North American Carsharing

10-Year Retrospective

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Carsharing (or short-term auto use) organizations provide members access to a fleet of shared vehicles on an hourly basis, reducing the need for private vehicle ownership. Since 1994, 50 carsharing programs have been deployed in North America—33 are operational and 17 defunct. As of July 1, 2008, there were 14 active programs in Canada and 19 in the United States, with approximately 319,000 carsharing members sharing more than 7,500 vehicles in North America. Another six programs were planned for launching in North America by January 2009. The four largest providers in the United States and Canada support 99% and 95.2% of total membership, respectively. A 10-year retrospective examines North America's carsharing evolution from initial market entry and experimentation (1994 to mid-2002) to growth and market diversification (mid-2002 to late 2007) to commercial mainstreaming (late 2007 to present). This evolution includes increased competition, new market entrants, program consolidation, increased market diversification, capital investment, technological advancement, and greater interoperator collaboration. Ongoing growth and competition are forecast. Rising fuel costs and increased awareness of climate change likely will facilitate this expansion.

In the past 6 years, energy prices have risen and become increasingly volatile. In 2002, the per-barrel cost of crude oil averaged $24.09 (*1*). In the summer of 2008, crude oil reached $140 per barrel, a sixfold increase (*2*). Similarly, the cost of gasoline per gallon increased 300% from 2002 through 2008—from an average of $1.34 a gallon to $4.07 by midyear 2008 (*3*). This trend has increased vehicle operating costs and uncertainty about future operating expenses. Although the fixed costs of auto ownership remained relatively unchanged between 2005 and 2007, average per-mile operating costs increased considerably in mid-2008 (*4, 5*). This increase was most significant for vehicle owners driving 16,093 km or fewer annually, representing a per-kilometer increase from 39 cents a kilometer to 44 cents in this 3-year period (*4, 5*).

Energy-cost uncertainty, coupled with pressure to increase energy efficiency and reduce carbon emissions, has encouraged more drivers to seek alternatives to private vehicle use. Carsharing programs or short-term auto use, which started in North America more than a decade ago, is one such alternative. The principle of carsharing is simple: individuals gain the benefits of private vehicle use without the costs and responsibilities of ownership. Carsharing is most common in major urban areas where transportation alternatives are easily accessible. Individuals generally access vehicles by joining an organization that maintains a fleet of cars and light trucks in a network of locations; vehicles are most frequently deployed from lots located in neighborhoods, public transit stations, employment centers, and universities (*6, 7*). Carsharing members typically pay for use through hourly rates and subscription-access plans. The majority of carsharing operators manage their services with advanced technologies, including automated reservations, smartcard vehicle access, and real-time vehicle tracking (*8*).

Although carsharing dates to the 1940s in Europe, more successful carsharing programs launched in Germany and Switzerland in the mid-1980s. In the United States, carsharing began with two experiments: Purdue University's Mobility Enterprise (1983–1986) and a demonstration project, Short-Term Auto Rental, in San Francisco (1983–1985). In 1994, carsharing reemerged with the launch of Auto-Com (later Communauto) in Canada, followed in 1997 by Cooperative Auto Network (CAN) and Victoria Carshare Co-op in Vancouver and Victoria, British Columbia. Today, approximately 650,000 individuals are members of carsharing programs worldwide.

This paper provides a 10-year retrospective of carsharing in North America (1998 to 2008), reflecting the period during which the lead author actively monitored developments in Canada and the United States.

COMPARISON OF NORTH AMERICAN CARSHARING IMPACTS

An increasing body of empirical evidence indicates that carsharing can provide numerous transportation, land use, environmental, and social benefits (*8–10*). More than a dozen North American carsharing studies are summarized in Table 1. These include both third-party and operator-led evaluations.

One of carsharing's most notable effects on transportation is reduced vehicle ownership. Carsharing removes between 4.6 to 20 cars per shared-use vehicle from the transportation network (*11–25*). Variance reflected in this metric is largely because of methodological differences. For example, Lane's research on PhillyCarShare distinguishes between cars "removed by members who gave up a car" and "cars removed by members who decided not to acquire a vehicle" (*19*), whereas others do not (*11–18, 21–24*).

The most current studies and member survey results released by U.S. and Canadian carsharing organizations show that 15% to 32% of carsharing members sold their personal vehicles, and between 25% and 71% of members avoided an auto purchase because of carsharing (*11–25*). The considerable variation in forfeited vehicle percentages likely is due to a stated-intention bias, location-specific differences, and business model. Because of carsharing membership,

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TABLE 1 Impacts of Carsharing (*11–25*)

	Authors, Year	Number of Vehicles Removed From Transportation Network per Carsharing Vehicle	Participants Selling Personal Vehicle (%)	Participants Avoiding Vehicle Purchase (%)	VMT/VKT Change (%)	Average Monthly Cost Savings (%)	Participants Walking More (%)	Participants Taking Transit More (%)
U.S. Studies								
Short-term auto rental (San Francisco, CA) (*11*)	Walb and Loudon, 1986	—	15.4	43.1	—	—	—	—
Arlington, VA, carsharing pilot (*12*)	Price and Hamilton, 2005	—	25	68	–40	—	54	54
Arlington carsharing (*13*)	Price et al., 2006	—	29	71	–43	—	47	47
CarSharing Portland (Portland, OR) (*14*)	Katzev, 1999	—	26	53	—	154 U.S.	—	—
CarSharing Portland (*15*)	Cooper et al., 2000	—	23	25	–7.6	—	25.8	13.5
City CarShare (Year 1) (San Francisco) (*16*)	Cervero, 2003	—	2.5	60.0	–3[a]/–58[b]	—	—	—
City CarShare (Year 2) (*17*)	Cervero and Tsai, 2004	6.8	29.1	67.5	–47[a]/–73[b]	—	—	—
City CarShare (Year 4) (*18*)	Cervero et al., 2006	—	—	—	–67[a]/24[b]	—	—	—
PhillyCarShare (Philadelphia, PA) (*19*)	Lane, 2005	10.8[c]	24.5	29.1	–42	172 U.S.	—	—
TCRP Report (national) (*20*)	Millard-Ball et al., 2005	—	—	—	–63	—	37	40
Zipcar (national) (*21*)	Zipcar, 2005	20	32	39	–79.8	435 U.S.	37	40
Canadian Studies								
AutoShare (Toronto, Canada) (*22*)	Autoshare, 2003	6–8	15	25	—	392 CA	—	—
AutoShare (Toronto) (*23*)	Autoshare, 2005	8–10	—	—	—	—	—	—
CommunAuto (Quebec Province, Canada) (*24*)	CommunAuto, 2000	9.1	21–29	55–61	—	—	—	—
CommunAuto (*25*)	CommunAuto, 2006	4.6[c]	24	53	—	492 CA	12–13	26–34

NOTE: — denotes data not provided.
[a]Reflects existing members' reduction in vehicle miles traveled/vehicle kilometers traveled (VMT/VKT).
[b]Reflects only trial members' reduction in VMT/VKT.
[c]Reflects vehicles removed by members who gave up a car.

average monthly transportation costs also decreased, ranging from $154 to $435 for U.S. members (*11–21*) and CA$392 to $492 for Canadian members (*22–25*). Furthermore, auto ownership reduction leads to public transit, walking, and bicycling modal shifts and reduced parking demand and vehicle miles or vehicle kilometers traveled (VMT/VKT) (*20*). Twelve percent to 54% of carsharing participants in North America walk more often; 13.5% to 54% take public transit more frequently; and 10.1% bicycle more (*11–25*). In the United States, the average carsharing member's VMT/VKT is reduced between 7.6% to 79.8% (*11–21*); this wide range is likely caused by location-specific variations as well as differences in member use and survey design. On the basis of all member surveys, the authors calculate a 44% average VMT/VKT reduction per carsharing user.

Along with reduced VMT/VKT and vehicle ownership, low-emission fleets also contribute to lower greenhouse gas (GHG) emissions (*8, 19*). AutoShare and U Car Share (as well as Flexcar, before its merger with Zipcar in late 2007) offer additional GHG reductions through partnerships with carbon-offset companies (*26–28*). Many members report an increase in environmental awareness after joining a carsharing organization (*19*).

Finally, carsharing provides other beneficial societal impacts. For instance, members have a heightened awareness of travel costs and take fewer spontaneous driving trips. This was the case for CarSharing Portland, for which 60% of carsharing reservations were made at least 1 day in advance (*14*). College and university students and low-income households also benefit from the flexibility and mobility that carsharing offers (*9*).

CARSHARING GROWTH IN NORTH AMERICA

Number of Organizations

As of July 1, 2008, 50 carsharing operations had been deployed in North America since 1994—33 are operational, and 17 are defunct. Another two programs were planned to launch in Canada and four in the United States by January 2009. Although there was a substantial increase in the number of North American operators between 1999 and 2001, the number has remained relatively constant since 2001, increasing only slightly.

As of July 1, 2008, 14 Canadian operators claimed 39,664 members and shared 1,667 vehicles. In the United States, 279,174 members shared 5,838 vehicles among 19 operators. (Zipcar, which operates in both the United States and Canada, is counted as an operator in each country.) Since 1994, there have been 16 program start-ups and two closures in Canada, yielding a closure rate of 12.5%. In the United States, there have been 34 program start-ups and 15 program closures since 1997, yielding a closure rate of 44.1%. Of the 15 U.S. closures, seven (46.7%) were research or pilot programs with an established sunset date; two (13.3%) were program mergers; one (6.7%) service shut down and contracted with a larger operator; and five programs (33.3%) closed because of operational deficits and greater staffing needs.

Since 2001, several program mergers and launches have occurred among North American operators. In 2001, the first program merger occurred between CarSharing Portland and Flexcar (*29*). More recently, there has been increasing growth and competition among organizations in North America, marked by ongoing market penetration. The second major merger, which occurred in October 2007 between the for-profits Flexcar and Zipcar, created the largest U.S. for-profit operator (*30*). Despite this merger, there is ongoing competition in 10 major metropolitan markets among carsharing operators or hourly car rental. Traditional car rental companies have begun to launch carsharing services, including Enterprise Rent-A-Car's WeCar and U-Haul's U Car Share (*31, 32*). In December 2008, Hertz launched its own carsharing service (*33*).

Membership and Vehicle Growth Trends

Between 1998 and 2008, U.S. and Canadian membership has continued to grow. The most dramatic growth for the United States and Canada occurred between 2000 and 2001, in which carsharing membership grew 1,174% and 81%, respectively (although its scale at that time was comparatively small to the current market). In 2001, member-vehicle growth in the United States outpaced Canada for the first time.

From the late 1990s to 2003, initial North American carsharing growth was on a near-exponential trajectory. (See Figure 1, where data reflect July of each year.) U.S. membership growth rates started to slow in 2005 but increased to 79% in 2007. U.S. annual growth rates fell to 51.5% in 2008. Canadian membership growth rates have followed a similar trajectory. They reached their highest growth rate in 2001 (81%) but had fallen to 47.5% in 2008.

Member–vehicle ratios are an important metric, which can be used to assess how many customers are being served per vehicle and the relative usage level of carsharing members (see Figure 1). Between 1998 and 2008, member–vehicle ratios have steadily risen in Canada, except in 2002 and 2007. During this period, Canadian member–vehicle ratios increased 68% from 14:1 in 1998 to 24:1 in 2008. In contrast to Canada, U.S. member–vehicle ratios are larger, have increased more dramatically, and varied more considerably during this period.

In the United States, vehicle growth rates have increased more slowly than has membership, resulting in higher member–vehicle ratios. U.S. member–vehicle ratios rose until 2005, reaching a peak of 64:1. This appeared to result from a business strategy of the largest U.S. operators to increase vehicle use, improve profitability, and attract outside investment (*8*). In 2006, U.S. member–vehicle ratios fell to 40:1, as operators attracted members for new vehicle placements. In 2007, member–vehicle ratios fell to 36:1, reflecting a substantial decrease since their peak in 2005. Nevertheless, between July 2007 and July 2008, U.S. member–vehicle ratios have increased to 49:1, likely in part because of college, university, and government-fleet market growth.

The United States continues to have some of the highest member–vehicle ratios in the world (*34*). The authors attribute higher U.S. member–vehicle ratios to less-frequent use by neighborhood residential users (many of whom use carsharing as a form of "mobility insurance" to supplement existing modes) and greater market diversification, resulting in large groups of members having less-frequent or periodic vehicle access (e.g., business, college, government fleets) (*8*). This also could reflect double counting of members (e.g., those that are enrolled for both business and residential use).

Business Models

In North America, five business models have emerged: for-profit, nonprofit, cooperative (owned by its members), public transit (carsharing operated by a public transit agency), and university research programs (operations run by universities for research purposes). In 2001, although U.S. for-profit organizations (four of 14) represented 28.6%

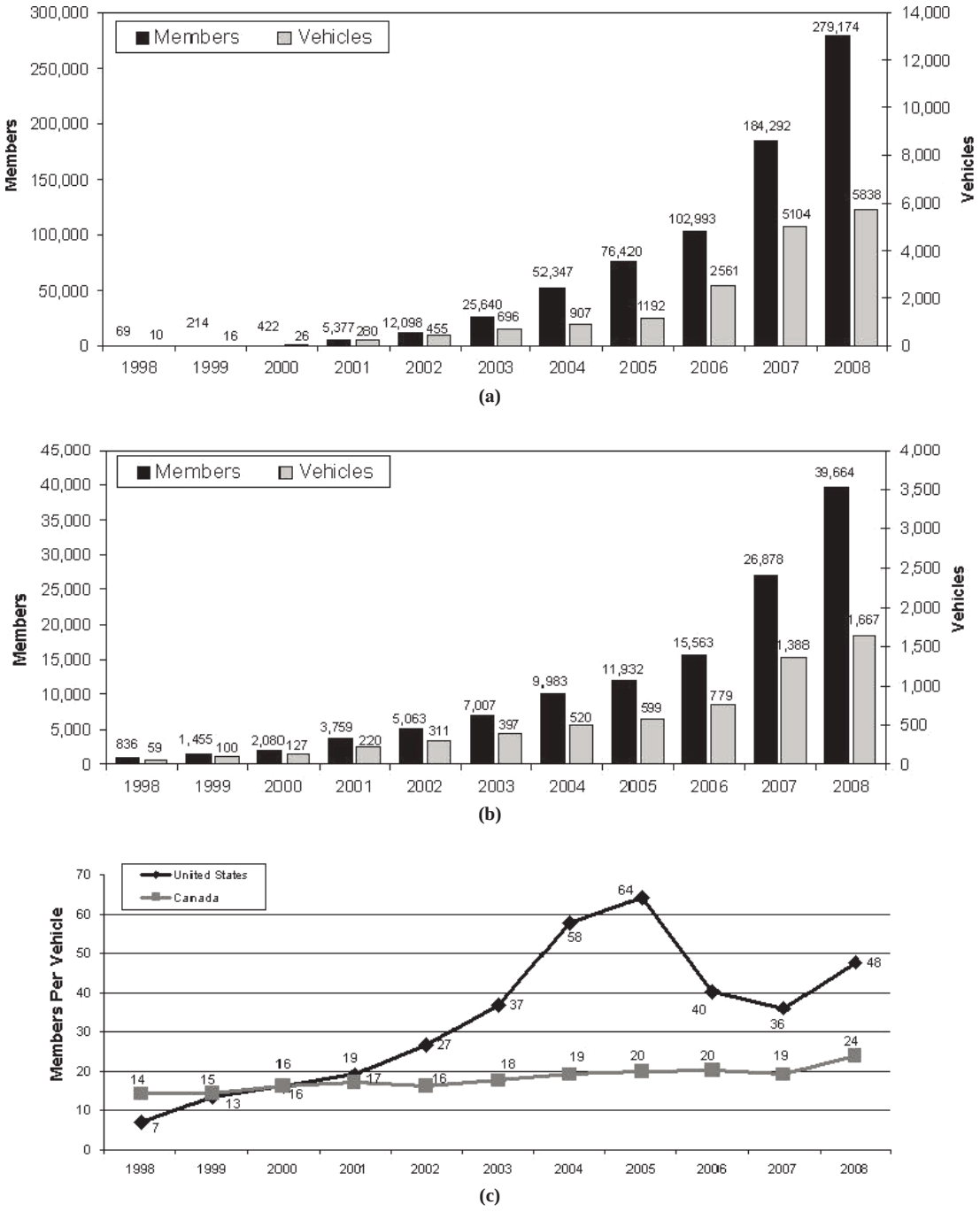

FIGURE 1 Data overview, 1998–2008: (*a*) U.S. carsharing growth, (*b*) Canadian carsharing growth, and (*c*) North American member–vehicle ratios.

of total operators, they accounted for 78% of members and 64% of vehicles deployed (*35*). By 2005, the market share of U.S. for-profit operators (five of 17) increased to 90% of members and 83% of the total fleet (*8*).

As of July 1, 2008, 26.3% of the operators were for-profit (five of 19) in the United States; they account for 74.1% and 83% of the members and vehicles, respectively. Since 2005, there has been a substantial increase in membership among nonprofit carsharing organizations, predominantly in three metropolitan markets. During this period, the three largest nonprofit operators increased membership from approximately 6,600 members in 2005 (*8*) to more than 71,000 in 2008.

In 2001, Canadian for-profit organizations (four of 10) represented 40% of the operators and accounted for 76% of members and 79% of vehicles (*35*). By 2005, market share among Canadian for-profit operators (two of 11) was quite similar: 78% and 76% of members and vehicles, respectively (*8*). In July 2008, 35.7% of Canadian carsharing operators were for-profit (five of 14) and represented 86.6% of members and 83.5% of the total fleet. Between 2005 and 2008, Canadian for-profit operators also increased their member–

vehicle market share. Although nonprofit organizations have undergone dramatic growth between 2005 and 2008, for-profit operators still account for the majority of members and fleets deployed in North America.

EVOLUTION OF CARSHARING IN NORTH AMERICA

The authors have identified three phases in North America's carsharing evolution: initial market entry and experimentation (1994 to mid-2002), growth and market diversification (mid-2002 to late 2007), and commercial mainstreaming (late 2007 to present). The phases are summarized in Figure 2.

Phase 1. Initial Market Entry and Experimentation (1994 to Mid-2002)

The first carsharing operators in North America modeled themselves after the successful carsharing efforts of Europe during the late 1980s and early 1990s, focusing on the neighborhood model. Indeed, several European operators and carsharing experts encouraged the launch of carsharing in North America in the 1990s. The earliest

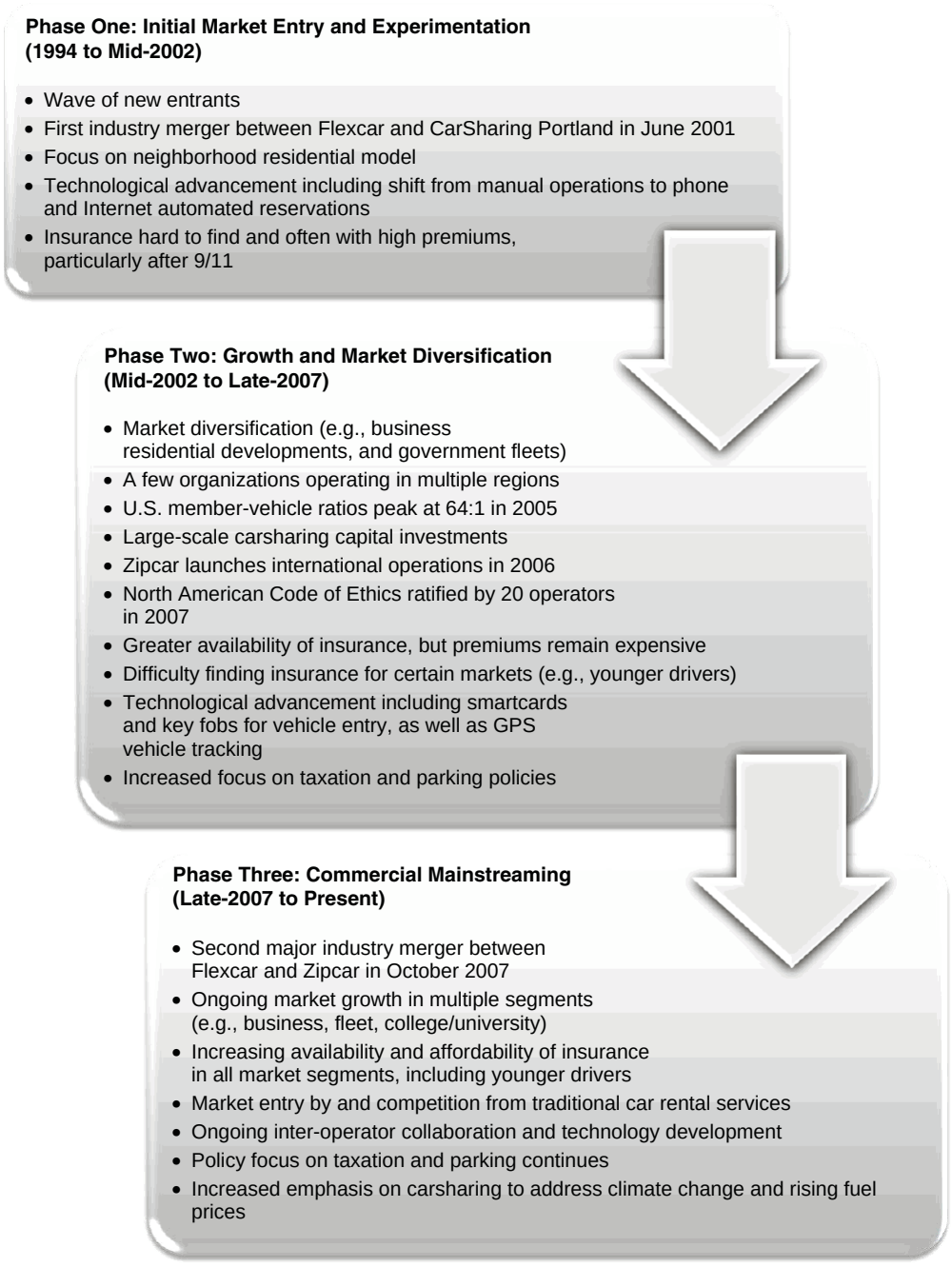

FIGURE 2 Three phases of North American carsharing.

Canadian operator, Auto-Com (now Communauto) was established in 1994. In 1998, CarSharing Portland began, becoming the first U.S. organization. Four main business models emerged early on: for-profit, nonprofit, cooperative, and university research programs.

During this time frame, U.S. and Canadian carsharing operators promoted a culture of sharing through Internet mailing lists, telephone conversations, and carsharing conferences, the first of which was held in Seattle, Washington, in May 1998. The second was hosted in Atlanta, Georgia, in April 2001. The first carsharing merger between CarSharing Portland and Flexcar occurred in June 2001.

In Canada, carsharing did not receive much governmental support in its early years: many politicians neither understood nor had examples of any existing North American carsharing systems to reference. Thus, the policy approach of Canadian operators was to spread the word about carsharing's benefits before seeking public assistance to support expansion. In contrast, governmental support existed for carsharing development in the United States from its start (e.g., grants, parking spaces, joint marketing support). During this phase, it was not uncommon for public transit operators to question whether carsharing might detract rather than attract riders. Furthermore, many North American operators did not actively pursue governmental assistance to secure carsharing parking early on, as they had relatively small vehicle fleets.

Early Carsharing Market Segments

From 1998 to mid-2002, almost all North American carsharing programs focused on the neighborhood residential model (shared-use vehicles parked in designated areas throughout a neighborhood or municipality) (*9*). In the late 1990s, business carsharing (shared vehicles for employee use during the work week for business and personal trip making) began to emerge in Canada. In the United States, this market started when businesses approached carsharing operators and requested their service. Operators launched a more-targeted focus on business customers (typically in dense employment areas), public transit, and residential developments after 2000. For example, City CarShare first placed vehicles in the Gaia apartment complex in downtown Berkeley, California, in 2002 (*36*).

Carsharing Technology Gets Started

While carsharing touts technology as a major factor in its success today, it began in the mid-1990s with manual processes. From necessity, CarSharing Portland developed an automated phone reservation system, which was adapted from a plane scheduling service. At this time, in-vehicle carsharing technology was available only in Europe. Overall, Internet use in North America was growing, although it was still dial-up based; thus Internet reservations were not considered essential or convenient early on. Similarly, use of mobile phones was growing but was far from ubiquitous and was not essential to communications. With the dotcom bubble of the late 1990s came more widespread Internet access and increased mobile phone use, and operators looked to the Internet for automated reservations. In a 2001–2002 operator survey, Shaheen et al. found that only half the U.S. carsharing operators were using advanced technologies (automated reservations with integrated billing and smartcard vehicle access), and the remainder were using either partially automated services (automated reservations via touch-tone telephone or Internet or both) or manual services (*35*). In contrast, during 2001 and 2002, none of the Canadian operators were using advanced technologies, and the majority still used manual services (*35*).

Insurance in the Early Years

In the past 10 years, the cost and availability of insurance has had a substantial impact on carsharing, particularly in the United States. After a carsharing feasibility study was completed in Portland in 1998, Van Pool Services Incorporated emerged as an early provider (charging approximately $4,200 per year per vehicle at that time). Insurance premiums varied from province to province in Canada, although it was comparatively easy to identify and it cost about CA$2,700 per year per vehicle. (CA$1 = US$1, 2008.)

Although operators did not initially identify it as a major cost consideration before 2001, high insurance premiums were a notable barrier to many North American organizations by 2002, particularly in the United States. In July 2002, U.S. shared-vehicle operators reported premiums ranging from $1,200 to $6,000 per vehicle per year, which accounted for 20% to 48% of operating costs (*9*). The chief reason for service termination between 2001 and 2002 was a substantial increase in premiums following the terrorist attacks of September 11, 2001 (*35*).

Summary

The final years of Phase 1 proved to be a notable time for carsharing. By June 30, 2002, a total of 24 operators in North America were serving 17,161 members with a collective fleet of 766 vehicles. This phase is characterized by early entrants learning how to run a neighborhood carsharing service, reduce operational costs, and understand how to best structure rates to attract customers. This phase ended in June 2002, before the launch of a targeted strategy aimed at business carsharing by a bicoastal U.S. operator.

Phase 2. Growth and Market Diversification (Mid-2002 to Late 2007)

The second phase of North American carsharing reflects growing memberships, fleets, market diversification (e.g., businesses, government fleets, and residential partnerships), capital investment, and multinational market entry. By 2003, a handful of carsharing organizations were operating in multiple regions, leading to economy-of-scale advantages and greater market penetration.

In 2003, independent carsharing organizations, comprising cooperatives, nonprofits, and for-profit operators, formed an informal association to build relationships and support start-ups. The group continues to meet annually. Since 2003, several efforts have been made toward developing interoperator collaboration, including the North American Code of Ethics for the Carsharing Industry (ratified by 20 operators, the majority nonprofit, in 2007), public policy collaboration, roaming memberships (members of one organization can submit their driving records to another organization to access their service), and technology development (*37*). In June 2005, Kitsap Transit in Bremerton, Washington, launched SCOOT, the first carsharing service managed by a public transit operator (C. Griffy, unpublished data, Feb. 2009).

The second phase is marked by higher member–vehicle ratios in the United States, as operators sought to increase vehicle use and

profitability to attract investors. In 2005, the overall average U.S. member–vehicle ratio peaked at 64:1, compared to 20:1 in Canada (*8*). Between August and September 2005, Flexcar and Zipcar made announcements regarding large-scale investments by Steve Case's Revolution LLC (a 60% holding interest in Flexcar) and Benchmark Capital (US$10 million), respectively. Subsequently, Zipcar launched international operations outside the United States, entering Toronto, Canada, and London in the United Kingdom in May and November 2006, respectively, alongside ongoing capitalization (*38*).

Market Diversification Continues

Although the neighborhood residential model continued to dominate carsharing in North America, programs increasingly targeted other market segments, including businesses, residential developments, government fleets, low-income markets, and college and university markets. Entry into some of these niches was enabled through risk-sharing partnerships (i.e., the partner to a carsharing organization guarantees revenue or operational support, or both, in exchange for shared-vehicle services) (*8*).

A few U.S. carsharing entrants began operations with corporate members in mind. By July 2002, Flexcar officially established a business membership program, and one of its first corporate members was the Seattle-based Starbucks Coffee Company (*39*). Zipcar followed and began its corporate program, Z2B, in February 2004. Within 3 months, the program had enrolled more than 50 companies (*40*). Similarly, Canada's CAN established The Company Car, a subsidiary to attract business clients and developers (*41*).

During this phase, operators increasingly formed new partnerships with residential communities (existing and new) to incorporate carsharing into properties. In addition, a few cities, such as Vancouver, British Columbia, provided assistance to operators and developers by downgrading the minimum number of required parking spaces for new construction with carsharing inclusion.

Starting in 2004, carsharing operators began providing city fleet services (shared vehicles for local government employees to use throughout the workday) in Berkeley and in Philadelphia, Pennsylvania (*42, 43*). The city of Philadelphia was able to reduce its municipal fleet by more than 400 vehicles, saving approximately $1.8 million annually (*43*).

Low-income carsharing offers shared-vehicle services to lower-income households and neighborhoods. Chicago, Illinois; Philadelphia; San Francisco, California; and Seattle, Washington, were among the first to pioneer this market. In several instances, U.S. governmental entities provided subsidies for low-income members, mainly through waived memberships for those participating in welfare-to-work programs or those living in affordable housing (*20*).

By using the 2005 carsharing-operator survey data of Shaheen et al. and program websites, researchers estimated that colleges and universities represented 4.6% of the U.S. market (17 operators) and 0.4% of the Canadian market (11 programs) (*8*). At that time, carsharing was available on about a dozen campuses and typically was accessible only by faculty and staff. By 2006, several operators began expanding carsharing to include students and more campuses throughout the United States. Many colleges and universities agreed to guarantee carsharing revenue and share management responsibilities. In some cases, expansion into the student market was feasible earlier on, as some campuses provided insurance to student drivers through their liability policies (*8*). At that time, Canadian operators also offered services to campuses but to a lesser degree than those in the United States. Some Canadian operators have higher minimum-age requirements; this is frequently related to insurance and lower demand among the student population.

Ongoing Challenge for Insurance in the United States

Insurance still posed a problem for U.S. carsharing from 2003 to 2007. In the 2005 operator survey, North American organizations were asked if finding insurance was an ongoing problem (*8*). More than 50% of U.S. respondents (eight of 15 responding to the question) indicated that finding insurance was a concern, compared to just 22% (two of nine respondents) in Canada. Although insurance availability increased because of wider carsharing acceptance, insurance premiums continued to remain high, especially in the United States. This was partially because of carsharing's expansion to individuals under age 21 on college and university campuses (*8*).

Rapid Technological Advance

Technology continued to advance during this phase. Several U.S. operators incorporated smartcards and key fobs for vehicle entry. Canadian operators focused more on Internet reservations and less on vehicle-access technologies. Additionally, the larger, more-established organizations developed technologies and start-up kits to assist smaller operators in North America (*8*). As of spring 2005, 73% of 11 Canadian operators were using partially automated systems, and 70% of 17 U.S. operators used advanced technologies (*8*).

Public Policy: Taxation and Parking

As carsharing became more popular in this phase, it began to receive more government attention. Although officials offered supportive partnerships, they also began to examine and apply taxation policies in 2005, in many cases categorizing carsharing and car rental in the same tax classification (e.g., applying a rental-car excise tax to both). Many North American carsharing operators have argued that carsharing and car rental are not the same as they do not yield similar social and environmental benefits, such as reduced vehicle ownership and vehicle miles traveled, along with increased public transit ridership. These developments coincided with the provision of hourly car rental in several U.S. cities by Enterprise and Hertz.

Increasingly, operators sought to develop supportive parking partnerships and policies during this period. Most fell into one of six categories:

- Parking reduction (downgrading the required number of spaces in a new development),
- Parking substitution (substituting general-use parking for carsharing stalls),
- Allowance for greater floor area ratios (developers can build more densely on a site),
- Provisions for on-street and off-street parking,
- Exemption from parking limits, and
- Creation of carsharing parking zones or universal parking permits (carsharing vehicles can be returned to any location).

Summary

By the end of Phase 2, there were 18 operators in the United States and 13 in Canada. These organizations operated a collective fleet of 5,883 vehicles and served approximately 200,000 members. This phase showed growing memberships, market diversification, capital investment, technology developments, greater insurance availability, supportive and unsupportive policy developments, and multinational expansion. Starting in summer 2005, carsharing organizations began to report increases in membership caused by rising fuel prices. This phase ended just before the merger of Flexcar and Zipcar in October 2007.

Phase 3. Commercial Mainstreaming (Late 2007 to Present)

The merger of North America's two largest for-profit operators, Zipcar and Flexcar (into Zipcar), marks the beginning of the most recent phase of carsharing: commercial mainstreaming. In this phase, carsharing began to receive greater attention as a sustainable and viable transportation alternative. Moreover, U-Haul's U Car Share launched in May 2007, followed by Enterprise's WeCar carsharing service in February 2008. In December 2008, Hertz launched its own brand of carsharing, Connect by Hertz (*44*).

From January to May 2008, survey data were collected from 27 North American carsharing operators: 15 (of 18) in the United States and 13 (of 13) in Canada. Zipcar, with service in both the United States and Canada, completed survey responses for each region. Organizations were surveyed by a combination of mail, facsimile, e-mail, and telephone questionnaires. Many did not complete all questions because of proprietary issues.

In this survey, 13 U.S. operators expressed interest in collaboration with other providers. Sixty percent of U.S. organizations (nine of 15) indicated interest in collaborating on roaming memberships and 53.3% on technology development (eight of 15 respondents). Nearly 70% of Canadian operators (nine of 13) expressed an interest in roaming memberships and 69.2% in technology collaboration (nine of 13 respondents). As of July 2008, eight U.S. and three Canadian operators allowed roaming memberships (*45*, *46*). A few surveyed U.S. and Canadian operators expressed interest in cooperating on back-office operations (e.g., accounting), insurance, marketing, and training.

Carsharing Market Continues to Diversify and Evolve

Although the neighborhood model remains the predominant market for carsharing operators in North America, larger U.S. organizations have increasingly focused their attention on college and university campuses, businesses, and municipal government fleets.

As of July 2008, 11 U.S. operators were providing services at more than 130 college or university campuses. Of these, multiple operators served 11 campuses. It is estimated that approximately 300 vehicles are stationed at campuses through an official partnership or agreement with a college or university. An approximate additional 220 vehicles are parked within a four-block radius of these campuses. In Canada, nine operators have vehicles placed either on or within very close proximity of 19 college or university campuses. Six carsharing operators have official partnerships with eight Canadian universities, offering student and faculty discounts. An advantage of this market is that it allows operators to gain a foothold into new local markets. After these programs are established, organizations can more easily implement more-traditional carsharing services (e.g., neighborhood residential model).

More city governments are examining carsharing as a means to provide city fleet services. In June 2008, the city of Vancouver, British Columbia, entered into a fleet agreement with CAN to reduce the number of city-owned fleet vehicles (*47*). In October 2008, San Francisco issued a request for qualifications for a shared-use government fleet operator to maximize efficiency and minimize costs, fuel consumption, and emissions (*48*).

Organizations will continue to partner with businesses and public transit agencies to provide access to carsharing vehicles. In January 2009, the Chicago Transit Authority joined forces with I-GO (carsharing service) to offer an unprecedented carsharing development—a joint smart card, enabling users to pay for both public transit and carsharing (*49*).

Ongoing Technology Development

Carsharing's future continues to evolve along with technological innovation. Global Positioning Systems now help carsharing providers and customers dynamically locate vehicles. For instance, Zipcar members who are iPhone users can use an application to identify available vehicles in real time. Furthermore, in October 2008, Daimler AG announced plans to launch an open-ended, one-way carsharing system in Ulm, Germany, called Car2Go. This approach could expand into North America.

In July 2008, most North American operators were using either advanced or partially automated technologies. Only four operators in the United States and two in Canada continued to use manual operations. Most were using partially automated or advanced technologies. North American carsharing hardware and software systems are supported primarily by Eileo, Invers, Metavera, and Open Car Networks. ETL and Vetronix, which previously supplied carsharing hardware and software, are no longer active providers.

Insurance Reflecting Market Risk and Business Model

In this phase, higher U.S. carsharing insurance premiums appeared to be associated with college and university services. In the authors' 2008 operator survey, 11 of 15 U.S. organizations provided their insurance premiums, six of which served the college or university market. These six had a higher average annual premium, $2,459 per vehicle, compared to an annual average of $1,480 per vehicle for the other five. In contrast, the range in Canadian premiums is more closely associated with differences between public- and private-sector insurance. In Canada, two of the four operators with the lowest premiums, ranging from CA$600 to $1,300 per vehicle annually, are located in British Columbia and receive their insurance from the Insurance Corporation of British Columbia. Canadian insurance carriers include the Co-operators, the Insurance Corporation of British Columbia, and ING. U.S. operators identified the following providers in the 2008 survey: the Association of Nonprofit Insurers, Britton & Britton Insurance, Liberty Mutual, National Fire and Liability, National Indemnity, Neil Garing Insurance, Nonprofits' Insurance Alliance of California, and Progressive.

As carsharing is commercially mainstreamed, insurance carriers will have more experience in pricing premiums and are more likely

to charge rates that are more reflective of costs and risks. Over time, insurance rates should decrease, although insurance in college and university markets may be higher because of younger-driver risk. In addition, pay-as-you-drive insurance (i.e., charging organizations by mileage and customer profile) may be an option

Increasing Importance of Public Policy

During this phase, carsharing organizations and advocates will increasingly focus on policy considerations relevant to the carsharing industry, particularly taxation and parking. As of July 2008, just nine North American cities (of more than 70 municipalities that have carsharing) provided on-street parking to operators. As organizations expand their fleets, both on-street and off-street parking locations will be needed to house vehicles. In the future, municipalities may be able to alleviate operator costs by providing lower-cost or free public spaces. These spots can also provide free marketing. Policy initiatives will likely focus on tax credits, subsidies, rental-car excise taxes, smart growth (antisprawl initiatives), and carsharing as a strategy for climate-change mitigation.

Summary

As of July 2008, the North American carsharing market had grown to 33 operators with 318,838 members and 7,505 vehicles collectively. New entrants and program mergers, market diversification, and policy developments will continue to characterize the commercial mainstreaming phase. In addition, carsharing will likely receive more attention as a sustainable transportation alternative because of rising fuel prices, smart-growth initiatives, and climate change concerns.

CONCLUSION

Since carsharing first appeared in North America in 1994, a total of 50 carsharing operations have been deployed—33 are operational, and 17 are defunct. From the late 1990s to 2004, North American carsharing growth was on a near-exponential trajectory. Since 2004, U.S. and Canadian membership has continued to grow. Whereas nonprofit organizations have undergone dramatic growth between 2005 and 2008, for-profit operators still account for the majority of deployed membership and fleets. Since 2001, a number of program mergers and launches have occurred among North American operators. More recently, traditional car rental companies have begun to implement hourly pricing options and launch carsharing services, including Enterprise Rent-A-Car's WeCar, Hertz's Connect By Hertz, and U-Haul's U Car Share.

North America's carsharing evolution can be classified into three main phases: initial market entry and experimentation (1994 to mid-2002), growth and market diversification (mid-2002 to late 2007), and commercial mainstreaming (late 2007 to present). In the first phase, early entrants learned how to deploy neighborhood carsharing services, reduce operational costs, and structure rates to attract customers. This phase was also characterized by minimal technology use, high insurance rates, and limited insurance availability. The growth and market-diversification phase reflects growing memberships, market diversification, capital investment, technological advancement, greater insurance availability, multinational expansion, and supportive and unsupportive policy developments.

The October 2007 merger between Flexcar and Zipcar, which created the world's largest multinational carsharing operator, marked the start of the commercial mainstreaming phase. In this phase, new entrants, program mergers, and market diversification will continue to characterize the North American market. A handful of organizations in the United States and Canada will continue to account for the majority of members and fleets deployed in the future. Carsharing will likely receive greater attention as a sustainable transportation alternative in an era of uncertain fuel prices, smart-growth initiatives, and heightened climate-change awareness. Increased public policy development will also be indicative of this phase. Supportive and unsupportive policy approaches will be key in guiding carsharing's growth and location decisions.

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