

Standing Committee on Transportation Demand Management (ABE50)
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Transportation Demand Management: A Focus on Moving People

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As TRB celebrates its centennial year, each of TRB's standing committees have been asked to highlight the committee's accomplishments and contributions to transportation, discuss the committee's current relevancy and activities, and reflect on the committee's role in meeting future challenges and opportunities. This article is a collaborative effort of past and current chairs of the Transportation Demand Management Committee, as well as key members.

The Committee on Transportation Demand Management (TDM) (“the Committee”) defines TDM as the application of infrastructure, information, financial, vehicle, technology, and support strategies and policies to influence travel behavior in one of three ways:

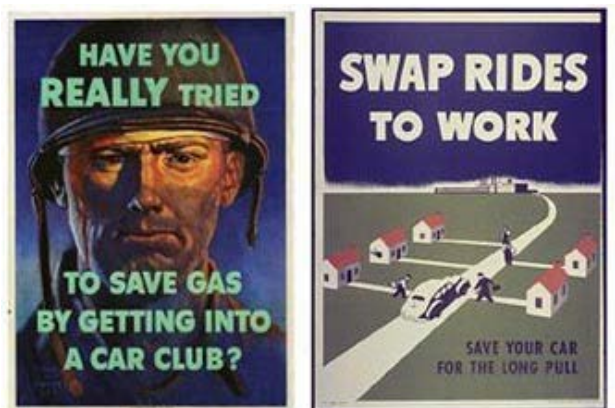
- Reduce vehicle trips and vehicle miles of travel by encouraging the use of shared-vehicle and non-vehicle travel options;
- Redistribute where and when travel occurs to shift travel from peak travel locations and periods; or
- Eliminate the need to travel at all.

More simply stated, less is more. Managing demand is doing things to improve the efficiency of the existing transportation system. Approaches to managing demand aren't limited to transportation. Utility companies aggressively seek to manage peak demands for energy by applying tools such as peak period pricing and influencing behavioral change. The same concept of managing demand for transportation has been around for over a half century in the United States. The primary driving force (pun intended) for demand management has varied over time and location. Whether justified as a national effort to encourage fuel conservation during World War II or part of regulatory requirements on employers to help reduce air pollution in our smoggiest cities, demand management strategies, from carpooling to telework to parking management continue to be widely used to address traffic congestion, expand mobility options, increase access to jobs, and protect the environment. Unfortunately, TDM has always had to battle against a culture dominated by the automobile and the highway system, as well as a long held and misguided strategy of “building our way out of congestion” through roadway expansion. To address these conflicts, research on TDM focuses on measuring the effectiveness of strategies, building a case for cost-effective TDM compared to roadway expansion,

developing tools to guide selection of strategies in various contexts, and improving applications of strategies to maximize impact.

YESTERDAY

Transportation demand management's roots can be found in efforts to encourage carpooling during World War II to conserve resources for the war effort (Figure 1). Jumping ahead to the oil embargo in the early and late 1970s, fuel supplies were disrupted and long lines grew at the gas pump. With support from the federal government, regional agencies began facilitating ride sharing to work to respond to the energy crisis, resulting in the U.S.'s largest mode share for carpooling of 19.7% (in 1980) or more than twice what it is today. Demographic trends such as



the growth of women in the workforce added significant numbers of work-bound travelers to the transportation system. At the same time, increasing residential suburbanization and decentralization of job centers combined to make public transit a less feasible travel option for many commuters. (American Association of State Highway and Transportation Officials, 2013).

Figure 1. Sources: U.S. Office of Price Administration, 1944 & U.S. National Archives and Records Administration, n.d.

It is important to note that TDM concepts were not solely applied to reducing vehicle trips on the road. Outside of the United States, many cities were dealing with the overburden of peak demand on their public transit systems. The same ideas of efficiently utilizing our transportation system through redistribution of when travel occurs was used to manage public transit systems that could not meet peak period loads.

From the beginning, the Committee has focused on improving the visibility and understanding of TDM among transportation professionals, by identifying research needs and expanding communications. For example, in 1993, the Committee held a symposium titled "Travel Demand Management Innovation and Research Symposium: Setting a Strategic Agenda for the Future." The Committee also created and administered surveys to transportation professionals in both TDM and related fields approximately every five years to identify research gaps. Researchers and industry leaders were asked to rate ideas identified by the Committee on a scale of 1 to 5, with 1 meaning "we know virtually nothing about the topic" and 5 meaning "we know a great deal about the topic." They were also asked to rate the same ideas from 1 meaning "not at all necessary or useful" to 5 meaning "very necessary or useful." Topics that were identified as highly necessary for TDM growth and success but lacking in information were selected for development of priority research needs statements.

The Committee has been successful in developing strong working relationships with other TRB committees to enhance collaboration and identify opportunities for cross-cutting knowledge sharing and research development. In 2012, the TDM Committee held its mid-year meeting in conjunction with four other TRB committees (Transportation Economics (ABE20), Congestion and Pricing (ABE25), Transportation and Economic Development (ADD10), and Revenue and Finance (ABE10)), and conducted joint working sessions with several of the committees to identify overlapping research interests. The Committee has also co-sponsored more workshops in recent years. Some examples include a workshop examining the benefit/cost analysis of road pricing for demand management (2011 - co-sponsored with the Committee on Congestion Pricing (ABE25)), a workshop on the interplay of congestion pricing and alternative modes (2013 - co-sponsored with Committee on Congestion Pricing (ABE25)), and a workshop on national performance measures (2019 - co-sponsored by ADA10, ABJ30, AP010, ABE30, and ABC30). In consideration of emerging technology, the Committee held workshops on disruptive technologies and its impact on transportation revenues (2018 - co-sponsored with the Committee on Revenue and Finance (ABE10)), and a workshop on the impact of connected and automated vehicle technology on TDM (2019 - co-sponsored with the Committee on Congestion Pricing (ABE25)). These strategic co-sponsorships allowed for broader audiences and different focuses on TDM.

Over time, the scope of the Committee was modified to identify, stimulate, review, and report research related to social, economic, public policy, psychological, behavioral and management aspects of TDM. As part of the Committee's scope, the Committee turned outward. In 2013, the Committee began working with the leading trade group in TDM, the Association for Commuter Transportation (ACT), to develop a research track within ACT's annual international conference to reach hundreds of TDM practitioners. As evidenced by this continuing working relationship, ACT and the Committee on TDM has elevated the content of the conference and has exposed practitioners and funding agencies to peer-reviewed research. The Committee also uses the conference opportunity to hold its mid-year meeting to recruit new friends to the Committee. For many years, ACT also held its own board meetings prior to the TRB Annual Meeting to facilitate collaboration.

TODAY

Transportation demand management practice and research today sees both opportunities and challenges, such as:

- Current recognition from the transportation field that TDM is a key solution.
- Key TDM strategies, such as pricing, are seeing more implementation in the field.
- Sketch planning tools focused on TDM-based collected research are being utilized.
- New technology is bolstering TDM.
- Lack of dedicated funding, research coordination and data measurement are challenges that need to be addressed.

These topics will be explored more in this section.

Collectively, interest in multifaceted approaches to managing demand whether it be associated with a traffic mitigation due to a major construction project, sustainability, and climate change goals, responding to natural emergencies such as hurricane recovery, neighborhood development, curb management, or coping with recurring congestion has generated increased attention on TDM's role as a key piece of part of the solution. For example, USDOT's urban partnership agreements (UPAs) included TDM elements as one of the four "Ts"

along with tolling/congestion pricing, enhanced transit services, and the deployment of advanced technology. The purpose of the UPA was demonstrate how to carry out a comprehensive approach to traffic congestion in four urbanized areas. The approaches taken varied between partner jurisdictions (e.g., HOV-to-HOT lane conversion vs. full facility pricing). UPAs helped demonstrate what was achievable with a multi-pronged approach.

Interest and investment in TDM and TDM research also isn't limited to the United States. For example, the European Platform on Mobility Management (EPOMM) is a network of governments in European countries that are engaged in Mobility Management (MM). EPOMM has conducted numerous MM research projects across European cities that have yielded tools and standard processes that cover TDM. The results have been shared with the U.S audience through many avenues, including the Committee.

Key TDM strategies, such as pricing schemes and parking management, are being leveraged to reduce travel demand. The State of New York's action in 2019 to add congestion (or "de-congestion") pricing for Manhattan below 60th Street in 2021 will allow transportation researchers the opportunity to study the impacts of this TDM tool in the United States' largest city, and it may support efforts to introduce congestion pricing elsewhere. A growing number of U.S. cities are also reducing or eliminating off-street parking requirements, which may gradually influence travel behavior by making parking more expensive.

Research-based TDM sketch planning tools such as the TDM return on investment (ROI) and trip reduction impacts of mobility management strategies (TRIMMS) calculators have been developed, using empirical results of TDM strategy evaluations. They help estimate the return on investment and highlight TDM's many societal benefits in addition to traffic congestion mitigation, such as reduced vehicle crashes and reduced roadway maintenance costs that are generated by reducing travel demand.

New technologies are providing impetus for development and expansion of new shared-use travel modes such as transportation network companies, bikesharing, carsharing, and e-scooters. Real-time travel information is facilitating mode choice flexibility and one-way travel options. Mobility as a Service with transportation options packaged together and a common payment platform will place more of the tools for identifying the travel options, routes, and times for travelers. These innovations provide an opportunity for various TDM strategies to work together such as incentivizing non-vehicle or non-peak travel based on real-time congestion metrics.

Even with the many positive indicators discussed, key challenges to the TDM research community remain. TDM research lacks the dedicated funding source like TRB's cooperative research programs (CRPs). While submitting research ideas through the CRPs continues, the Committee extends efforts to share the research needs with to others such as university transportation centers and industry practitioners to encourage and support academic and practitioner research, and to showcase research conducted by state, regional, and local organizations that would expand understanding of TDM applications and effectiveness.

Another challenge is that TDM research is not well-coordinated. This leads to one-off research projects funded at local/regional/state level that are often not well-publicized. This hinders the adoption of TDM because potential users do not realize that strategies could work for their situations and environments. Another current limitation is that while vehicle counts on roadways are routinely tracked and reported, the most notable TDM impacts of the increase in person-throughput, are rarely directly measured in real-time; this places TDM strategies at a disadvantage relative to other efficiency solutions. The industry is just beginning to understand

and invest how to count vehicle occupancy and person through-put in real-time. Advances in vehicle-to-infrastructure technology and/or mobile phone tracking are promising technologies to close this gap. This will help TDM play a bigger role in daily operations of the transportation system.

TOMORROW

The history of the TDM Committee is instructive in defining and forecasting the Committee's future. We see first and foremost the adaptability of the Committee to changes in the industry and in the economic and policy structure in which the industry operates. The driving forces and public expectations for TDM have evolved since the 1970s, from concerns about energy to air pollution to congestion to system performance to leveraging technology. The common thread through all these diverse objectives and expectations is TDM's focus on and experience with travel behavior change and the ability of TDM strategies to contribute to a wide range of transportation objectives at a far lower cost than required to expand transportation capacity.

The diverse range of potential opportunities for TDM continues to expand significantly, to encompass additional issues, including climate change, public health, personal health, wellness, equity, safety, affordability, and the economy, including companies' bottom lines. Economic vitality and sustainability, personal mobility and accessibility, energy conservation, and personal travel equity and affordability, are among the policy areas for which TDM research is reaching a critical level. For the transportation industry to be a key player in these critical topics, TDM practice provides meaningful ways to achieve these outcomes.

As the noted management guru Peter Drucker said, "Research is not one effort -- it is three: improvement, managed evolution, and innovation." (Drucker, 1989) TDM has been effective in evolving from ridematching for carpools to being holistic solutions for companies, local communities, regional agencies, and beyond. TDM continues to leverage technology advances to innovate and adapt to regulatory and demographic changes. For example, TDM programs have long provided multimodal information, effectively becoming the forerunner of Mobility as a Service. The lessons learned by TDM agencies will help communities and employers focus on the user experience, not just the technology capabilities, to affect changes in travel behavior.

The Committee recognizes recent trends and factors raise a host of new TDM research questions. These new research questions join perennial research needs:

- Climate: What are effective policies to achieve long-term reductions in carbon emissions and other air pollutants by working with people and their travel choices? What are effective short-term actions to shift demand during poor air quality days?
- Public health: What are the effective strategies to improve community health in response to the obesity epidemic in the United States? How can TDM improve access to healthy foods and public health services? How can housing and transportation development mitigate negative health impacts?
- Private industry: What are effective strategies to influence optimal travel behavior choices by the work force to increase transportation system efficiencies, including reducing peak-period travel? How is the private sector addressing their employee and transportation needs critical to their industry, including productivity, sustainability, and resiliency?
- Equity and affordability: What are historically underserved communities asking for that will support their mobility needs through information, incentives and outreach? In what

conditions is TDM an effective tool for housing + transportation cost affordability? What is a realistic expectation for TDM to achieve in economic and social benefits?

- Transportation system optimization: How can system operators integrate TDM as a tool to measurably improve traffic flow? What are the most effective strategies to utilize transit capacity, respond to dropping rates of transit ridership, and also play a role in handling transit service disruptions or real-time responses to peak transit demand? How is vehicle automation-technology changing the opportunities for TDM? How can TDM best utilize micro-mobility and other mobility innovations to provide more transportation choices and connections across a multimodal transportation system?
- Land use and development: How will changing demographics and land development patterns affect personal travel needs? What TDM policies and conditions on development are most effective in supporting sustainable development patterns?
- Performance measures: How can these benefits be reliably defined and measured for TDM strategies? What new and emerging data, methods, and tools will be useful to quantify non-traditional benefits of TDM?
- Policy development and communications: How can TDM research results be communicated most effectively to travelers, policy makers, and other stakeholders? What is the role of social media for TDM research and TDM practice?

The Committee sees significant future opportunities to advance and expand valuable research that is set up to evolve to meet new challenges on the horizon and be nimble to incorporate new technology and policy developments. We foresee the research actions to include:

- Utilizing new technology to improve the ability to measure TDM in real-time, find new and innovative TDM metrics, and transition from counting cars to counting people.
- Expanding beyond mode shift for commuters and broaden to mobility on demand where trips can be substituted (e.g., shopping online replacing travel, telework, deliveries of food instead of grocery shopping or going to a restaurant).
- Engaging behavioral economics and community-based social marketing experts to help assess effects to influence behavior.
- Capitalizing on emerging mobility options and improved real-time data as resources to influence travel patterns and strengthen TDM (rather than treating the technology itself as a solution).
- Recognizing the critical need for strong TDM to achieve a sustainable future with the significant influence connected and automated vehicle technology may have on travel behavior and land use patterns.
- Reducing “one-off” research studies by improving coordination and focusing on multiple site testing of TDM.
- Researching the political conditions necessary to gain passage of controversial measures, such as road pricing and the removal of parking subsidies.

The Committee also understands that research questions and proposed actions in of itself will not move forward TDM research. Based on the challenges and opportunities already discussed, the Committee has identified key future elements needed to advance the TDM research agenda, including:

- Engaging University Transportation Centers and state DOTs in setting and implementing a national TDM research agenda/demonstration to augment resources spent on researching TDM.
- Strengthening the connection between practitioners and researchers - utilizing the bridge the TDM Committee as built with the Association for Commuter Transportation.
- Engaging FTA and FHWA as well as ITE and AASHTO, and their international counterparts, with a key message that TDM is an integral piece of successful transit implementation, as well as well broader transportation efficiency and performance.
- Continuing and improving cross-collaboration with other TRB committees, including those who focus on traffic engineering and system operations.
- Expanding collaboration and integration with outside organizations such as American Planning Association, US Council of Mayors, Natural Resources Defense Council, National Association of City Transportation Officials, and others.

The TDM Committee and TDM research history shows how the topic has evolved and adapted over the years. The common theme has always been the ability of TDM to address a wide range of both transportation and non-transportation objectives. As key policy areas of economic sustainability, personal mobility, energy conservation, safety, equity and affordability become critical topics, TDM research will be a shining star and be a key player in providing meaningful ways to address these policy issues.

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