POLICY BRIEF

Mobility Hubs

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Equity review by Rio Oxas

Project Description

This project reviews and summarizes empirical evidence for a selection of transportation and land use policies, infrastructure investments, demand management programs, and pricing policies for reducing vehicle miles traveled (VMT) and greenhouse gas (GHG) emissions. The project explicitly considers social equity (fairness that accounts for differences in opportunity) and justice (equity of social systems) for the strategies and their outcomes. Each brief identifies the best available evidence in the peer-reviewed academic literature and has detailed discussions of study selection and methodological issues.

VMT and GHG emissions reduction is shown by effect size, defined as the amount of change in VMT (or other measures of travel behavior) per unit of the strategy, e.g., a unit increase in density. Effect sizes can be used to predict the outcome of a proposed policy or strategy. They can be in absolute terms (e.g., VMT reduced), but are more commonly in relative terms (e.g., percent VMT reduced). Relative effect sizes are often reported as the percent change in the outcome divided by the percent change in the strategy, also called an elasticity.

Summary

Strategy Description

Mobility hubs provide coordinated access to public transit, bike share, car share, and other means of travel in a single location. They are designed to provide safe, comfortable, convenient, and accessible spaces for seamlessly transferring between modes with the goal of improving alternatives to driving.

Behavioral Effect Size

Because mobility hubs are a relatively new strategy, no studies of their impact on VMT have yet been published. Studies from Europe suggest that mobility hubs can shift travel from driving to other modes and reduce car ownership.

Strategy Extent

Mobility hubs can be developed in places where transit routes converge. By providing access to bike-share, car-share, and ride-hail services, existing transit centers can be transformed into mobility hubs.

Strategy Synergy

Mobility hubs have synergistic effects with transit, bicycle, and pedestrian strategies. The development of a mobility hub is likely to have a greater effect on VMT if implemented in conjunction with transit, bicycle, and pedestrian improvements. Land use strategies can increase the effectiveness of mobility hubs.

Equity Effects

Mobility hubs help to improve the quality of travel by modes other than driving and thus increase low-cost options for accessing destinations. Incorporating public services can enhance their benefits to disadvantaged communities. If mobility hubs decrease VMT, they will reduce environmental impacts that disproportionately harm disadvantaged communities.

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Strategy Description

Mobility hubs are places within a community that provide coordinated access to public transit, bike share, car share, and other means of travel. They are designed to provide safe, comfortable, convenient, and accessible spaces for seamlessly transferring between modes with the goal of improving alternatives to driving.

The concept reportedly emerged in Germany in the late 1990s, with the first hubs implemented in the early 2000s (Arnold et al., 2023). Multiple Metropolitan Planning Organizations (MPOs) in California have been promoting mobility hubs as a strategy for both reducing VMT and improving accessibility, especially for disadvantaged communities.

Other terms are sometimes used interchangeably with mobility hubs, including "smart mobility hubs," "shared mobility hubs," and "multimodal hubs" (Geurs et al., 2023). They are related to the concept of transit centers but explicitly incorporate modes other than transit. The concept of "mobility as a service" (MaaS) represents an informational and financial, rather than physical, integration of these modes.

Guidance on the development of mobility hubs can be found in the Metropolitan Transportation Commission's *Mobility Hub Implementation Playbook* (2021), the San Diego Association of Government's *Mobility Hub Features Catalog* (no date), the Orange County Transportation Authority's *Mobility Hubs Strategy* (2022), the City of Los Angeles' *Mobility Hubs: A Reader's Guide* (no date), and other documents.

Strategy Effects

Behavioral Effect Size

Because mobility hubs are a relatively new strategy, no studies of their impact on VMT have yet been published.

Evidence from Europe is suggestive of the effect mobility hubs might have on VMT. A German study found that mobility hubs reduced car ownership by promoting a shift in travel from driving to other modes available at mobility hubs (Czarnetzki & Siek, 2022). A study from the Netherlands found that more than 60 percent of participants would have used public transportation for their last trip if a multimodal transport hub had been available (Horjus et al., 2022).

Synergy

Mobility hubs have synergistic effects with transit, bicycle, and pedestrian strategies. They are likely to be most effective in reducing VMT in areas with high quality transit and good connections to other modes. The development of a mobility hub is likely to have a greater effect on VMT if implemented in conjunction with transit, bicycle, and pedestrian improvements. Land use strategies that enhance the residential density and mix of uses around mobility hubs may increase their effectiveness.

Extent

Scale of Application: Mobility hubs can be developed in places where transit routes converge. By adding access to bike-share, car-share, and ride-hail services, existing transit centers can be transformed into mobility hubs. The Sacramento Regional Transit District, for example, is planning 52 mobility hubs focused on disadvantaged communities (SacRT, 2024).

Efficiency or Cost: The implementation of mobility hubs requires coordination among different public agencies and with private service providers. The cost of developing a mobility hub depends on existing conditions, the size of the mobility hub, and the extent of the planned improvements. In 2021, the Metropolitan Transportation Commission

awarded $2.4 million for six mobility hub pilot projects (MTC, 2022).

Time / Speed of Change: The speed of developing a mobility hub also depends on existing conditions, its size, and the planned improvements. Challenges with coordination among different public agencies and with private service providers may lengthen the implementation timeframe.

Geographic variation: Mobility hubs can potentially be implemented in any community with public transit service. The impacts on VMT are likely to vary by setting.

Equity

Mobility hubs help to improve the quality of travel by modes other than driving and thus increase low-cost options for accessing destinations. Public agencies can prioritize the development of mobility hubs within disadvantaged neighborhoods. The City of Los Angeles, for example, initiated a mobility hub project designed to serve the needs of under-represented populations including welfare recipients and low-income individuals (City of Los Angeles, no date). Incorporating public services within hubs can enhance their benefits to disadvantaged communities. Such services might include daycare centers, libraries, health centers, and other non-profit providers. Designing hubs for easy access by persons with disabilities and for non-English speakers is essential, as are measures that ensure safety for all users, particularly women, children, and the LGBTQ+ community. If mobility hubs decrease VMT, they will reduce environmental impacts that disproportionately harm disadvantaged communities.

Confidence

Evidence Quality

Evidence of the impacts of mobility hubs on VMT is limited. No direct evidence is available.

Caveats

The limited evidence available on potential impacts is from Europe and may not be applicable to the U.S.

Technical & Background Information

Study Selection

Most studies of mobility hubs published to date focus on their planning, siting, design, and/or implementation (e.g., Anderson et al., 2017; Arnold et al., 2023; Aydin et al., 2022; Frank et al., 2021; Hached et al., 2023; Geurs et al., 2023). Several studies present typologies of mobility hubs (e.g., Bell 2019; Geurs et al., 2023; Hachette and L'hostis, 2023; Rongen et al., 2022; Roukouni et al., 2023; Weustenenk and Mingardo, 2023).

Two studies from Europe provide indirect evidence of the possible effect of mobility hubs on VMT. Given the dearth of direct evidence from the U.S., these studies are reported here. Czarnetzki & Siek (2022) surveyed residents to examine the effect of mobility hubs on the use of car-share services as well as other modes. Horjus et al. (2022) used a stated-preference survey to examine the intention to use shared transport if a mobility hub were to be created.

SANDAG used the agency's activity-based travel demand forecasting model to test the performance of the Central Mobility Hub proposed for downtown San Diego as a part of the Connections CMCP (Comprehensive Multimodal Corridor Plan). The results suggest that the project could reduce VMT in the study area by as much as 18% (SANDAG, 2023). This study is suggestive of the kind of impact mobility hubs, when implemented with supporting policies, could have on VMT, but does not provide empirical evidence of their actual impact.

Methodological Considerations

As mobility hubs are implemented in the U.S., it is important that rigorous evaluation studies are conducted to assess their impacts on VMT. Evaluation studies should include measurements of VMT before and after the implementation of the mobility hub for both the population served by the hub and for a control population not served by the hub. A difference-in-differences analysis assesses whether the change in travel behavior for the "treatment" (i.e., served by the hub) population exceeds the change in travel behavior for the "control" (i.e., not served) population. The evaluation can be conducted at either the system level or the individual level.

System-level: A system-level study would rely on system-level data on the use of each mode affected by the mobility hub. Data on transit boardings and alightings by stop and on bike-share and car-share trips by location could be used to complete the difference-in-differences analysis. A buffer of some distance around the mobility hub would be used to define the treatment and control areas, i.e., which transit stops and which bike-share and car-share origins would fall within each area. Control areas should be as similar as possible to the treatment areas with the exception of the lack of a mobility hub.

Individual-level: An individual-level study would use a survey of residents to measure travel behavior before and after the implementation of the mobility hub. The survey should measure the frequency of use of each of the relevant modes as well as (weekly, monthly, or annual) VMT. Such data can also be collected with a smartphone app that tracks movements and uses a survey to provide additional information. A buffer of some distance around the mobility hub would be used to define the treatment and control populations. Control populations should be as similar as possible to the treatment populations with the exception of their proximity to a mobility hub.

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