclement weather and difficulty in finding skilled workers.



Southeastern Minnesota

Mayo Clinic in Rochester also has major transportation issues. Mayo Medical Laboratories, for example, receives approximately 30,000 specimens daily from all over the world—most of which require time-sensitive processing. But on average, planes cannot fly into Rochester 9 or 10 days a year because of bad weather. On these days, the specimens have to be trucked from the MSP International Airport, losing critical processing time.



Southwestern Minnesota

TPEC researchers interviewed manufacturing firms in the clusters most important to this area, as well as area freight carriers, about their specific transportation needs in efforts to come up with some low-cost improvement strategies that could be implemented in the short term.

Statewide

Sponsored by MnDOT, a statewide project examined a wide range of industries, including medical devices, robotics, and processed foods. In all, 28 firms were interviewed within 12 industry clusters.

Several common themes emerged from the interviews: the importance of shipment reliability, the desire for improved intermodal freight facilities, and the condition of the infrastructure. Several firms whose products were either breakable or perishable cited the need for smooth pavements, for example.



The project also highlighted the unique challenges faced by some of the state's major industry clusters, such as the hospitality and tourism cluster in the Brainerd Lakes Area. A four-lane highway makes it easy for visitors from Saint Cloud or the Twin Cities to visit resorts in the area, but travelers coming from the Dakotas face a more circuitous route. Air travel options help to an extent, bringing in visitors from farther distances who can fly in to Fargo or Saint Cloud.

Other issues identified were weather-related delays, rail capacity and equipment issues, truck driver workforce and regulatory issues, regional air access, congestion delays in the MSP metro area, and carrier availability.

Spotlight: Minnesota Cereal Grain Movement

In the past two decades, the grain supply chain experienced a number of political, technological, and market innovations that have directly influenced the way grain producers and wholesalers navigate their local freight networks. In Minnesota, many grain producers and sellers have been upping their personal trucking capacity and making longer trips to a wider range of intermodal and domestic market options. These changes are causing state transportation officials to reconsider the consequences for road infrastructure and congested freight corridors.

TPEC researchers Tom Horan and Lee Munnich, along with graduate student Travis Fried, conducted a spatial analysis of inter-county cereal grain movements on Minnesota roads. Their study drew on disaggregated Commodity Flow Survey data provided by Quetica, LLC, and included interviews with local grain producers and freight operators.

The study also employed USDA crop production and cropland data to build an original, computational model that simulates local corn movements within two key grain-producing counties. The results suggest subsequent steps for building a spatial model that best captures the evolving grain market's impact on local freight movement and its implications for the future growth of the state's principal trucking corridors.

The new approach helps visualize market influence on how producers navigate their local road networks. For example, the model suggests that the emergence of biofuel has an especially substantial effect on producer behavior and grain trucking movement.





Technology

Preparing for new and emerging technologies such as self-driving vehicles

Technological innovations in transportation create new economic opportunities. They also raise challenges for policymakers, who need to keep informed of the changes, their potential impacts, and the policy and legal implications. One particular area—self-driving vehicles (SDVs)—is described as a potentially transformative and disruptive innovation.

TPEC researchers study the implications of changing transportation technology and recommend actions for policymakers. Their aim is to ensure that the full economic benefits from transportation innovation are realized—thus enhancing Minnesota's economic competitiveness.

Automated Vehicles: The Legal and Policy Road Ahead

At a conference cosponsored by TPEC in 2014, state and national leaders explored the various legal, ethical, technical, and policy dimensions of self-driving vehicles. The conference—Automated Vehicles: The Legal and Policy Road Ahead—featured presentations and discussions of industry and design perspectives, civil liability and insurance, criminal liability, regional and city planning perspectives, and ethics, equity, and access.

Articles based on the conference were published in a special issue of the *Minnesota Journal of Law Science & Technology*, a multidisciplinary journal edited by University of Minnesota faculty and law students. The issue, published in 2015, focused entirely on the conference presentations.

Spotlight: Conference Highlights

- From state and national statutes to liability, privacy, and insurance rules, policymakers and rule makers will need to carefully consider and modify current law to accommodate contemporary issues.
- As vehicles assume more control, lawsuits are likely to shift from the driver to the manufacturer. Plaintiffs could also target vehicle owners for failing to maintain a vehicle adequately.
- Minnesota law may need attention. It explicitly defines the driver as having physical control and states that “any person driving a vehicle shall be liable.”
- SDVs will likely generate a great deal of data on operators’ travel habits, including information on GPS location, speed, traffic, weather conditions, and road conditions, as well as information about other road users around the operator. How to protect or use the data is an open question.

“Although self-driving vehicles and other developments of the digital economy are already legal, it is becoming increasingly clear that there is a role for public policy to ensure that the benefits are enjoyed as widely as possible.”

—Frank Douma, SLPP Director

Mobility and Access for People Unable to Drive

One of the predicted benefits of self-driving vehicles is improved mobility and access for those unable to drive. The extent to which this happens, however, will depend not just on marketplace competition, but also on public policy decisions that ensure an equitable transportation system. This is the conclusion of an analysis by TPEC researchers Frank Douma and Adeel Lari and graduate student Kory Andersen. Their work was published in the *Michigan State Law Review* (Issue 1, 2017).

Although accessible SDV prototypes have been developed, deployment is uncertain. The researchers suggest that tax incentives could be created to prompt vehicle manufacturers to further develop and promote SDVs to service people with disabilities.



Another challenge to making SDVs benefit all people is keeping the costs affordable. “If SDVs enter the market as available for private purchase, only the most well-off individuals would reap the safety and mobility benefits,” Douma says.

This private ownership model also assumes that individuals would absorb the costs that public transit agencies currently incur for on-demand paratransit services. An alternative, the researchers say, is moving toward a model where fleets of SDVs function as a circulatory system for the population at large, providing mobility benefits to more people at lower costs. States could reform existing legislation and enact new policy that encourages an SDV fleet system.

“Enhancement of mobility on demand will only happen equitably if there is a strategic and consistent focus on the principles of universal design and people-centered planning and execution. As a society, we are excited by this new technology but need to ensure that those with the most need for transportation access are included in every step of the process.”

—Sandy Vargas, Chair, TPEC Task Force on Autonomous Vehicles and Equity

Spotlight: Self-Driving Vehicle Task Force

TPEC researchers convened a task force to examine the potential impacts of self-driving vehicles on people who are transportation disadvantaged. The task force will seek to identify strategies that ensure seniors, the disabled, and other disadvantaged communities fully enjoy the mobility offered by SDVs. It is made up of representatives from MnDOT, Metro Mobility, metro-area counties, nonprofits, and organizations from Greater Minnesota.

“Minnesota is well-positioned and has the momentum to drive local and national SDV policy,” says Frank Douma. “In 2017–2018, we will take our task force on the road to engage with colleagues, local politicians, and communities. Our goal is to develop a vision for SDVs in small towns and rural areas so all areas can benefit.”





Engagement Highlights

Sharing insight with leaders and stakeholders

Events

Impacts of Freight Rail on Minnesota's Economy

This event in February 2016 explored freight rail's impact on the Minnesota economy, including a study on the number of jobs rail contributes to in Minnesota, the industry clusters that are dependent on rail, and an online freight atlas that can be used to better understand freight flows in the region.



“TPEC links researchers with practitioners and policymakers to ensure its work addresses real-world needs and its findings are widely shared.”

—Laurie McGinnis, CTS Director

Roundtables: Technologies and Transportation Equity

A series of roundtable discussions hosted by TPEC in 2016 investigated the policy impacts of new transportation technologies. The roundtables specifically explored the impacts of the digital infrastructure and self-driving vehicles.

Discussion topics included opportunities and obstacles for improved mobility and access for people who cannot drive, possible impacts of self-driving vehicles on urban form, and broader impacts of the digital infrastructure on the physical infrastructure. Participants included U of M faculty and research staff, key members of state and local governments, and interested citizens.

Discussion themes included:

- **Equity.** New technologies could enhance equity. For example, they could allow aging rural residents to live in their homes longer, provide access to new economic opportunities for residents of low-income neighborhoods, and remove barriers for people with disabilities.
- **Economic impacts.** The expansion of private ride-sharing organizations such as Uber and Lyft has implications for taxi drivers and other transportation providers and for lower-income neighborhoods. There may be a need to ensure continued transportation service to residents excluded from ride-sharing services that require access to a smartphone and credit card.
- **Technology and job class.** New technologies can help individuals not only to improve their transportation options but also to work remotely. However, employees in the service sector and other positions that require a physical presence will benefit less from telework opportunities.
- **Rural communities.** Residents in rural areas may benefit less from new technologies than those in urban areas. Ride sharing and car sharing depend on higher-density neighborhoods to turn a profit, making lower-density rural communities less attractive markets. In addition, more limited broadband connectivity in rural areas means that residents have less access to telework, teleshopping, and telemedicine.

Autonomous Vehicles—The Legal and Policy Road Ahead

The October 2014 conference convened a multidisciplinary group of leaders from academia, government, industry, and civil society to explore the legal, ethical, technical, and policy dimensions of automated and autonomous vehicles (see page 11 for more).

Mapping the Midwest's Future

Under the TPEC umbrella, the Humphrey School of Public Affairs cosponsored a two-day forum: Mapping the Midwest's Future—Regional Innovation Clusters and Competitiveness. The 2014 forum marked the launch of the U.S. Cluster Mapping Portal, a national economic initiative that provides open data about regional clusters and economics to support business, innovation, and policy in the United States. Conference attendees included more than 180 business leaders, policymakers, economic development officials, and academics from 12 Midwest states and 4 Canadian provinces.

2013 Fall Forum: Transportation Policy and Economic Competitiveness

Local and national perspectives on freight transportation and economic competitiveness were discussed by U.S. Senator Amy Klobuchar; Matt Rose, CEO of BNSF Railway; and former Congressman James L. Oberstar. The event, held in September 2013, included two panel discussions featuring businesses and local policymakers.

Presentations and Multimedia

TPEC researchers share their findings and expertise with state and local leaders. Examples:

- Lee Munnich and Frank Douma discussed finance (pricing) and technology (self-driving vehicles) with the state's Legislative Energy Commission (July 2015).
- The Metropolitan Council's Committee of the Whole invited Munnich to present and discuss research on industry clustering (September 2015).
- Douma presented the latest policy and legal issues surrounding self-driving vehicles to the Governor's Broadband Task Force (March 2017) and the Minnesota Council on Transportation Access (March 2017).

The screenshot shows the TPEC website homepage. At the top is the University of Minnesota logo and the text "UNIVERSITY OF MINNESOTA Driven to Discover". Below that is the Humphrey School of Public Affairs logo and the text "HUMPHREY SCHOOL OF PUBLIC AFFAIRS | CENTER FOR TRANSPORTATION STUDIES". The main heading is "TPEC TRANSPORTATION POLICY AND ECONOMIC COMPETITIVENESS". There is a navigation menu with "Home", "Research", "Researchers", "Publications", "Events", and "About". A paragraph states: "The Transportation Policy and Economic Competitiveness Program conducts research, creates tools for policymakers, and engages in outreach to increase understanding of the relationship between transportation and economic development." Below this is a "RESEARCH AREAS" section with three columns: "Finance" (Identifying and developing sustainable revenue streams), "Industry Clusters and Freight" (Improving knowledge of the state's key industries and their infrastructure needs), and "Technology" (Preparing for new and emerging technologies such as self-driving vehicles). At the bottom is a "Resources for Policymakers" section with three items: "Minnesota Transportation Finance Database", "National Freight Economy Atlas", and "Minnesota Journal of Law, Science & Technology".

The TPEC website (tpec.umn.edu) contains links to research reports, tools, and much more. In addition, a video of TPEC researcher Frank Douma discussing the future of self-driving vehicles was created by the Humphrey School's Civios program. Civios (civios.umn.edu) is an online collection of videos, podcasts, and other multimedia tools that translate public affairs research into easy-to-understand presentations.

On tap: outstate convenings to gather feedback about the relationship between transportation and the economy.

Selected Publications

Reports

Transportation Investment and Economic Development in Minnesota Counties, April 2015, Report no. MnDOT 2015-12

Transportation Planning to Support Economic Development: An Exploratory Study of Competitive Industry Clusters and Transportation in Minnesota, January 2015, Report no. MnDOT 2015-02

Value Increase and Value Capture: The Case of TH-610 in Maple Grove, Minnesota, January 2014, Report no. MnDOT 2014-03

Journal Articles

The Legal Obligations, Obstacles, and Opportunities for Automated and Connected Vehicles to Improve Mobility and Access for People Unable to Drive, *Michigan State Law Review*, Issue 1, 2017.

Obtaining Manufacturers' Perspectives in Making Regional Transportation Decisions, *Community Development Journal*, February 2017.

Evolving Supply Chains & Local Freight Flows: A GIS Analysis of Minnesota Cereal Grain Movement, *Transportation Research Record* (submitted).

Roadway Safety Policy and Leadership: Case Study of Six Midwest States, *Transportation Research Record*, 2635 (2017): 19-27.

Competitive Industry Clusters and Transportation in Minnesota, *Competitiveness Review*, 26, no. 1 (2016): 25-40.

Minnesota Journal of Law, Science & Technology, 2015, special issue with articles from the TPEC Conference on Autonomous Vehicles—The Legal and Policy Road Ahead.

Revisiting the Fuel Tax–Based Transportation Funding System in the United States, *Public Works Management and Policy* 20, no. 2 (2015): 105-126.

Legal Accelerators and Brakes for Deployment of Automated Vehicles. In *Road Vehicle Automation 2*, edited by G. Meyer and S. Beiker, 93-104. Berlin: Springer Verlag, 2015.

Minnesota Task Force for Mileage-Based User Fee Policy, *Transportation Research Record* 2345 (2013): 48-52.

White Papers

Minnesota Transportation Funding Redistribution (2009-2014): Who Contributes More, Who Receives More?, May 2017

Event Summaries

Mapping the Midwest's Future: Regional Innovation Clusters and Competitiveness, December 2014

People

Researchers and Staff

TPEC welcomes public engagement and encourages you to contact us with your questions, comments, and research needs.

Lee Munnich

TPEC Director
Senior Fellow, State and Local Policy Program
Humphrey School of Affairs
612-625-7357
lmunnich@umn.edu

Adeel Z. Lari

Director, Innovative Financing
State and Local Policy Program
Humphrey School of Affairs
612-624-7746
larix001@umn.edu

Frank Douma

Director, State and Local Policy Program
Humphrey School of Public Affairs
612-626-9946
douma002@umn.edu

Barb Rohde

Research Fellow
Humphrey School of Public Affairs
rohde006@umn.edu

Tom Horan

Visiting Scholar, State and Local Policy Program
Humphrey School of Public Affairs
909-748-8748
tom_horan@redlands.edu

Zhirong (Jerry) Zhao

Associate Professor
Humphrey School of Public Affairs
612-625-7318
zrzhao@umn.edu

Advisory Board

The TPEC Advisory Board provides input and advice regarding program directions and activities. A key role of this group is to provide insight regarding priority needs for Minnesota and suggestions for how the program might meet them. Membership includes, but is not limited to, the current chairs and ranking members of the legislative transportation committees, other current and former elected officials, prominent research scholars, and high-level managers from both public and private transportation organizations.

Technical Advisors

Technical guidance is provided by a select group of State of Minnesota and University of Minnesota staff whose work is closely related to the work of the program. Organizations represented include MnDOT, the Minnesota Department of Employment and Economic Development, the Metropolitan Council, and the U of M Center for Transportation Studies. Members of this group, both individually and as a group, provide advice regarding research approaches, development of outreach activities, and similar technical discussions. Members are asked to serve, and make recommendations for others to serve, on technical advisory groups for specific research activities.

Transportation Policy and Economic Competitiveness Program

State and Local Policy Program
Humphrey School of Public Affairs
University of Minnesota
301 19th Avenue South, Suite 295
Minneapolis, MN 55455

Phone: 612-626-0564 • E-mail: slpp@umn.edu • Twitter: @TPEC_UMN

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