Carsharing in North America

Market Growth, Current Developments, and Future Potential

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Carsharing provides members access to a fleet of autos for short-term use throughout the day, reducing the need for one or more personal vehicles. More than 10 years ago, carsharing operators began to appear in North America. Since 1994, 40 programs have been deployed—28 are operating in 36 urban areas, and 12 are now defunct. Another four are planned to launch in the next year. Carsharing growth potential in North America is examined on the basis of a survey of 26 existing organizations conducted from April to July 2005. Since the mid-1990s, the number of members and vehicles supported by carsharing in the United States and Canada has continued to grow, despite program closures. The three largest providers in the United States and Canada both support 94% of the total carsharing membership. Growth potential in major metropolitan regions is estimated at 10% of individuals over the age of 21 in North America. Although carsharing continues to gain popularity and market share, the authors conclude that increased carsharing education, impact evaluation, and supportive policy approaches, including mainstreaming carsharing as a transportation strategy, would aid the ongoing expansion and development of this alternative to private vehicle ownership.

Auto ownership is widespread in North America. In 2001, 92.1% of U.S. and 78.2% of Canadian households owned at least one vehicle (*1*, *2*). More than 60% of U.S. and 36% of Canadian households owned two or more vehicles (*3*, *2*). Not surprisingly, transportation represents the second- and third-largest consumer expenditures in the United States (19.1%) and Canada (13.66%), respectively (*4*, *5*). With auto ownership and fuel costs rising, individuals are seeking alternatives to private vehicle ownership. Short-term auto rentals or carsharing programs—through hourly rates and subscription-access plans—provide such an alternative, especially for individuals living in major urban areas, households with one or more vehicles, and those with access to other transportation modes, such as transit and carpooling.

The principle of carsharing is simple: individuals gain the benefits of private vehicle use without the costs and responsibilities of ownership. Instead of owning one or more vehicles, a household or business accesses a fleet of shared-use autos on an as-needed basis. Individuals gain access to vehicles by joining an organization that maintains a fleet of cars and light trucks in a network of locations. Generally, participants pay a fee each time they use a vehicle (*6*, *7*). Carsharing became popularized in Europe in the mid- to late 1980s. At present, approximately 330,000 individuals belong to carsharing organizations worldwide. Since 1994, a total of 40 programs have been deployed in North America—28 are operating in 36 urban regions, and 12 are now defunct. Another four are planned to launch in the next year.

Common goals among North American carsharing organizations include (*a*) reducing congestion and auto ownership; (*b*) providing cost savings since customers pay per use, sharing the costs of the vehicle lease, maintenance, repair, and insurance; (*c*) reducing emissions by lowering overall vehicle miles (kilometers) traveled and using clean fuel vehicles (e.g., gasoline–electric hybrid cars); (*d*) facilitating more efficient land use (e.g., carsharing reduces the number of parking spaces needed); and (*e*) increasing mobility options (e.g., low-income market segment) and connectivity among transportation modes.

This paper provides an overview of North American carsharing growth, market developments, and future potential. From April to July 2005, the authors surveyed 26 of 28 existing operational programs in North America to collect data on market developments. All 28 organizations provided current membership, vehicle, and technology use data for this paper. One hundred percent of U.S. carsharing organizations participated in the market development survey ($n = 17$). Nine of 11 existing Canadian organizations participated, yielding an 81.8% response rate. Organizations were surveyed by a combination of mail questionnaires and telephone interviews. In addition, researchers updated data from each organization's website, when available. Many organizations did not complete all questions in the survey because of proprietary issues or uncertainty. The survey data were supplemented with expert interviews and a literature and Internet review.

OVERVIEW OF CARSHARING IMPACT

A number of social and environmental benefits are commonly associated with carsharing, supported by an increasing body of empirical evidence. However, differences in data collection and study methodology frequently produce inconsistent results, often with limited samples, which make it difficult to estimate carsharing effects. Thus, ongoing impact evaluation research is recommended.

The impact of carsharing can be categorized into transportation, environmental, land use, and social effects (*8–10*). A major impact of carsharing on the transportation system is a reduction in vehicle ownership. Canadian studies and member surveys suggest that between 15% and 29% of carsharing participants sold a vehicle after joining a carsharing program, whereas 25% to 61% delayed or had forgone a vehicle purchase (*11–13*). U.S. studies and surveys indicate that between 11% and 26% of carsharing participants sold a personal vehicle, and between 12% and 68% postponed or entirely avoided a car purchase (*14–16*). Furthermore, U.S. and Canadian data reveal that each carsharing vehicle removes between six and 23 cars from the

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roads (*13, 14, 17, 18*). According to recent European studies, a carsharing vehicle reduces the need for four to 10 privately owned vehicles (*19*). Location-specific variations are likely to result in differences in this impact measure. A reduction in vehicle ownership, in turn, is likely to result in fewer vehicle miles or kilometers traveled (VMT-VKT), reduced traffic congestion and parking demand, and an increase in the use of public transportation and other transport modes (such as biking and walking) in lieu of car travel (*10, 20, 21*). VMT-VKT reduction data range from as little as 7.6% to as much as 80% of a member's total VMT-VKT in Canada and the United States. Estimates differ substantially between members that gave up vehicles after joining a carsharing program and those that gained vehicle access through carsharing (*14, 17, 22, 23*). The authors calculate an average reduction of 44% in VMT-VKT per carsharing user across North American studies. European studies also indicate a large reduction in VKT, between 28% and 45%. Carsharing also induces lower VMT-VKT by emphasizing variable driving costs, such as per-hour or mileage charges.

Furthermore, reduced vehicle ownership and VMT-VKT lower greenhouse gas (GHG) emissions, as trips are shifted to transit, biking, and walking. In Europe, carsharing is estimated to reduce the average user's carbon dioxide emissions by 40% to 50% (*19*). In addition, many carsharing organizations include low-emission vehicles, such as gasoline–electric hybrid cars, in their fleets (*12, 23, 24*). Carsharing members also report a higher degree of environmental awareness after joining a carsharing program (*21*).

Finally, carsharing also shows evidence of beneficial social impact. Households can gain or maintain vehicle access without bearing the full costs of car ownership (*10, 25*). Depending on location and organization, the maximum annual mileage up to which carsharing is more cost-effective than owning or leasing a personal vehicle lies between 10,000 to 16,093 km (*24–26*). Low-income households and college students can also benefit from participating in carsharing (*8*).

CARSHARING MARKET DYNAMICS: NORTH AMERICA

North America began to experiment with carsharing in the early 1980s through two demonstration programs: Mobility Enterprise, a Purdue University Research project, and the Short-Term Auto Rental (STAR) initiative in San Francisco, California. After the entry of these two programs in 1983, and their subsequent exit in 1985 and 1986, respectively, it was not until 1994 that carsharing reemerged with the launch of Auto-Com (later CommunAuto), followed in 1997 by Cooperative Auto Network and Victoria Carshare Coop in Canada and Dancing Rabbit Vehicle Cooperative in the United States (*6*). By 2001, the United States claimed 14 carsharing organizations and more than 5,000 members, and Canada claimed 10 programs and nearly 3,800 members. Since then, this developing industry has continued to expand. This section of the paper examines the following developments: number of organizations, membership and vehicle trends, member–vehicle ratios, and business models.

Number of Organizations

There was a notable jump in the number of organizations in both the United States and Canada, which occurred between 1999 and 2001. Since 2001, the number of organizations in Canada and the United States has somewhat stabilized (see Figure 1).

Canada, which currently hosts 11 organizations, has experienced fewer closures than the United States. The U.S. market, which now has 17 organizations, has experienced a greater total number of new entrants and closures. The sunset of six research or limited electric vehicle deployments explains more than half of U.S. closures. The remaining closures reflect one merger in the United States and five closures (three in the United States and two in Canada) among smaller organizations that lacked sufficient staff and users.

U.S. startup activity peaked in 2001, with nine programs. Since 2001, organizational launches in Canada and the United States have fluctuated between zero and five total each year. This likely reflects some barriers to entry for new entrants, including first-to-market advantages and economies of scale for existing programs (*8*). Not surprisingly, the capability of larger operators to expand to new regions may deter start-ups considering large urban markets, at least those pursuing more traditional carsharing markets, such as neighborhood residential, in the future.

More direct competition among operators—similar to the Washington, D.C., area, where two programs now provide carsharing services—appears more likely in the near future in several geographic regions, including Portland, Oregon; San Francisco; and Seattle, Washington. Indeed, one large American operator has announced plans to enter several major metropolitan markets, many of which are already served by other operators. This trend could ultimately lead to some program mergers, which has previously occurred in Europe.

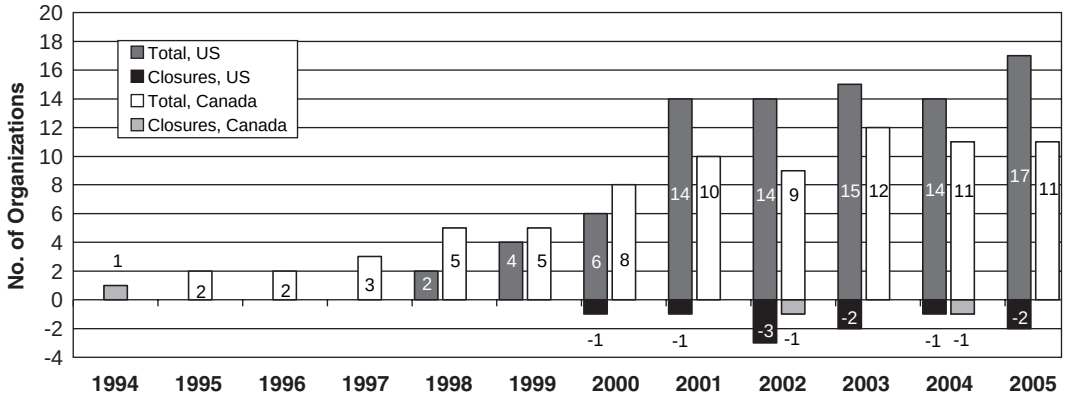

FIGURE 1 Total organizations and closures in United States and Canada.

Total Membership and Vehicle Trends

Between July 2004 to 2005, growth rates in membership and vehicles continued to slow in both the United States and Canada. See Figure 2. (Data in each graph in the figure reflect July of each year.) Membership in the United States rose by 46%, making 2005 the first year that the U.S. carsharing market has not at least doubled in membership size. Carsharing membership in Canada increased by 19.5%, down from 42.5% growth the previous year. In decline since 2001, U.S. vehicle growth was approximately 30% in 2005; Canadian vehicle growth dropped to 15%. It is important to note that the three largest operators in both Canada and the United States are responsible for the majority of growth (i.e., 94%). Furthermore, membership totals are likely to reflect double counting in some cases (e.g., a member who participates in business and personal carsharing may be counted twice in an organization's estimates).

Member–Vehicle Ratios

The effect of vehicle growth rates slowing more than membership growth is higher member–vehicle ratios. Rather than an industry dynamic, this appears to be a business strategy (e.g., increasing vehicle use and profitability and attracting investors), particularly among the largest U.S. operators. As of July 2005, the member–vehicle ratio of the five largest U.S. organizations was 66:1, whereas the remaining U.S. carsharing programs had a member–vehicle ratio of 20:1. Because of the large membership of the five biggest programs, the overall average U.S. ratio was 64:1. The dynamic around member–vehicle ratios is noticeably different in Canada. The average member–vehicle ratio was 20:1 in July 2005, and even the three largest Canadian organizations had member–vehicle ratios that ranged from 19:1 to 24:1.

Higher U.S. member–vehicle ratios may be explained in part by more limited membership requirements (i.e., few organizations require deposits and only one-third collect monthly dues). Fourteen of 17 U.S. programs, including the two largest, do not require deposits; deposits range from $100 to $350 for the three operators that collect them. Nine of 17 U.S. programs have one-time membership fees (ranging from $25 to $115, and $400 for a one-time buy-in or membership fee in the case of one program). Thirty-three percent of U.S. programs charge monthly fees, ranging from $10 to $20. Three programs collect annual fees, ranging from $35 to $100.

In contrast to the United States, nine of 11 Canadian organizations, including the two largest, require deposits; deposits range from CA$300 to $500 per member and typically are higher than U.S. program deposits. Two Canadian programs charge one-time membership fees of CA$400 and $500. Presumably, high deposits require a greater commitment to join or subscribe to a carsharing program.

Forty-five percent of Canadian organizations charge monthly dues, typically ranging between CA$10 and $25. Thus, monthly dues are more frequent among Canadian programs. Higher membership costs, along with good transit access, may lead to more consistent and intensive vehicle use among members, generating more revenue for the

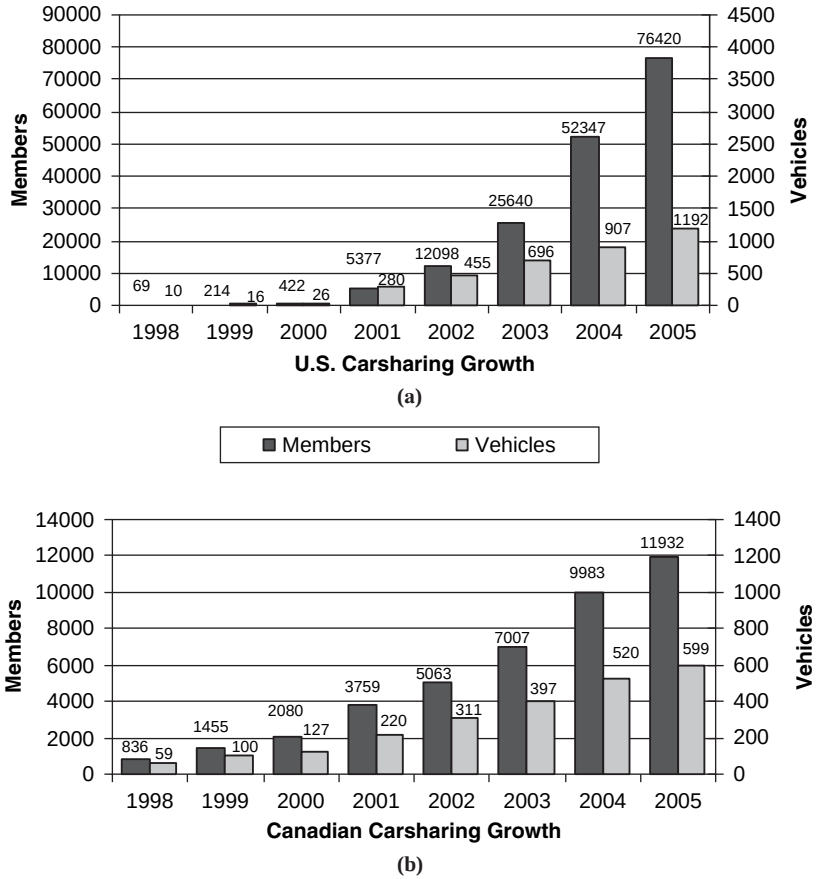

FIGURE 2 Carsharing growth, 1998–2005: (*a*) United States and (*b*) Canada.

organization and ultimately limiting the number of customers that can be served by a single vehicle. Although monthly fees may not represent as great a commitment to carsharing membership as high deposits, these fees can act as a screening mechanism to limit inactive members in both the United States and Canada. No Canadian program charges an annual membership fee.

Finally, vehicle ownership rates are higher in the United States than in Canada—more than 60% of U.S. and 36% of Canadian households own two or more vehicles (*2, 3*). Thus, vehicle ownership may affect how carsharing is integrated into households in Canada and the United States. For instance, carsharing may be more likely to serve as a household's primary vehicle (or supplement a one-vehicle household) among Canadian members. Although carsharing has been shown to reduce vehicle ownership (*8, 11, 14, 19*), particularly when coupled with good transit access, the proportion of households with one or more vehicles that subscribe to carsharing may be growing in the United States. In this case, the U.S. market could be serving a greater number of households with higher auto ownership rates and ultimately more individuals per carsharing vehicle on average. In the future, high U.S. member–vehicle ratios may stabilize or become lower in key geographic markets, when coupled with greater vehicle penetration (i.e., a denser network of lots and more vehicles per lot). With increased saturation, members may gain confidence in vehicle availability and convenience and ultimately increase use.

Business Models

There are two main carsharing business models: for-profit and nonprofit, the latter including cooperatives. In the United States, whereas only 29% of the organizations operate as for-profits (five of 17), these organizations accounted for 90% of the membership and 83% of the fleets deployed. Similarly, in Canada, whereas only 18% of the organizations are for-profit (two of 11), these accounted for 78% and 76% of the membership and vehicles deployed, respectively. In summary, although there are many more nonprofit carsharing operators in the United States and Canada, these operators account for a minority of the North American carsharing members and fleets deployed. Although for-profits account for the majority of carsharing members and vehicles, the more growth-oriented programs in Canada and the United States (i.e., the top four programs in each nation) are split between for-profit and nonprofit models.

CURRENT AND FUTURE MARKET DEVELOPMENTS

A survey of existing North American organizations by the authors indicates that carsharing membership growth potential in major metropolitan regions is estimated by respondents at 6.9% of individuals over the age of 21 in Canada ($n = 8$) and 12.5% in the United States ($n = 13$). Note that the minimum age requirement for most carsharing organizations in North America is from 21 to 25. Thus, growth potential could exceed these projections, if programs begin to serve individuals of 18 to 21 years of age (e.g., college market). This section of the paper examines existing and future demographic markets, profitable locations, rate structures, insurance, and technology. Note that survey respondents did not answer every question.

Existing and Future Demographic Markets

Demographic markets are defined as the primary groups or markets served by carsharing, including neighborhood, business, college, low-income, and commuter. More than 82% of U.S. and 100% of Canadian carsharing survey respondents provided estimates of their existing demographic markets based on membership. Researchers supplemented these data for the remaining organizations ($n = 6$) by consulting program websites and industry experts. All program market-segment estimates were weighted by number of members per organization for the entire North American market. Neighborhood residential was the staple demographic market in the United States and Canada, accounting for 81.7 and 96% of their existing membership, respectively (see Figure 3). Other existing segments tended to represent a greater share of the total U.S. market than in Canada, including 12.3% business, 4.6% college (age 21 and over), 1.3% low-income, and 0.1% commuter.

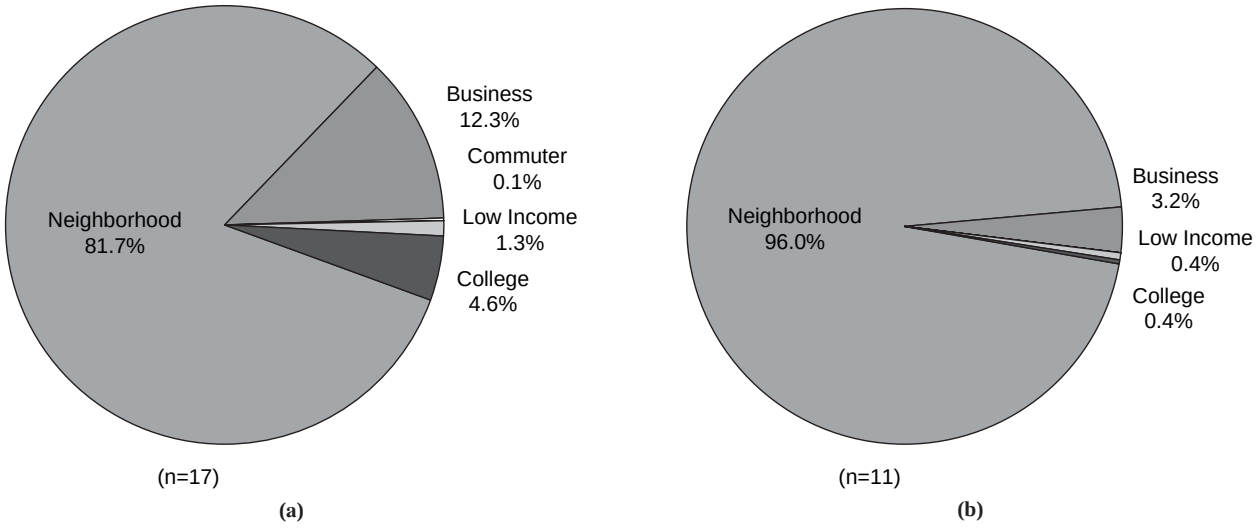

FIGURE 3 Existing demographic markets: (*a*) United States and (*b*) Canada.

Respondents were asked to project into the future. Sixty-five percent of U.S. ($n = 11$) and 73% of Canadian ($n = 8$) survey respondents provided future estimates. Responses were treated as market opportunity opinions and averaged across organizations. In 5 years, U.S. and Canadian organizations forecast that the majority of their demographic markets will still consist of neighborhood residential, but this segment will represent a smaller proportion of the total market because of greater diversification (e.g., business customer growth in the United States and Canada). In the United States, business and college markets are projected to increase in market share to an estimated 22% and 23%, respectively. U.S. organizations also forecast small but growing low-income, commuter, and older adult community markets.

In Canada, neighborhood residential is expected to decrease in market share to 80%. Most of the remaining share will be captured by growth in the business market, which is expected to expand to between 10% and 15% of the total market.

Rate Structures

Approximately 83% of North American survey respondents ($n = 23$) stated that either profit or cost recovery was a principal factor in selecting their current rate structure. As part of their pricing, Canadian operators much more frequently emphasize mileage as the primary cost basis, whereas this is practiced less frequently in the United States. For instance, ZipCar, I-Go, and Community Car all provide varying amounts of free mileage either per reservation or hourly usage. Flexcar now provides an unlimited number of miles in the hourly charge of its vehicles.

This analysis includes membership dues, rates, and mileage for all rate plans of 25 North American organizations, not including two U.S. university research programs and one organization that currently provide free service. Since deposits represent a potential barrier to membership rather than actual usage fees, they were excluded from this analysis. Data were obtained from the Internet or through personal communication with organizations. Rates have been adjusted to U.S. dollars by using a 1.24603 exchange rate.

As Figure 4 indicates, the average rates for equivalent distance and time of use in the United States and Canada differ significantly. Carsharing charges in the United States increase substantially during the time a vehicle is used. This echoes a key difference between U.S. and Canadian rates: the United States tends to charge higher hourly rates, sometimes bundled with "free miles," whereas Canada has a tendency to charge lower hourly rates with few or no free miles.

Overall, Canadian rates tend to be substantially lower than their U.S. counterparts, particularly after 2 h of use. Although the scenario in Figure 4 more accurately reflects typical carsharing use, the rate differential between the United States and Canada is somewhat smaller for the same hours of use and higher mileage (e.g., 200). This is likely attributable to a few factors, including lower insurance costs and more uniform compact fleets in Canada. Although crude oil is cheaper in Canada, Canadian fuel taxes cause the pump cost to be higher than that in the United States. Given higher fuel costs and a strong motivation to reduce mileage and GHG emissions among numerous Canadian operators, it is not surprising that Canadian programs on average charge more per kilometer driven.

Insurance

Vehicle insurance continues to be a major industry obstacle. Following the terrorist attacks of September 11, 2001, North American organizations were confronted with the challenge of higher insurance premiums (*10*). At present, insurance premiums remain high for numerous North American carsharing operators.

Only two of nine U.S. survey respondents indicated that they had changed their insurance carriers within the last 6 months. (Two new U.S. organizations launched within the last 6 months.) Similarly, just one of nine Canadian survey respondents had changed insurance carriers within the last 6 months. This organization indicated shifting from third-party to self-insurance as a method of reducing costs. North American organizations were also asked whether finding insurance was an ongoing problem. Answers differed sharply between the United States and Canada, with 53% of U.S. respondents ($n = 15$) indicating that finding insurance was an ongoing problem, in contrast to just 22% percent of Canadian organizations ($n = 9$).

Carsharing insurance is estimated to cost more than $2,500 per vehicle per year. There are several ways in which carsharing pro-

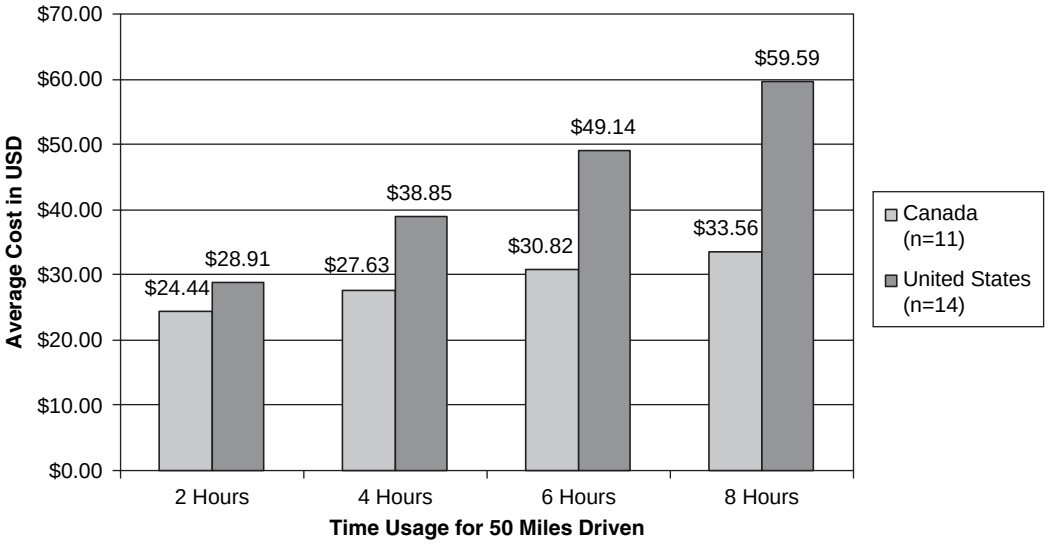

FIGURE 4 How changing time of vehicle use affects U.S. and Canadian rates.

viders can reduce insurance costs: (*a*) lowering insurance liability limits by decreasing the maximum amount that an insurance carrier is required to pay in case of an accident; (*b*) self-insuring; (*c*) increasing the number of vehicles to enter a group insurance pool; (*d*) increasing deductibles; (*e*) covering fewer loss categories (e.g., theft); and (*f*) shifting more loss of risk to members.

In the carsharing industry, U.S. organizations typically carry $1 million in single limit (per accident per claim) liability insurance. Some organizations have reduced this limit to $300,000, an amount more typical of personal automobile rather than fleet insurance. Some organizations may confront higher coverage thresholds, however, because of partner regulations (e.g., a partner transit agency requires minimum liability coverage beyond that of a carsharing operator). Lowering insurance costs through self-insurance of vehicle damage was also observed among a number of U.S. organizations. Another strategy for reducing insurance costs is the formation of a carsharing affinity group—an insurance pool that provides coverage at a discounted rate to members (D. Brook, unpublished data, July 2005).

More than 80% of 23 survey respondents indicated that they would consider group insurance with other carsharing providers. Only two organizations indicated that they would not consider group insurance, and two other respondents were uncertain ($n = 4$). Two of the four were larger U.S. and Canadian organizations that did not express difficulty finding an insurance carrier. Two of the four also indicated that some provinces, such as British Columbia, provide the option of public sector and self-insurance. The majority of U.S. and Canadian respondents have found it a challenge to identify affordable insurance for a growing younger driver market (i.e., individuals under the age of 21). Planned organizations eager to enter into the college market shared this sentiment. A few strategies have been designed to permit entry into the college student carsharing market. For example, Boulder CarShare in Colorado self-insures younger drivers, charging $250 per each year a driver is under age 25. At Zipcar's Wellesley College location in Massachusetts, the college provides insurance to student drivers through its liability policy.

Another potential solution is for the insurance and carsharing industries to partner, providing a mechanism for students to maintain insurance coverage on their parents' policies. The latter method is similar to rental car insurance in that a rental company maintains state minimum liability insurance, but the renter must provide their own personal auto insurance or purchase additional liability insurance to rent a vehicle. In fact, one rental car company now offers hourly rentals to student drivers at Stanford University under the condition that they provide their own insurance coverage. This service, however, is priced at a rate significantly higher than typical carsharing charges (*20*).

Technology

Technology plays an important role in North American carsharing. Electronic and wireless technologies have been used to address the challenges of vehicle security, maintenance, and service quality. Increasingly, carsharing programs are purchasing technology (e.g., reservations and billing, vehicle-access systems) from specialized vendors or licensed products from Zipcar, Flexcar, or Cooperative Auto Network.

Researchers obtained technology information on all 28 carsharing programs through the Internet and expert interviews. Thirteen North American organizations now use advanced operations (i.e., automated reservations, integrated billing, and advanced vehicle-access systems). Only 11.5% of North American programs continue to use manual operations, whereas 3 years ago 37.5% operated manually (*27*). Partially automated systems (i.e., automated reservations via touchtone telephone or Internet) are more predominant in Canada (73%), whereas advanced systems are more common in the United States (70%). North American organizations credit advanced technologies with lower costs, faster billing, and enhanced consumer experience.

Recent technology trends include instant reservation capabilities (i.e., a few minutes before a trip) and vehicle class reservations, which are also known as anonymous pods (i.e., when a user does not reserve a specific vehicle from a lot but rather a class of vehicle). In the study survey, 55% of respondents ($n = 20$) reported considering or offering instant reservations. Thirty percent of respondents ($n = 20$) have considered or currently support vehicle class reservations.

To supplement the survey, the authors interviewed five major technology vendors (Metavera, INVERS, EngineGreen, Vetronix, and ETL) regarding future innovations. Most backend providers interviewed reported making advances that allow better software–hardware integration and greater ease of set-up for carsharing (Metavera, EngineGreen, and Vetronix, unpublished data, July 2005). In the near future, two vendors believe that carsharing operators are not likely to introduce innovative features (e.g., one-way rentals, ridesharing) because of added management complexities; nevertheless, providers interviewed do offer some technical support for the customization of novel carsharing features, such as prepaid usage cards.

CARSHARING POLICY APPROACHES

This section summarizes the findings of a broad literature review, Internet investigation, and expert interviews on existing and proposed carsharing policy approaches. An array of supportive carsharing policies were identified, ranging from encouraging carsharing organizations to deploy or expand services in new or untested markets (risk sharing) to promoting the incorporation of carsharing in new and existing developments (see Table 1). These policies have also been augmented by a variety of U.S. federal funding sources, including the Congestion Mitigation and Air Quality program, jointly administered by FHWA and FTA; the FTA's Job Access Reverse Commute program; and the U.S. Environmental Protection Agency. Municipal and nonprofit funding has also been used to provide start-up grants, loans, and lines of credit in the United States and Canada (*47*, *48*). In addition to sales taxes, which are already paid by some carsharing members, 2005 marks the first year in which members of two carsharing programs are required to pay a municipal or state "user tax" (annual and usage) that classifies carsharing categorically with car rentals.

The majority of policy approaches were observed in the United States and in locations where carsharing has existed the longest and supports the largest memberships. There are a few instances in which supportive policies have preceded carsharing operations (e.g., Austin, Texas). In addition, the university market has mirrored many of the same policy trends, often incorporating a combination of approaches, including free or discounted parking, membership subsidies, transit discounts, risk sharing, and fleet reduction.

Although developer, zoning, or building policies are increasingly popular in promoting carsharing partnerships, there is presently more activity with existing developments (i.e., property managers). This is not surprising as it often takes several years to establish a new development. Carsharing approaches with property managers can

TABLE 1 Carsharing Policy Approaches

Automakers. In California, automakers are eligible for additional zero emission vehicle (ZEV) credits for placing qualifying low-emission vehicles into carsharing applications linked to transit (*28*).

Developers and Zoning Regulations. In the United States and Canada, there are many policies aimed at easing zoning regulations and encouraging carsharing in new developments. Municipalities support the vast majority of these policies, with only a few at the county and state levels. These policies can be categorized as follows: 1. parking reduction (i.e., downgrading the required number of spaces in a new development) (*29*); 2. parking substitution (i.e., substituting general use parking for carsharing stalls) (*30*); 3. trip reduction (i.e., reducing vehicle and single-occupant vehicle trips) (*31*); and 4. allowing greater floor area ratios (FARs) (i.e., developers can build more densely on a site) (*20, 32*). While the majority of parking and trip reduction policies have been codified into municipal codes, there are instances where parking reductions and FAR bonuses have been granted through case-by-case variances (*20, 32*). Last, the U.S. Green Building Council is considering the inclusion of a carsharing credit in its revised Leadership in Energy and Environmental Design (LEED) rating system (*33*). LEED is a voluntary program in which U.S. and foreign architects/developers can meet sustainability benchmarks.

Fleet Reduction. A number of policy initiatives have focused on fleet reduction requirements, predominantly by local governments. At least three U.S. cities have replaced their municipal fleets with carsharing services (Todd Boulanger, unpublished data, July 2005, *34, 35*), and another two U.S. cities are considering or planning such a switch (Steve Gutmann and Ron Szeto, unpublished data, July 2005). One county also uses carsharing services to supplement peak demand of their motor pool and to retire under-utilized vehicles (Steve Gutmann, unpublished data, July 2005). Two states are in the process of evaluating carsharing to improve the efficiency of their vehicle fleets (Steve Gutmann, unpublished data, July 2005, *36*).

Participant Subsidies. The authors identified two types of participant subsidies in the U.S. to encourage use/membership: 1. those available to participants in a specific location (i.e., university, city) and 2. those geared toward the low-income market. At least one city, one property manager, and a university have provided participants with paid use or membership and application fee reimbursement (some restrictions apply) (Steve Gutmann, unpublished data, July 2005, *20, 37*). In a few other instances Job Access Reverse Commute (JARC) and Congestion Mitigation and Air Quality Improvement (CMAQ) funds have been used to subsidize low-income users (*28–40*). Additionally, one municipal transportation authority and a number of transit agencies have subsidized carsharing membership, use, or both (*20, 41*).

Parking Policies and Variances. The authors found the greatest number of policies affecting parking. While these policies are the most prevalent, they vary considerably including: 1. provisions for on-street parking (Marco Viviani, unpublished data, July 2005); 2. provisions for off-street parking, (Ron Szeto, unpublished data, July 2005); 3. exemption from parking limits (*20*); 4. creation of carsharing parking zones, (Dave Brook, unpublished data, July 2005); 5. free or reduced cost parking spaces (Ron Szeto, unpublished data, July 2005); 6. free or reduced cost parking permits (*35*); 7. universal parking permits (i.e., carsharing vehicles can be returned to any on-street location) (*35*); 8. formalized processes for assigning on-street parking spaces (*20*); and 9. recommended use of parking meter revenue to subsidize carsharing (Graham Hill, unpublished data, July 2005).

Risk Sharing Partnerships. Partnership risk sharing is increasingly being used to support carsharing in the U.S. in new or potentially risky markets. Three proponents of risk sharing were identified: 1. local government, 2. a university, and 3. property management. Three ways in which this is done include 1. the partnering organization purchases a block of memberships and/or guarantees vehicle use (Charlie Simonson, unpublished data, July 2005); 2. vehicle subsidies (*20*); and 3. the "subtraction model," in which the carsharing organization values the monthly cost of vehicle placement and subtracts monthly revenue from that collected value and bills the shortfall to the risk partner (Dave Brook, unpublished data, July 2005).

Taxes. There are several instances in which municipal and state governments have issued tax credits to carsharing members in the U.S. including 1. local and state sales tax credits (*42*); 2. exemption from rental car taxes (Dave Brook, unpublished data, July 2005); and 3. tax credits to employers and property managers (*43, 44*). There have also been some legislative distinctions between nonprofit and for-profit carsharing, whereby members of nonprofit carsharing organizations may receive tax exemptions and credits (*45*). In addition to sales taxes, the authors identified two instances in the United States in which carsharing members are taxed as car rental users (*44, 46*).

Transit Discounts. In Canada, at least one bus operator offers discounts to carsharing members (Marco Viviani, unpublished data, July 2005). In the United States, transit discounts have been bundled with various "pass" programs that can include free or discounted carsharing membership or use (Steve Gutmann, unpublished data, July 2005).

Universities. Carsharing is operating at approximately a dozen North American universities. Universities have supported and enticed operators onto campus by providing free or reduced cost parking (Charlie Simonson and Steve Gutmann, unpublished data, July 2005); subsidizing membership fees and use (Charlie Simonson and Steve Gutmann, unpublished data, July 2005); and adopting university fleet reduction measures (*47*).

be characterized as open-door—that is, when a vehicle is placed in an apartment complex or parking garage but is available for use by all carsharing members—or closed-door—that is, when a vehicle is placed in a limited-access location, such as a gated apartment complex, and is available only to members of those communities. Although open-door carsharing historically has been more prevalent in new or existing developments in North America, the industry may support more closed-door applications in the future, as property managers share risk in vehicle placement (e.g., the subtraction model; see Table 1).

Carsharing is likely to be used increasingly as a fleet management tool for public agencies (*49*), although it is unclear whether this will replace entire fleets or maximize efficiency through managing peak motor pool demand. University applications are also likely to gain popularity, particularly if insurance can be cost-effectively obtained for younger drivers. As carsharing becomes more mainstream, existing policies may need to be reevaluated. For instance, on-street parking spaces may no longer be available to an organization for free. Additionally, as carsharing becomes more competitive in more locations, case-by-case approvals likely will be codified to ensure fair practices among competing enterprises.

CONCLUSION

In recent years, the total number of organizations and start-up activity in North America has begun to stabilize; there are 28 programs in operation. The three largest providers in the United States and Canada both support 94% of total carsharing membership. It is likely that carsharing operators will face greater competition as larger organizations expand into existing markets. In addition, high U.S. member–vehicle ratios may level out or become lower (64:1 in July 2005) when coupled with greater vehicle penetration in key geographic locations. Average member–vehicle ratios are likely to remain higher in the United States, given lower membership requirements (e.g., deposits, fees) and user patterns. Higher mileage costs are likely to prevail in Canada, given higher fuel costs, a greater commitment to reduce GHG emissions, and usage patterns. Several growth-oriented organizations

will likely continue to account for the largest number of members and fleets deployed in North America.

Carsharing growth potential in major metropolitan regions is estimated at 10% of individuals over the age of 21 in North America. In the next 5 years, the carsharing industry will likely direct greater attention toward business markets in the United States and Canada (potentially representing as much as 22% and 15% market share, respectively). Fleet reduction strategies may accelerate government and business market penetration. U.S. operators will likely increase their presence in the college market (potentially representing 23% of U.S. market share), particularly among the younger student population, provided that the insurance impasse for drivers under 21 can be alleviated. Increased technological deployment, such as satellite radio and on-board concierge services (e.g., OnStar), may likely denote increasing competition among some carsharing operators.

Although carsharing continues to gain popularity and market share in North America, the authors conclude that increased carsharing education, impact evaluation, and supportive policy approaches, including mainstreaming of carsharing into local, state and province, and federal legislation, will support the ongoing expansion and development of this transportation alternative. Partnerships between carsharing organizations and municipalities, universities, property managers, developers, and transit agencies can continue to augment the expansion of this transportation mode. Furthermore, strong relationships may help to reduce the risk of serving new and uncertain markets through a range of risk-sharing strategies (e.g., member subsidies, subtraction model). And, partnerships with developers will increasingly help to secure additional carsharing parking spaces in the future.

Supportive policy approaches and grants will likely continue to aid carsharing organizations in their growth and location decisions. As carsharing markets develop and mature (e.g., government fleets, universities), policies will likely be codified and modified, as needed (e.g., because of high vehicle penetration and parking demand). Although supportive policies directly aid carsharing in particular locations, they can also help to establish standards from which new markets can model approaches. Such mechanisms, along with rising automobile ownership costs, will likely play a key role in driving the North American carsharing market into the future.

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