Integrating Shared Mobility Services with Transit Could Produce Economic and Environmental Benefits

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Project Objective

This study examined the potential to improve transportation system efficiency by reevaluating and redefining the role of public transit and its design principles in the new context of technology and shared mobility. Specifically, it evaluated the financial feasibility of an integrative, multimodal transportation system where public and private mobility services coexist to maximize economic and environmental benefits and free up public transit resources to be reallocated more efficiently.

Problem Statement

Public transit can significantly reduce greenhouse gas emissions and energy consumption in the transportation sector and alleviate road congestion. Thus, it plays an important role in improving the sustainability of transportation systems. However, many transit systems in the United States suffer from low ridership and high operating costs, providing a significantly compromised mobility service for travelers. Because transit agencies must provide coverage to their entire service area, including low density areas, inefficiencies in resource use are almost inevitable. However, new mobile technology and the rise of shared mobility services such as Uber and Lyft provide new opportunities to re-evaluate current transit system design principles and integrate public and private transportation options to improve the efficiency of the overall transportation system.

Research Methodology

Researchers at UC Davis conducted a financial feasibility analysis to determine potential routes operated by the Santa Clara Valley Transportation Authority that could be better served by alternate transit routes and/or shared mobility services. Financial feasibility was analyzed by mathematical and theoretical comparison between the existing public transportation system and a model of an integrated, multimodal public transportation system. Researchers identified existing routes with low ridership, high costs, and proximity to alternative transit routes as candidates for replacement by shared mobility services.

The threshold for low average ridership was set at 16.95 passengers per vehicle trip (the point at which the fuel use per passenger would exceed that of a private vehicle). The threshold for large cost per rider was set to be $7.39 per trip (equivalent to a three-mile Uber service price in the area).

To meet the criteria of having a nearby alternative transit routes, a given transit route had to have other routes within 3 miles of its frequently used origins and destinations. The researchers then analyzed the financial feasibility of removing the transit route with low ridership and covering that demand by combining private mobility services and nearby transit routes with sufficiently high ridership.

Results

As illustrated in **Error! Reference source not found.**, the average ridership of each transit routes varies significantly. The researchers identified about two dozen routes with low ridership and high average cost per rider. Most of these routes serve lower density areas.

The researchers then explored the feasibility of eliminating these routes and reallocating saved transit funds to subsidize shared mobility trips of up to 3 miles for target passenger populations. As can be seen from **Error! Reference source not found.**, the average cost per rider of most routes is above the $7.39 threshold, meaning that the transit agency could subsidize shared mobility trips for passengers and still save money. If the budget for all of these routes were pooled, more would be available to subsidize each shared mobility ride on average. Shifting passengers from transit routes with low ridership to shared mobility vehicles would also be expected to reduce fuel use and greenhouse gas emissions, since transit buses with few passengers use more fuel per passenger than private vehicles.

Based on the analysis of Santa Clara County and a review of the relevant literature, the researchers concluded that an integrated multimodal public transportation system would be financially feasible and environmentally sustainable. Such an integrated system would likely improve rider experiences and the level of service, while increasing flexibility, availability, and reliability.

The researchers focused on the financial feasibility of integrating public and private transportation options. However, there would doubtless be legal, political, and equity concerns about making this shift. A review of the research literature and successful practices in some cities suggest that these barriers may be overcome, although thoughtful coordination and cooperation among entities in the system will be critical.

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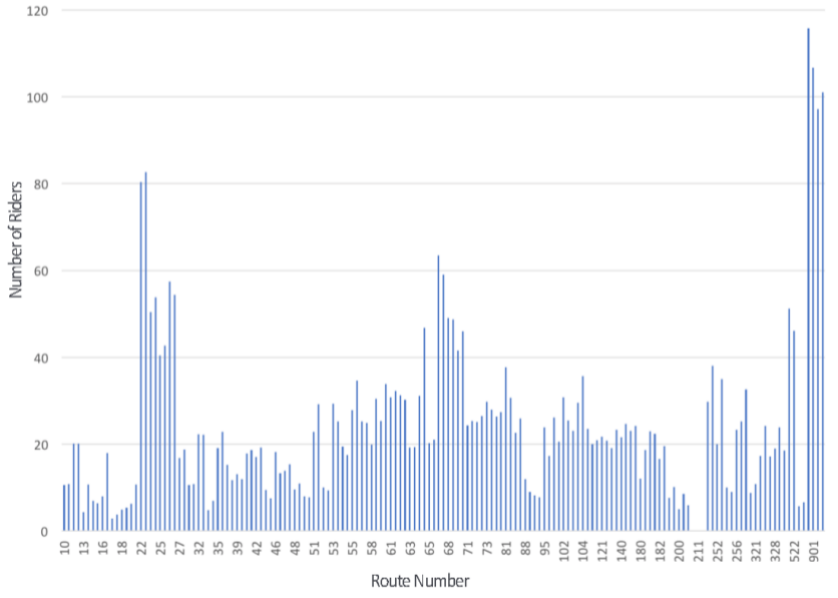

Figure 1. Average ridership of Santa Clara Valley Transportation Authority transit routes.

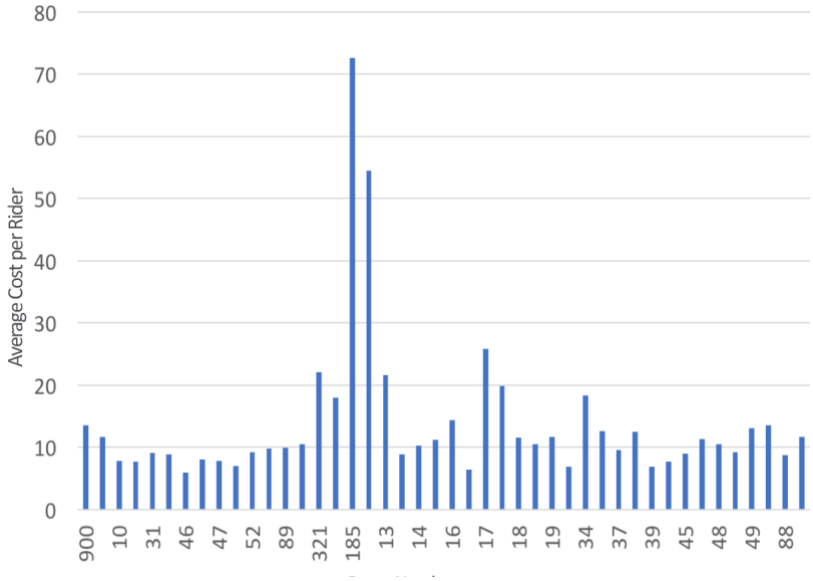

Figure 2. Average gross cost per rider for Santa Clara Valley Transportation Authority routes with low ridership.