

Commuter-Based Carsharing

Market Niche Potential

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The automobile accounts for more than 95 percent of all person miles traveled in the United States, whereas transit accounts for less than 3 percent of all trips. Between the private automobile and traditional transit, niche markets exist for other transportation services, such as airport and transit feeder shuttles and carsharing. Commuter-based carsharing, by which individuals share a fleet of vehicles linked to transit, could potentially fill and expand one such niche; complement existing services, mainly transit and feeder shuttles; and develop into a viable transportation alternative. A brief overview is presented of transit feeder services, particularly in Northern California. The CarLink I field test is described—a commuter-based carsharing model developed and tested in the San Francisco Bay Area in 1999. Key behavioral findings are highlighted. Recommendations are made for strengthening the viability of this innovative service, mainly on the basis of experience from the CarLink I field test. Empirical evidence suggests that CarLink could be sustainable if certain conditions exist: strong cooperation with local businesses and transit is established; parking limitations and congestion are prevalent; system feasibility is demonstrated; incentives are used (e.g., preferred parking and transit pass subsidies); higher user fees are generated; and technology and management costs are lowered. Further, CarLink's long-term potential and viability could be strengthened by a combination of approaches, including cost reduction strategies, policy incentives, linkages to other complementary services (e.g., ridesharing), and local program support (e.g., demonstration grants).

At the end of World War II, transit reached its peak in the United States, with almost 24 billion passenger trips. Within 10 years, ridership levels dropped by almost 50 percentage points. By the late 1950s and early 1960s, the U.S. mass transit industry—primarily owned and managed by private operators—was on the brink of collapse (1). Meanwhile, automobile trips were growing, and in 1956, the motor vehicle's role was further solidified by passage of Interstate highway system legislation (2). Coupled with an integrated road network, the automobile offered unparalleled freedom and mobility, and its popularity grew (3).

In contrast, the transit industry was in decline. In response, Congress enacted the Urban Mass Transportation Act of 1964. This legislation provided capital grants for transit operations and research support for demonstration projects to encourage local experimentation with innovative technologies and services (4). However, transit operations and productivity were not revitalized as planned. Transit reported a \$300 million annual operating deficit only 6 years later (1). In 1974, new legislation was adopted to provide federal aid for operations and capital improvements, which marked a controversial step in national transit policy (4).

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Given this history of transit and highway subsidies, it is not surprising that only a few viable markets (e.g., airport shuttle services) have evolved in the United States to close service gaps between the automobile and traditional transit (1). However, today's shift toward local transit policy (5), fostered by the federal Intermodal Surface Transportation Efficiency Act of 1991 and Transportation Equity Act for the 21st Century (TEA-21), suggests that an opportunity may exist for more sustainable market niche services to emerge (1), such as transit feeder shuttles and commuter-based carsharing. In fact, both carsharing and shuttles are gaining popularity (1, 6, 7). [See Shaheen et al. for a discussion of the past, present, and future of carsharing internationally (6, 7)].

As a supplement to traditional transit, feeder services almost exclusively serve commuter markets and connect to a single workplace or neighborhood (e.g., apartment buildings) destination (1). Feeder services bridge the gap on the origin or destination end of a transit trip (8). A commuter-based carsharing model, such as CarLink, could also provide connectivity to traditional transit. CarLink could provide a shared fleet of vehicles for accessing transit at the home and work ends of a trip (i.e., home-based users and work-based commuters). Further, coworkers could share vehicles for multiple uses throughout the day (i.e., day use). On evenings and weekends, vehicles could also be shared by participants (i.e., home-based users) who drive home from transit stations at the end of the day. Carsharing vehicles would provide a shared community resource at transit stations, in neighborhoods, and at employment centers. Shared-use cars could offer instant access to destinations not conveniently accessible by transit alone (9).

An overview of transit feeder services is presented, particularly employer-sponsored shuttles, station cars, and commuter-based carsharing in Northern California. Carsharing is demonstrated as a complementary niche service (not a replacement) to traditional transit and feeder shuttles. Although most shuttles rely heavily on local support (e.g., taxes and vehicle registration fees), carsharing offers a feeder service alternative with commercial potential. CarLink (a commuter-based carsharing model) benefits, the 1999 CarLink I field test, and key findings are described. Several ways to strengthen CarLink's viability are explored.

TRANSIT FEEDER SERVICES: AN OVERVIEW

In the 1970s, private subscription commuter vans and buses, which transported suburban residents to employment centers, were popular throughout the United States. Residents and developers typically organized such services rather than employers (1). Today, however, such services are much less common.

In the last 15 years, transit feeder services—supported by employers and developers—have emerged that help attract and retain employees and promote travel demand management. In the 1980s,

business parks in the East San Francisco Bay region deployed the first rail-based shuttle services (1). Walnut Creek Bay Area Rapid Transit (BART) District commuters were transported to and from the Bishop Ranch and Hacienda Business Parks. Because of rising costs, however, both of these programs were eliminated in the early 1990s (1). Interestingly, this same region was the home of the CarLink I field test, which was based out of the BART Dublin-Pleasanton station in 1999, and was linked to the Lawrence Livermore National Laboratory (LLNL) (10).

Today, most commuter subscription services have been taken over by local authorities, employers, or both, and supported by subsidies. In the San Francisco Bay Area, several innovative partnerships between employers and rail transit operators have formed recently to provide feeder services, such as the BART Station Car Program and CarLink (1, 10, 11). Further, in May 2000, BART and Hertz jointly launched a commercial, station car rental program at the Fremont station.

Interestingly, CarLink has its roots in both European carsharing and U.S. station car concept. Bernard defines carsharing and station cars as two separate, although somewhat overlapping, concepts (12). Carsharing, according to Bernard, is a European development that usually begins as a local cooperative with one or two vehicles parked in several residential neighborhoods, which are seldom used for commute trips. The station car concept includes several to many cars parked at central locations (e.g., transit stations and businesses) for subscribers to make local trips. Station cars are typically small electric vehicles for environmental reasons, although other types of vehicles can be used. Under this definition, CarLink is a station car program. As with any developing concept, definitions are evolving. This study considers CarLink as a blend of the station car and carsharing concepts, which are not mutually exclusive (10).

TRANSIT FEEDER SERVICES: IS THERE AN UNMET DEMAND?

Today, transit feeder shuttle services continue to gain popularity in Northern California. More than 100 shuttles operate in the Bay Area (1). Common characteristics of successful employer-based transit shuttles include

- Linkages to concentrated employment centers that are outside walking distance of a transit station;
- Frequent service during peak commuting periods with timed transfers;
- Most commuting time spent in traditional transit versus shuttle (i.e., a shuttle trip is under 15 min);
- Similar origin-destination patterns served for a substantial number of employees;
- Congestion and parking barriers in using the automobile, which is not a problem with shuttle;
- Several major employers, versus many small businesses, willing to support the service; and
- Use of integrated fare policies (i.e., either fully subsidized or shuttle costs included in the cost of a monthly transit pass) (8).

In the San Francisco Bay Area, transit feeder shuttles cost approximately \$75,000 to \$80,000 per vehicle a year to operate. Typically, the shuttles provide peak-period service (or headways that are timed with transit schedules) to reduce wait times at transit stations. Although feeder shuttles are quite successful in the Bay Area, service

limitations do exist. These service gaps provide a complementary niche for commuter-based carsharing programs. Six reasons are outlined that support CarLink as a provider of complementary service to traditional transit and feeder shuttles.

First, many San Francisco Bay Area shuttles include one 22-passenger van, circulating from a transit station to one or more employment sites during peak commuting periods. Because shuttle capacity is somewhat limited, a potential exists for unmet demand. CarLink could supplement such van service and perhaps attract customers who are unwilling to take a shuttle for various reasons (e.g., flex hours, unpredictable schedules, a preference for personal vehicles).

Second, most vans are fully subsidized for employees, so funding is limited. Shuttles are often co-funded by employers, the Transportation Fund for Clean Air [i.e., Assembly Bill (AB) 434 funds], and local transit providers. AB 434 funds are generated from California vehicle registration fees to support air quality management programs, such as feeder shuttles. However, these funds are limited. For many shuttle programs, transit authorities pay 50 percent of shuttle costs, AB 434 funds cover another 25 percent, and employers fund the remaining 25 percent. Funding for shuttles is highly competitive; thus, the number of subsidized shuttle services deployed in a region each year is limited. Employers commonly cannot secure a shuttle service in a highly congested region, such as Silicon Valley. Further, many smaller employers (the predominant model in Silicon Valley) cannot support a shuttle service. CarLink could serve employers of almost any size (by scaling the number of vehicles contracted) without the level of local subsidy needed by a traditional feeder shuttle service. It is important to note that CarLink vehicles could carry up to five passengers; ridesharing is highly encouraged among CarLink participants and is facilitated by advanced technologies.

Third, timed shuttles can provide connectivity only to individuals whose work schedule is within service hours. Individuals, who work late or have variable hours, typically cannot use shuttle service. CarLink can provide a more demand-responsive alternative to individuals who may need to travel at different times than those covered by the shuttle service. Further, CarLink service includes a guaranteed ride service (e.g., taxis) in case a vehicle is not available. It is notable that during the 10-month CarLink I field test, the guaranteed ride service was never used (10).

Fourth, shuttles normally operate only during peak periods; thus, individuals who vanpool, carpool, or take transit are typically restricted to the work site during the day. Besides providing a more demand-responsive alternative, CarLink could also provide a supplementary mobility option to individuals who carpool or take transit by offering an on-site vehicle fleet for business and personal trip making during the day. During the CarLink I field test, researchers found that the shared-use fleet actually increased the mobility options of participants who carpooled, vanpooled, biked, or took transit to work (10).

Fifth, feeder shuttles serve only one side of a transit commute (i.e., either residential or employer sponsored). In the case of employer-based shuttles, services are typically limited to a few employees during peak periods. With CarLink, the same vehicle fleet can serve all home-based users, work-based commuters, and day users. (See the CarLink I Field Test Description section for an expanded description of the CarLink model and study results.)

Sixth, CarLink offers a parking management solution to transit providers because shared-use vehicles can serve multiple transit customers per day with a single parking space. Thus, CarLink can give transit operators a means of attracting new customers through

a more efficient use of their parking spaces. On the basis of these arguments, a potential market niche exists for commuter-based car-sharing that is complementary to existing services. Although car-sharing has been described as complementary to transit here, if bus companies were to provide door-to-door services (e.g., smart para-transit) in the future, CarLink might compete with such a service (Alan Zahradnik, unpublished).

The remaining discussion addresses potential carsharing benefits; the CarLink model, the 1999 Northern California field test, and key study findings; and recommendations for strengthening the viability of commuter-based carsharing services.

COMMUTER-BASED CARSHARING: POTENTIAL BENEFITS

A shared-use system, such as CarLink, could decrease traffic by reducing the number of cars needed by households and encouraging commuters to walk, bike, or use transit, at least for some of their trips. For commuters and employers especially, shared-use vehicles could offer a low-cost, low-hassle alternative to private vehicles. Further, carsharing could improve air quality by incorporating low-emission vehicles into shared-use fleets.

Commuter-based carsharing could reduce government spending on arterial street systems and mass transit by adding to transit ridership with more reverse commuters and midday, evening, and weekend riders. Sharing vehicles could even free up parking spaces; by serving multiple users each day, vehicles would spend less time parked at transit stations and employment centers. Carsharing could aid employers by attracting (e.g., to the suburbs) and retaining employees and reducing the need for additional corporate vehicles to support travel needs. Moreover, carsharing could reduce the need for additional household vehicles. Individuals and employers could benefit by gaining the mobility of a car (linked to transit) without individually carrying the full ownership costs; transit operators could benefit by tapping a larger potential market; and society might benefit by diverting travelers from single-occupancy vehicles to transit for some of their trips. In 1999, the commuter-based carsharing model CarLink I was developed and tested in Northern California.

CARLINK I FIELD TEST DESCRIPTION

The CarLink I field test was launched on January 20, 1999, and ended on November 15, 1999. Fifty-four persons enrolled in the program and shared 12 natural gas-powered Honda Civics. The participants were from San Francisco, Oakland, and East Bay communities. The cars were based at premium parking spaces at the Dublin-Pleasanton BART station. The model incorporated traditional and reverse commuting travel patterns and a day-use fleet application, tested at an employment center (i.e., LLNL).

The CarLink I field test combined short-term rental vehicles with communications and reservation systems (i.e., smart technologies) to facilitate shared-vehicle access. The 10-month demonstration was implemented and researched by two teams at the Institute of Transportation Studies (ITS) at the University of California, Davis. Project partners included American Honda Motor Company, California Department of Transportation (Caltrans), BART District, Partners for Advanced Transit and Highways (PATH), and LLNL. INVERS (a German-based smart carsharing technology company) and Teletrac provided the advanced carsharing and vehicle tracking technologies.

The CarLink model includes three separate user structures—a home-based user lease, transit links for “work-based commuters, and shared-vehicle access at employment sites through work-based day use. During the field test, each group paid a fee according to the amount of car use. The user groups are characterized as follows:

- Home-based users drove a CarLink vehicle between home and the Dublin-Pleasanton BART station daily, keeping the car overnight and through the weekends for personal use. There was a fee of \$200 per month for this package.
- Work-based commuters took BART to the Dublin-Pleasanton station and drove CarLink vehicles to and from work at LLNL. There was a monthly fee of \$60 per car, which was shared with a coworker by carpooling.
- Work-based day users used CarLink vehicles for business trips or personal errands during the day. Through focus groups and questionnaires, an initial fee was estimated to be \$1.50 per hour and \$0.10 per mile for personal trips. Participants did not pay for work trips because LLNL donated the compressed natural gas fuel for this program.

All user fees included fuel, insurance, and maintenance costs. Roadside assistance and an emergency taxi service were also provided. Besides vehicle support services, CarLink I implementation staff supported the program by cleaning and occasionally refueling the vehicles, as well as maintaining e-mail and telephone contact with users.

Using questionnaires, household interviews, and focus groups, researchers explored CarLink attitudes and use over time. Although the CarLink I participant sample was not statistically significant (i.e., 54 enrolled), valuable lessons may still be drawn from these survey and interview results, including operational understanding, participant profiles, behavioral findings, cost and revenue data, and directions for future research (10). Key study findings are as follow

- Although many CarLink user commutes took longer (on average, approximately 10 min longer), the travel was less stressful.
- CarLink drivers used personal vehicles less than before they joined the study. Those in the work-based commuter group also increased their use of BART for recreational travel, perhaps because they became more familiar with the transit system and had easier access to it (e.g., preferred parking at the BART station).
- The combination of CarLink, BART, and carpooling resulted in a net reduction in commuting of approximately 20 vehicle mi (32.2 km) per commuter day (on average) across the fleet due to the transit mode shift. This reduction was primarily attributed to work-based commuters, because most home-based users used transit before CarLink. Further, CarLink resulted in at least 20 new BART trips each day.
- Several home-based users said that if CarLink became a permanent service, they would sell one of their personal cars, which would greatly reduce their transportation costs. Work-based commuters were more hesitant about selling a vehicle until transit services improved and CarLink could supply more parking lot locations and types of vehicles (e.g., minivans and pickup trucks).
- Most work-based commuters said that they would return to solo driving after CarLink ended, but would try to carpool more frequently (10).
- For a preliminary CarLink economic analysis, costs were separated into fixed, or startup, and monthly operational costs. It is important to note that during the CarLink I field test, researchers did

not strive to reduce costs given that the primary research focus was on user response (10).

- Principal CarLink program costs included vehicle depreciation, fuel, insurance, maintenance and administration, and the COCOS and Teletrac technologies (i.e., smart carsharing systems). Approximately 20 percent of program costs were covered by the field test user fees. This is not surprising because the study's main objective was focused on gauging participant response rather than on optimizing costs and revenues (i.e., breaking even).

RECOMMENDATIONS AND CONCLUSIONS

Today, carsharing and transit shuttles are gaining popularity as modal alternatives that provide connectivity and increase transit use. The potential of shuttle vans and commuter-based carsharing in filling key transportation service gaps was explored. Carsharing, in particular, has the potential to become an economically viable, demand-responsive service that complements existing transit and shuttles. Carsharing's commercial potential is appealing in Northern California because shuttle vans rely heavily on Bay Area subsidies (i.e., approximately 75 percent of total costs).

Six reasons were presented in support of using commuter-based carsharing as a supplement to existing services. First, shuttle capacity is somewhat limited (e.g., most are 22-passenger vans). Second, shuttle funding is competitive; so service availability is also limited. Third, shuttle service is typically provided only during peak commuting periods; thus, persons who work variable or late hours are often unable to use such a service. Fourth, the mobility of persons who take transit, carpool, or vanpool to work is often restricted to an employment center during the day. CarLink can provide a supplementary transportation option for business and personal trip making throughout the workday. Fifth, shuttles only serve one side of a transit commute (primarily the employment side). In contrast, CarLink can serve transit connections at the home and work sides. Finally, CarLink can provide a parking management solution to transit providers and employers by serving multiple users with a single parking space throughout the day.

Although the preliminary economic analysis of the CarLink I field test revealed revenue shortfalls, CarLink's long-term potential and viability could be strengthened through a combination of approaches, including cost reduction strategies, policy incentives, increased revenues and linkages to other complementary services (e.g., ridesharing), and local program support.

Cost Reduction Strategies

Several cost reduction strategies are (a) streamlining carsharing technologies and reducing program management costs, (b) expanding program size with limited personnel increases, (c) using alternative-fuel-vehicle purchase incentives to reduce vehicle costs, and (d) using potential electric-drive vehicles for stationary electricity generation or grid support services, or both.

Carsharing Technologies Streamlined

The CarLink I field test enabled researchers to specify carsharing technology requirements that could be met more affordably. By streamlining vehicle tracking, billing, and reservations, labor and management costs potentially could be reduced.

Program Expansion with Limited Personnel Increases

A chief advantage of a smart carsharing system is the ability to expand program size with only modest increases in operations personnel. Smart technologies can greatly facilitate the management, reservations, and billing of a shared-use fleet and help to keep personnel costs down.

Alternative-Fuel Vehicle Incentives

A potential way to reduce CarLink capital costs is to buy cleaner vehicles and use alternative-fuel vehicle purchase incentives. Several incentives have been established at federal, state, and regional levels to encourage the purchase of low-emission vehicles. Some incentives are direct air quality management district incentives; others include federal and state credits and sales tax exemptions (13). By using alternative-fuel vehicles, carsharing would contribute further to the environmental benefits (e.g., energy conservation and emission reductions) associated with a shared-use vehicle system.

Use of Grid-Connected Electric Vehicles

When not in use, battery, hybrid, and fuel cell vehicles can be important to utility grids (e.g., additional power supply). Battery electric vehicles can store power off peak and discharge on peak, and fuel cell and hybrid vehicles connected to a fuel source can act as stationary generators during peak-demand periods (14; unpublished data, Timothy Lipman). Further, all of these vehicle types can serve as emergency backup generators and provide other utility grid ancillary services. However, these possible electric power supply strategies would require regulatory policy modifications and fuel cell vehicles would potentially require some additional fueling infrastructure (e.g., small natural gas steam reformers to produce hydrogen). Although the details of such arrangements still need to be addressed, these strategies could reduce carsharing fleet costs by enabling operators to supply their own power or sell power and support services, or both, back to deregulated utility grids. This approach could ultimately reduce shared-use fleet energy costs and even result in net revenues.

Policy Incentives

A range of policy incentives should be explored to encourage carsharing and transit use, including subsidized transit passes and premium parking at transit stations. Some incentives are now available and should be promoted in conjunction with carsharing (e.g., in marketing materials). Disincentives, such as restricted parking, would be more challenging to implement. Nevertheless, when parking is limited, persons are more likely to use a transit mode other than the automobile (15, 16).

User-Side Subsidies

Reduced transit fares and customer discounts should be explored as a means to encourage transit and carsharing use. For instance, transit and vanpooling benefits are now tax free to employees under

TEA-21 (i.e., approximately \$400 per year on income taxes). If employers purchase transit passes for their employees, they are also eligible for a 7.5 percent saving on payroll taxes. In the Bay Area, more than 1,500 employers participate in the commuter check program, which provides financial incentives to employees to use transit or vanpools. Commuter checks (or transit vouchers) are sold to employers throughout the United States as either a supplemental employee benefit (payroll tax savings) or a substitute for salary (a pretax salary deduction) (17).

Preferred Parking at Transit Stations and Employment Centers

During the CarLink I field test, guaranteed parking spaces were provided at the BART Dublin-Pleasanton station. Premium parking was found to be a significant program incentive and should be emphasized whenever possible, particularly where parking is limited (10).

Zoning Ordinances as Mode-Shift Incentive

According to Shoup, local governments could stimulate use of other modes, such as transit and carsharing, by changing zoning ordinances and eliminating free parking, particularly in congested corridors (15). Parking case studies from four Los Angeles regions and downtown Ottawa, Ontario, Canada revealed that when employers pay for parking, 66 percent of employees (on average) will drive alone, whereas if employees pay their own parking, only 39 percent (on average) drive alone (18).

High-Occupancy Vehicle or High-Occupancy Toll Lane Privileges

Local governments could also encourage carsharing use by allowing shared-use vehicles (e.g., gasoline or alternative fuel) access on high-occupancy vehicle (HOV) or high-occupancy toll (HOT) lanes (1). On July 1, 2000, California enacted AB 171, which grants single-occupant vehicles use of HOV lanes for electric and alternative-fuel-powered vehicles, including zero-emission vehicles, ultralow-emission vehicles, and super-ultralow-emission vehicles. HOV lane use typically requires two occupants. If carsharing organizations would use alternative-fuel vehicles, the department of motor vehicles could assign an identification sticker for those vehicles allowing them to use HOV lanes even if there were only one occupant.

More Efficient Parking Use

Through carpooling, a carsharing program could help reduce a transit provider's or an employer's parking needs (and increase the value of the CarLink program), while potentially helping to meet air quality control requirements. On the basis of the CarLink I field test, researchers estimated that CarLink could reduce parking demand at a BART station by four spaces, or \$400 per month (i.e., each space is valued at \$100/month) (10). Such benefits should be emphasized to employers and transit providers when carsharing services are proposed.

Increased Revenues and Local Support

Commuter-based carsharing viability can also be strengthened by increasing local support through increased revenues and linkages to other complementary mobility services (e.g., ridesharing). Several strategies are (a) increasing user fees; (b) obtaining demonstration grants to support carsharing as a developing industry (1); (c) encouraging public-private partnerships to initiate and support such programs; (d) linking to other mobility services, such as dynamic ride-sharing; and (e) conducting research on the nonmonetary benefits of carsharing.

Increased User Fees

Increased user fees would help support economic viability. If carsharing were demonstrated to be reliable and convenient, carsharing users would likely pay more for this service. All CarLink user groups appeared willing to pay more than they did to participate in the CarLink I field test. However, further investigation is needed to more accurately estimate market rates (10).

Demonstration Grants

Demonstration grants could also support carsharing startups. Seed funding could be used to support carsharing ventures, using logic similar to that of the Urban Mass Transportation Act of 1964, which provided grants for transit demonstration projects and encouraged local experimentation (1).

Public-Private Partnerships

Partnerships among local transit providers, employers, and industry can be invaluable to the development and viability of a commuter-based carsharing service. Such partnerships can foster and encourage the creation of unique transportation services that reflect the needs of the local community. CarLink was based on a public-private partnership that was crucial to the field test's deployment and success (10).

Linkage to Dynamic Ridesharing

When linked to commuter-based carsharing, dynamic ridesharing can help fill empty seats on a per-trip basis and generate additional revenue. In a dynamic ridesharing program, persons request a ride from an operations center or database via telephone or directly through the Internet (this could also be accomplished via a handheld device linked to transit schedules and the carsharing reservation system). In a specific coverage area, a request may be made for any destination or time of day; however, ridesharing matches are more likely to occur for travel during peak periods and along principal commuter routes (19). Requests can be made in advance or close to the time a ride is needed. A return trip would be a separate trip request and could be matched with a different driver. Dynamic ridesharing can benefit drivers and passengers. Passengers can benefit by accessing an alternative mode of travel, and drivers can benefit by sharing trip costs, gaining passengers to qualify for HOV lane use, reducing travel times, and avoiding bridge tolls.

Further Study of Nonmonetary Program Benefits

In the future, researchers should continue to explore the nonmonetary benefits of carsharing, including pollution reduction, congestion relief, and reduced energy use and land use effects. The CarLink I field test provided a starting point for a full benefit-cost analysis of commuter-based carsharing. However, many societal benefits and costs were not estimated and economies of scale could not be calculated, because the CarLink program was not large enough for extrapolation (10).

In conclusion, commuter-based carsharing shows market niche and economic potential. Thus, this new mobility option should be explored further. More research is needed to examine cost reduction strategies, policy incentives, willingness to pay for services, and local initiatives to foster carsharing's long-term viability. Further study is needed to investigate the economic potential and nonmonetary benefits of a range of carsharing models (e.g., commuter, neighborhood, apartment complex, resort, university) to individuals and nationwide. This analysis serves as a starting point for a market assessment of commuter-based carsharing from which other efforts might build.

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