CarSharing Portland:
Review and Analysis of Its First Year

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July 1, 1999

Acknowledgments

The evaluation of CarSharing Portland's first year drew upon the resources of several talented individuals. I am grateful to each of them for working with me on this project during the past year and for their contributions to this report.

I thank Matthew Nice for careful and exhaustive statistical analyses, Russell Martin for painstaking efforts to provide us with data from the CarSharing Portland records and Maren Sounders for prompt and reliable responses to the never-ending stream of questions.

I am extremely grateful to Nina DeConcini for continuing support of CarSharing Portland and its first year evaluation. And I owe special thanks to Aphra Katzev for statistical and graphics wizardry.

Above all, I wish to acknowledge my deep appreciation to David Brook for joining with me on the project at its inception and for having the gumption to bring a car sharing organization to this community. I know there are many others who are equally grateful for his dedication and desire to see CarSharing Portland succeed.

Executive Summary

Overview

CarSharing Portland (CSP), the largest and most recent commercial car sharing organization in the United States, completed its first year of operation at the end of February 1999. At that time it had 110 active members who shared 9 vehicles located at 7 sites in the city of Portland, Oregon. CarSharing Portland sought to decrease unnecessary automobile travel by providing individuals, who did not own a vehicle or sought an alternative to owning a second vehicle, access to one for their short term travel needs. This report constitutes a comprehensive review and analysis of CarSharing Portland's first year of operation

Operating Procedures

CarSharing Portland provides short-term, hourly use of vehicles that are located in parking sites close to the member's household or place of work. Members are charged only for the time and mileage of each trip.

A $25 application fee is charged to applicants to defer the cost of a driving history screening and credit check. To qualify for membership individuals are required to make a fully refundable security deposit of $500 which is held as long as they are members.

CSP has only one usage fee plan: $1.50 per hour + 40¢ per mile; with a $45 daily maximum. During the first year, there was one specialty vehicle, a pickup truck, which was billed at $2.00 per hour + 40¢ per mile, with a $55 daily maximum. Gasoline, insurance and maintenance are included in these rates.

CSP's fleet consists of 8 four-Door Dodge/Plymouth Neons plus one Toyota pick up truck. During the 3 month Start Up period, reservations were handled by CSP's Staff; for the balance of the first year they were taken by a reservations service.

Member's Behavior

- 26% of CSP members sold their personal vehicle after joining the organization.
- 53% of CSP members avoided a vehicle purchase as a result of their membership.
- CSP members increased transit ridership, bicycle use and walking.
- 75% of CSP members became more aware of their transportation costs.
- CSP members estimated they saved an average of $154 per month in transportation costs.
- CSP members who owned a personal vehicle exhibited a modest VMT reduction but, given their short average (5.6 months) membership period, the decline was not statistically significant.

Membership Demographics

- An average of 33 new members joined each quarter.
- The principal motive for joining was the occasional need for a vehicle.
- The majority of CSP members are college graduates, evenly divided in gender, with a median monthly income between $3,001- $4,000.
- The average age of CSP members is 37 years with bi-modal peaks at 30 years and 50 years.
- 41% of CSP members owned a vehicle at the time they joined, 59% did not.

- 61% of CSP members rent a home or apartment, 39% own their residence.

Satisfaction with CSP's Service

- 81% of CSP members felt it had measured up to their initial expectations.
- 75% of CSP members achieved their anticipated transportation cost savings.
- A sizeable majority of members rated each CSP service feature to be excellent.
- Booking a vehicle at the preferred time and location was occasionally a problem.
- Not owning a vehicle and occasional access to one were the highest ranking advantages of membership in CSP.
- Distance to station and trip planning were the highest ranking disadvantages.
- More vehicles and locations were the most common recommendations.
- Most CSP members felt a sense of pride in belonging to an organization that sought to achieve a more livable community.

CSP Trip Usage

1. The number of member trips in CSP vehicles varied widely between months and members with an overall average of 2.5-3.5 trips per month.

2. The average CSP trip duration ranged from 3 – 4.5 hours, while the overall mean trip distance was 22.6 miles.

3. The majority of trips were for entertainment and shopping, with 76% of the trips taken between 6am-6pm.

4. The frequency of CSP trips declined slightly with increasing length of membership and distance to the nearest station.

5. The effects of membership length and distance to station were less important for vehicle owners than non-owners.

Conclusion

CarSharing Portland sought to achieve a number of very broad goals during its first year. They included:

- Establish a shared vehicle mobility service in several central Portland neighborhoods
- Insure the operational and financial viability of the organization
- Attract a sufficiently large segment of the population to insure a stable and steady growth in members
- Meet the mobility needs of the members with a high degree of satisfaction
- Reduce member vehicle ownership needs and vehicle miles of travel (VMT)

The findings presented in this report indicate that, CarSharing Portland has, in most respects, effectively met each of these objectives. An organization has been formed, its membership is growing, and the members seem very satisfied with the service it provides. A firm financial foundation has also been laid and it is clear that the concept of sharing cars is not only appealing, but that is workable in this country.

CarSharing Portland also achieved a number of its original mobility goals:

- Seventeen members sold a personal vehicle, while 34 more avoided purchasing one. When multiplied across a large number of future CSP members, the cumulative impact of a reduction of vehicles of this size on traffic congestion, parking and transit ridership should be sizeable. In addition, comparable reductions in automobile pollutants can be expected, if the cars in the CSP fleet are new, smaller and better maintained than the ones the members might have otherwise kept or bought.

- CSP members also became more aware of their transportation costs and began changing their customary mobility habits by planning vehicle usage more carefully and "bundling" together trips that might have formerly been taken separately.

- Car sharing also led to significant changes in the use of alternative transportation. After joining CarSharing Portland, individuals took the bus more often, rode their bicycle more and did more walking than they had before.

Taken together, the results of CarSharing Portland's first year should give rise to a good deal of optimism about its future and the positive impact its growing membership will have our urban environment.

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Chapter 1
Background and Initial Planning

I like the idea of having a community car. I'm promoting being a one-car family.
Loree Devery CSP Member

Introduction

CarSharing Portland (CSP), the largest and most recent commercial car sharing organization in the United States, completed its first year of operation at the end of February 1999. At that time it had 110 active members who shared 9 vehicles located at 7 sites in the city of Portland, Oregon. CarSharing Portland sought to decrease unnecessary automobile travel by providing individuals, who did not own a vehicle or sought an alternative to owning a second vehicle, access to one for their short term travel needs.

The introduction of car sharing in this country is of considerable interest because of its potential for reducing the mounting transportation problems of our urban communities. It is widely believed that car sharing will:

- Reduce the vehicle ownership needs of members
- Decrease the vehicle miles members travel
- Increase member use of public transit and other alternative modes of transportation

While these anticipated benefits of car sharing have been observed in Western Europe, where car sharing is flourishing,[1] they stand in need of supporting evidence from the car sharing organizations that have recently been established in Canada and those in this country where it is just getting started.

Now that CarSharing Portland has completed its first full year of operation, we are in a position to investigate the anticipated mobility effects of car sharing. During its first year a considerable amount of data was collected that provides a rich source of information about the service, its members, their patterns of usage and the how membership in the organization influenced travel behavior. This report constitutes a comprehensive review and analysis of CarSharing Portland's first year of operation

Overview
After reviewing the founding of CarSharing Portland, its current operational structure and marketing activities, we will take a close look at following topics:

- The growth of the organization and the demographic characteristics of its members,
- The member's overall satisfaction with the service and how it has affected their travel behavior.
- The members use of CSP vehicles, their trip characteristics, and service demand pattern.
- The predictors of the member's service usage

[1] For an excellent review of the history of car sharing in Europe and North America, see Shaheen, Sperling and Wagner, 1998.

- The impact of membership on vehicle miles of travel, vehicle ownership and use of alternative transportation modes

We conclude by discussing the most notable results of CarSharing Portland's first year, the major effects it had on member's travel behavior and its plans for future growth and development.

Methodology

Three classes of information were utilized in this analysis

- Pre Membership (Appendix H) and Year End Survey (Appendix I) responses of CSP members to a variety of questions about their background and travel behaviors, as well as their appraisal of CSP's service.

- Two rounds (before joining CSP and at the end of its first year) one week Trip Diary (Appendix G) records provided by volunteer samples of CSP members and a comparison sample of non-members (Control Group)

- CSP trip and reservation data provided by Trip Ticket records completed by the members at the conclusion of each trip in a CSP vehicle and from records complied by CSP staff

Further information about these instruments, the characteristics of the respondents and the methods employed in analyzing the data will be presented in the chapter where they are employed.

Historical Background

> *Ten years ago the idea of car sharing was considered just a daydream. Since then, however, car sharing has become increasingly successful, and today it is one of the most significant trends in the evolution of transport and mobility in Switzerland and the rest of Europe.*
>
> Conrad Wagner
> WestStart Fellow

Early Influences
The formation of CarSharing Portland was stimulated by the rapid growth of car sharing in Europe, especially by Mobility Car Sharing Switzerland and StattAuto in Germany, both of which began formal operation in 1987. In 1995, the author of this report and David Brook, President of Car Sharing Portland, began a program of independent research on car sharing and preliminary discussions of starting a car sharing organization in Portland.

Our early thinking was also influenced by the work of Benoit Robert, who successfully established car sharing organizations in Montreal and Quebec City. We also learned a great deal from an earlier, ambitious attempt to form a commercial car sharing organization in San Francisco, the Short Term Auto Rental (STAR) program. While STAR ended in 1985 after operating for 18 months, a good deal of valuable information was obtained from published reports of its activities and the personal accounts of its founder and manager both of whom lived in Portland. Indeed, the latter individual, Russell Martin, joined our initial planning sessions and later served as CSP's first Manager.

Public Adoption
Interest in car sharing as a community-wide policy initiative accelerated as a result of several public talks in Portland during 1996 and 1997 by Conrad Wagner, founder of the Swiss car sharing company that subsequently grew to become Mobility CarSharing Switzerland. As a result of his stimulating presentations, the City of Portland and the Air Quality Division of the Oregon Department of Environmental Quality (ODEQ) formed a group to discuss the feasibility of a car sharing service in Portland.

This group of 10-20 people met several times to consider the nature of the business organization, e.g. cooperative, non profit or for-profit company, and the most effective approach to starting a car sharing service in Portland at this time. In light of these discussions, the ODEQ obtained funds from the Environmental Protection Agency (EPA) Region 10 (Seattle, WA) to create a car sharing service in Portland.

Preliminary Steps
The EPA grant provided funds for:

- A Market Research Study consisting of focus groups and community-wide survey to assess the potential market for a car sharing service in Portland. (Peters, Scott, & Burkholder, 1997)
- Development of a Business Planning Study to consider operational elements and capital requirements for the organization. (Scott, Peters, & Burkholder, 1997)
- Seed money for a selected service provider during the first year and funds to support a comprehensive evaluation of the new mobility service. (Brook & Katzev, 1997)

Following consideration of proposals to form a Portland car sharing service, the ODEQ selected CarSharing Portland to be the provider with Public Policy Research as subcontractor to conduct the evaluation. On March 1, 1998 CarSharing Portland began a three-month Start-Up Phase with two vehicles at two locations. This "shakedown" period was designed to establish basic operating procedures before expanding into other neighborhoods. A report of this period (Katzev, Brook, & Martin, 1998) reviews the

organization's start-up activities and presents an analysis of trip demand and usage patterns of the early adopters.

Table 1 summaries the key milestones in the formation of CarSharing Portland and its first year of operation.

Table 1. Milestones in CSP's Development and Implementation

Milestone	Date
Background research and study	1992 – 1995
First visit of Conrad Wagner to Portland	May 1996
EPA Region 10 Award to ODEQ	May 1966
Market Feasibility Study	July 1997
Business Planning Study	July 1997
CarSharing Portland selected as service provider	September 1997
CarSharing Portland begins three-month start-up service	March 1, 1998
Buckman Heights partnership begins	August 1998
First business member joins CSP	February 1999
Conclusion of first year's operation	February 28, 1999

Chapter 2
CSP Organization and Start-Up Issues

Car sharing is incredibly convenient and very inexpensive. It definitely fits my lifestyle.
Julie Livingston CSP Member

Organization

Operating Procedures
CarSharing Portland offers members an alternative to *owning* a car, by providing convenient *access* to one when they need it. The service provides short-term, hourly use of vehicles that are located in parking sites close to the member's household or place of work. Members are charged only for the time and mileage of each trip.

A $25 application fee is charged to applicants to defer the cost of a driving history screening and credit check. To qualify for membership individuals are required to make a fully refundable security deposit of $500 which is held as long as they are a member. Once approved new members participate in a 30-minute Orientation Session where the membership agreement is signed and a review is conducted of the organization's procedures, scheduling, access to vehicles, and their care and maintenance.

Trip Fees

Standard Vehicle
- $1.50 per hour
- 40 cents per mile
- $45.00 = Daily Cap

Specialty Vehicle
- $2.00 per hour
- 40 cents per mile
- Daily Cap = $55.00

To keep rate schedules and user categories as simple as possible, CSP has only one usage fee plan: $1.50 per hour + 40¢ per mile; with a $45 daily maximum. During the first year, there was one specialty vehicle, a pickup truck, which was billed at $2.00 per hour + 40¢ per mile, with a $55 daily maximum. Gasoline, insurance and maintenance are included in these rates.

An early survey indicated that many members were continuing to rent cars for weekend trips even after joining CarSharing Portland. Since the vehicles were under-utilized and weekend rental income was being lost, a two tiered mileage fee was introduced which kept the original standard rate of 40¢ per mile, but applied it only to the first 40 miles of a trip, with all additional miles at 15¢ each. Unfortunately, this appeared to more difficult for members understand and was certainly more difficult for the staff to explain. A few months later, the present "daily maximum" rate was introduced and the two-tiered mileage system was dropped.[2]

Vehicle bookings were made initially by telephoning the CSP Staff. After three months, a local answering service began to handle them. Access to the vehicles requires unlocking the driver's side door whose lock has been modified to accommodate a single, common key. The ignition key for each vehicle is located in a real estate lock box inside each vehicle. This box can be opened when the user enters a security code number on the lock box keypad.

The information required for billing and usage analysis is obtained from a Trip Ticket that each member complete at the end of each trip. Statements are sent monthly and charged directly to the member's credit card. The Trip Ticket provides a record of the odometer reading and the time at the start and completion of each trip. It also permits the member to note the purpose of their trip, as well as any problems associated with the operation, availability or cleanliness of the vehicle. The current version of a CarSharing Trip Ticket is shown on the following page.

[2] It is possible this daily maximum is too low, as a CSP member recently drove half way across the United States and back in 5 days.

Management
Russell Martin, who ten years earlier had been manager of the STAR program in San Francisco, was hired as Operations Manager of CSP in November, 1997. This title was later changed to General Manager to more accurately reflect the full scope of his responsibilities. Jampa Nyendak Lathsang worked as an interim assistant for several months, starting in February 1998. During the first year David Brook, the owner and founder of CarSharing Portland, worked for the organization two days a week and continued part-time as an Extension Energy Agent with Oregon State University Extension Service.

Prior to the start of service in March, 1998 considerable time was devoted to establishing the organizations basic policies and procedures. This included:

- Developing the member screening process with the insurance company
- Creating the Membership Agreement Form with the firm's legal counsel
- Setting up the accounting system
- Working out the credit card billing procedures
- Obtaining the vehicles
- Developing the interior lock box/rekeying procedure
- Establishing and guiding each new member through the Orientation Session

It was discovered that leasing off street parking was more difficult than had been anticipated, as many neighborhood businesses either did not have extra parking or, if they did, their monthly fee was beyond our budget. Many businesses also expressed concern about the problems that might result from having a publicly available vehicle on their lot.

During the summer of 1998, as the number of members and vehicles increased, the responsibilities became too much for one person. Maren Souders, who had expressed an interest in working for the company, was interviewed and hired to coordinate Education and Marketing in August 1998. She quickly assumed the valuable role of Office Manager as well.

In the spring of 1999, Russell decided to step down from his role as General Manager in order to focus on special projects. This included transferring bookkeeping responsibilities to a professional bookkeeper who works at CSP once a week and developing a new touch-tone reservation system to overcome the limitations of the one existing then. It was at that time that David assumed the General Manager's position
.

CSP Vehicles

Vehicle Locations

In order to have a presence in as many areas of the city as possible, CSP has chosen to grow by establishing single vehicle stations. During its first three months, CSP operated in only one neighborhood area of Portland. This period was designed to refine the systems and procedures before expanding into other close-in neighborhoods and downtown Portland. CSP also attempted to place the vehicle sites on bus lines, although iit appears that members rarely use the bus to get to the stations. By the end of the first year, CSP had 7 sites located in each section of the city. These stations, along with the location of each of the member's household, are depicted in the map shown in Figure 1.[3]

[3] We thank Russell Martin for his excellent work in creating the map of CarSharing Portland Members and Vehicle locations shown in Figure 1.

Inert Figure 1. CSP Member/Stations Map on this Page

One exception to the single-vehicle station is the Buckman Heights Apartments which has three vehicles at (2 sedans and a pick up truck). This site was the result of a proposal by Ed McNamara, Development Director of Prendergast & Associates, a local developer, to locate several vehicles at their new "transportation-friendly" apartment building at NE 16th Ave. just off Sandy Blvd. Prendergast & Associates contracted for CarSharing Portland to locate 2 sedans and the pickup truck at this building (Buckman Heights Apartments) for a six months, after which the number of vehicles could be adjusted in light of current usage levels. It is interesting to note that even with discounted security deposit and application fees only a few of the 144 residents of the building have joined.[4]

Vehicle Acquisition

At the outset CSP staff decided that the vehicles to standardize the fleet vehicles in so far as possible. Based on his experience at STAR, Russell believed this would minimize the tendency of members "shop" for a favorite vehicle, as well as making it easier for them to become familiar with the controls in any vehicle in the fleet that they drive. The decision was also mandated by CSP's system of a common key to unlock all vehicles.

Four-door Dodge/Plymouth Neons were selected to the standard sedan. They were chosen because they have good interior room and reasonable performance at reasonable cost. They also have a "friendly," somewhat distinctive, modern image that was thought to give them a slight edge for an innovative service like CarSharing Portland.

The vehicles are standard 4-door "base" models, with the standard fleet option package of automatic transmission, air conditioning and a radio. Most of the vehicles have a fold down rear seat that allows carrying long items. Member surveys indicate that a cassette tape deck is the feature they would most like to see added.[5]

The vehicles are leased through a partnership with VPSI Inc., a major commuter vanpool provider in the United States. By leasing, CSP has been able to place more cars on the road for less up front capital.

> *The basic principle underlying all these [car sharing initiatives is that if all people had equal access to all the cars in their town or neighbourhood, the total number of vehicles required to satisfy a given level of demand would be smaller than if all vehicles were privately owned.*
>
> Benoit Robert
> President Auto Com
> & CommunAuto

Vehicle Scheduling

As noted above, CSP begin with a 3-month shakedown phase, where the staff handled all reservations using a cellular phone between the hours of 7 AM and 9 PM seven days a week. Handling reservations at the outset in this way was designed to provide first hand experience with scheduling requests and scheduling conflicts. With so few members the inconvenience of being on-call was minimal.

After this initial period, CSP contacted with a local answering service/call center to handle vehicle scheduling. It was hoped that a fully computerized system would generate a detailed call history that could be analyzed for operational planning and evaluation purposes. However, the company was unable to

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[4] The lack of nearby neighborhood shopping easily accessible without driving along Sandy Boulevard may be part of the reason at this time.

[5] Although many members would like to add more upscale vehicle like a Toyota or other Japanese car, none indicate they are willing to pay extra for it.

deliver the computerized system that was promised. In addition, they did not reliably record reservations so that several times each month vehicles were not available at times they had been confirmed for use.[6]

Vehicle Insurance
Because commercial car sharing organizations were virtually non-existent in this country at the time CarSharing Portland was established, it was quite difficult to obtain insurance coverage. Most brokers wanted to sell "car rental" policies, which are designed for state minimum-mandated coverage, rather than high levels of coverage typical of what a member would normally carry on a privately owned vehicle. It was not until CSP received a referral from VPSI Inc. to their fleet van pool insurance broker that it was possible to obtain coverage of the type that was needed.

CSP's insurance coverage from Traveler's Insurance requires a detailed review of a potential member's driving record for the past several years. The policy specifies no more than two moving violations or insurance claims in the past three years. Sometimes there is an element of subjectivity in determining whether or not a person's driving record is satisfactory. The screening criteria are noted on CSP's application, so it's not clear how many drivers may have not applied because they thought they would not qualify.

During its first year, CSP members had no accidents and, as a result, no insurance claims were made. However, its insurance carrier indicates that it will take several years to establish a "track record" that would justify in lower rates.

> *Though the program [STAR] had waiting lists for participants, it failed in part because the residents weren't properly screened for credit risks and cars weren't dependable enough.*
> Laura Meade Kirk
> Chicago Tribune

Two insurance-related issues have somewhat hampered CSP's growth. The first is an age 72 cut-off that restricts from serving the growing retirement home segment, a natural car sharing segment of the population. The second is the age 21 minimum that eliminates many college age students, another obvious market segment. At the present time, CSP is seeking an insurance provider who can offer lower insurance costs and who will, at the same time, be able to provide coverage for these two potential markets.

Vehicle Maintenance
The vehicles in CarSharing Portland's fleet operated without any major mechanical problems during the first year. CSP members are requested to return the vehicle in the condition they would like to find it on their next trip. On the whole, they have been very good about complying with this request so that was unnecessary for the staff to devote a great deal of time to cleaning the vehicles. They are vacuumed twice a month and given an exterior wash about one a month. Finally, at the prospect of a penalty for not doing so, the members have also been very "conscientious" about refueling the vehicles, which is required once the indicator falls below the 1/4 level on the fuel gauge. Members are reimbursed for the cost of the fuel by submitting the receipt and are given one hour free usage for undertaking this task.[7]

Marketing

Advertising

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[6] In April 1999 CSP switched over to all "touch tone" reservations with a Computerized Automobile Reservation System (CARS). The system, developed by Wilder Engineering of Campbell, CA, employs a custom-designed 24 hour interactive "touch tone" telephone system (no voice scheduling is available). It also provides detailed reservation information for better management control and billing purposes. This system has eliminated the occasional double booking problems which had plagued CSP while using the answering service for vehicle scheduling.

[7] At the start of its second year, CSP switched to a Wright Express fleet gas card. The card can only be used for the purchase of gasoline and for security purposes at the time of purchase members are required to use their PIN number and inform the attendant the odometer reading at the time of refueling.

During the first year, CarSharing Portland spent about a $1,000 per month on marketing and advertising. The initial marketing program was designed to provide multiple exposures of CSP's message to potential members. A representative advertisement that was used early in the first year is shown on the next page. Appendix D, E, & F show an additional advertisement, early promotional Fact Sheet, a widely deployed Door Hanger and a newly developed brochure.

Although quite a few individuals have heard of CarSharing Portland, there continue to be some misconceptions about it. For example, some believe it is a cooperative organization, where everyone has to take care of maintenance. Others think that it is located in only one neighborhood and that that it is simply another type of auto rental. On the other hand, a surprising number of individuals appear to be aware of the European car sharing services.

People love to be moral even if there is no point to it…So we changed our marketing. We stopped saying you have to get rid of something, and started to say we offer you something

Carsten Petersen
Stattauto CoFounder

CSP found paid ads in the free weekly newspaper along with on-board ads inside transit buses were effective in attracting potential members. Newspaper articles and TV stories generated by press releases turned out to be invaluable and always generated a flurry of calls. When a new vehicle location was established, door hangers were placed on all homes within a surrounding 10 block area.[8]

Since many people inquire about CarSharing but never join, CSP distributes a quarterly Newsletter to prospective customers as well as supporters in government agencies and non-profit groups. CSP also provides members with a monthly newsletter updating procedures and policies and announcing new vehicle locations.

Publicity
From its inception, CarSharing Portland has generated a great deal of media interest which led to many local, as well as national news reports. Coverage about CSP appeared on television, in magazines newspapers and trade journals. Table 2 lists some of the most noteworthy reports in the media. Appendix C lists the advertising, media, and public relations activities of CSP for each month of the first year, as well as representative examples of these reports.

Table 2. Selective Media Reports

Source	Date	Item
Newspapers		
Philadelphia Inquirer	July 1998	Article about CSP
Business Journal	August 1998	Front page article about CSP
Chicago Tribune	September 1998	Article about CSP
USA Today	January 1998	Weekend edition article about CSP
Magazines/Newsletters		
Sierra Club Journal	March 1998	Brief description of CSP
OEC Newsletter	April 1998	Note about CSP
Oregon Cycling Magazine	September 1998	Brief mention in article
Co-op America Quarterly	January 1999	Car sharing report featuring CSP
Television/Radio		
National Public Radio	March 1998	Story on CSP
Oregon Public Broadcasting	April 1998	Story about CSP
KGW Channel 8	April 1998	News story
ABCNews.com	February 1999	Article on CSP

Chapter 3
Members: Growth Rate and Demographic Profile

[8] A recent grant has enabled CSP to upgrade its original one-page Question and Answer marketing sheet with a brochure developed by a local advertising agency.

Getting rid of my car was a lot like giving up cigarettes, and I feel about as good about myself because of it. It's about as hard, but once you get free of it, a whole new world opens up of health and well being. I have all the convenience and more, of owning a car by having ready access to [car sharing], without having to maintain it, take it to the shop, you know, deal with it. So it improves my life while saving the planet.

Xander Patterson CSP Member

Membership

Size

A total of 120 individuals had joined CarSharing Portland by the end of its first year (February 28, 1999). They shared a fleet of 9 vehicles giving rise to a ratio of users to vehicles of 13.3:1. The vehicles were located at 7 separate close-in neighborhood stations in each quadrant of the city.

This year-end total is comparable to that reported by other North American car sharing organization. Indeed, at the end of its first year, the Co-operative Auto Network (CAN) in Vancouver, BC had an identical number of members-- 120 members and 9 vehicles,[9] while Auto-Com in Quebec City had 160 members and 16 vehicles (Robert, Leblanc & Morisette, 1996).

Growth Rate

Figure 2 plots the number of new members joining CSP since its founding through the end of its first 12 months. While the number of new members has increased steadily, Figure 2 reveals a relatively uneven pattern to its growth, with individuals more likely to join during some months than others.

[9] Tracey Axelsson, CAN Director. Personal Communication.

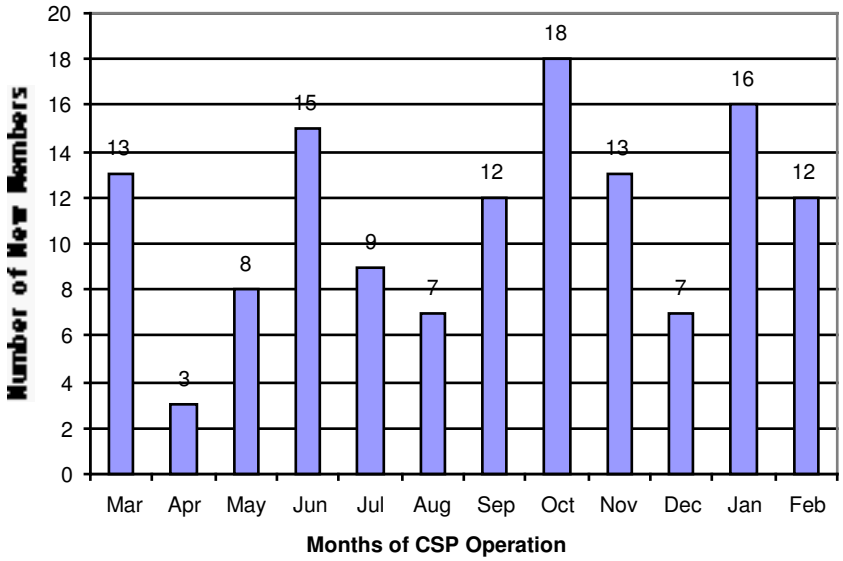

Figure 2. Number of New CSP Members Each Month

To determine if these fluctuations would even out over larger intervals, the monthly values have been combined into four quarterly blocks. These are shown in Table 3 that depicts CarSharing Portland's rate of growth in 3 month blocks. When examined over these larger intervals, it is evident that CSP has grown by an average of 33.3 new members each quarter or 10-12 new members each month.

Table 3 Quarterly Growth of New Members

Quarter		Average P/Quarter	Average P/Month
1st	Mar – May	24	7
2nd	June – Aug	31	10.3
3rd	Sept – Nov	43	14.3
4th	Dec – Feb	35	11.7

Membership Activity

Information Requests and Applications

Table 4 suggests a similar pattern of growth for information requests and formal applications to join the organization. During the last 6 months CSP received well over 50 information requests each month. During this same period an increasing number of individuals submitted membership applications. Note that 34 applications were made in February, 1999, more than any other month in CSP's history.

Table 4. Monthly Measures of Membership Activity

General CarSharing Portland Membership Activity Measures By Month

	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan99	Feb99	Total
New Members	13	3	8	15	9	7	12	18	13	7	16	12*	121

Information Requests	**54**	**71**	**47**	**25**	**36**	**91**	**92**	**76**	**65**	**58**	**58**	**71**	**744**
Applications	**9**	**6**	**16**	**14**	**8**	**24**	**15**	**24***	**18**	**18**	**10**	**34***	**196**
Members Withdrawn	**--**	**--**	**--**	**1**	**--**	**--**	**4**	**--**	**1**	**1**	**2**	**1**	**10**
Cars Added	**2**	**--**	**--**	**1**	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**2**	**9**

Notes: The average number of days from applying for membership to joining CarSharing Portland was 25.70 days (SD 32.46), with a range of 0 - 218 days. An asterisk (*) indicates that in addition to individual members, businesses either requested information, applied for membership or joined CSP. March 1998 data includes some data from February, 1998.

Withdrawals

Table 4 also indicates that a total of 10 individuals have withdrawn from the organization after they had become active members. Their reasons for doing so varied widely.

- Five individuals moved out of town
- One needed the cash from the CSP refundable security deposit
- One intended to join for a short period for health reasons
- One found the distance to the too far from her household
- One took a new job that required a vehicle to commute
- One preferred the convenience of a personal vehicle

It is important to point out that no one withdrew from the organization because they were dissatisfied with the service. Rather, in almost all cases, a change in the member's personal circumstances associated with their work or household location was the most common reason for them to withdraw from the organization.

Key Year End Measures

Members = 120
Information Requests = 744
Applications 196
Withdrawals = 10
Vehicles = 9
Vehicle/Member Ratio = 13.3

Member Demographics

Characteristics
The members of CarSharing Portland were surveyed before they started to use the service and at the end of the first year. Table 3 summarizes the basic demographic characteristics of the members, provided by the 87 respondents (72.5% return rate) to the initial, Pre Membership Survey.

Table 5. Member Demographics

Demographic	**Value**
Mean Age of Respondent	37.24 years Bimodal peaks at 30 years and 50 years
Range of Age	22 – 75 years
Mean Education	16.40 years
Gender	47 female, 40 male
Income per Month	**Frequency**
$1000 or les	10
$1001-$200	17
$2001-$300	12
$3001-$400	16
$4001-$500	11
$5001 or mor	17

The members range in age from 22 to 75 years, with a mean of 37.24 years. The age of the members falls into a bimodal distribution with a peak at 30 years and another at 50 years.

A sizeable majority of the members are well educated, with an average highest completed grade in school of 16.4 years. All CSP members have completed high school and most have graduated from college.

Table 5 indicates the members are fairly evenly divided between females (47) and males (40). In addition, their monthly income cuts across all levels with the reported median income level equal to $3,001 - $4,000.

When the members applied to join CSP, they were asked whether or not they rented or owned their residence. Of the 113 respondents, 69 (61%) indicated they either rented a home (30) or apartment (39). The remaining 44 (39%) said they owned their residence.

Table 6 Occupations of CSP Members

Occupation	Frequency
Professional	43
Service (food health, fire)	16
Manager/Owner	9
Clerical/Sales	9
Craftsman	9
Student	4
Government	4
Laborer	2
Other	7

The occupational status of CSP members is shown in Table 4. It is evident that a sizeable majority of members hold professional positions (lawyers, health care, education, etc.) with a smaller number holding positions ranging across a wide variety of occupational categories.

Taken together, these findings suggest that the early adopters of the car sharing concept in Portland, Oregon are a highly educated group who in most other characteristics represent a wide segment of the general population. They are not restricted to any single age group, or income level, nor are they more likely to represent one gender more than the other.

Vehicle Owners versus Non-Owners

Table 7 indicates that 41.1% (44) of the CSP members owned a personal vehicle at the time they joined the organization, while 58.9% (63) did not. Previous investigations (Steininger, Vogl & Zettl, 1996) have shown that this variable is closely associated with the impact of car sharing on mobility behavior. We will look closely at this relationship among CSP members in Chapters 6 and 8.

Table 7 also indicates that 17 of the vehicle owners reported they intended to sell their personal vehicle after joining CarSharing Portland. Almost all of those we were able to contact at the end of the first year reported that CSP made it possible for them to follow through with this plan, so that they no longer owned a personal vehicle.

Table 7. General Topics (N = 87)

Topic	Frequency	
Reason for Joining CSP	**1st Choice**	**2nd Choice**
Need for an additional vehicle	32	4
Financial Savings	10	19
Environmental Concerns	7	6
Initial Knowledge of CSP		
TV/News	28	
Ad	27	
Friend	19	
Lecture	4	
Vehicle Ownership[10]		
Own a vehicle	44	
Do not own a vehicle	63	
N/A or Missing	2	
Intent to Sell Personal Vehicle		
Yes	17	
No	29	
N/A or Missing	41	

Initial Source of Information

Table 7 indicates that a sizeable majority of members first learned of CarSharing Portland in the media. About half of those indicated this was by way of a TV, radio or newspaper report, while the other half indicated it was in from an advertisement. Communication from a friend or family member seems to have been less important during the first year, with 19 respondents reporting that was how they first learned of CarSharing Portland.

Motives for Joining

Goals

The members were also asked about their reasons for joining CarSharing Portland. We asked this general question on both the Pre Membership and Year End Survey. There has been a good deal of speculation about why individuals imbued with the American transportation ethic would want to join an organization promoting the shared use of vehicles. While many suggest it would be largely motivated by environmental concerns, our evidence suggests this factor, while important for many of CSP's early adopters,[11] was not the primary reason they decided to join.

Most (32) respondents said they were motivated to join CSP because of their periodic need for an additional vehicle. When asked for the second most important reason, the majority said it was the financial savings they expected to derive from avoiding the purchase of a vehicle. These results were confirmed on the Year End Survey which included a more open ended question about the goals of joining CSP. The member's responses were grouped into the categories shown in Table 8.

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[10] Vehicle ownership data obtained from the Pre-Membership Survey was supplemented by information from CSP Office records.

[11] Comparable findings have been observed in Europe. For example, in tracing the history of the car sharing organization in Switzerland, Munheim (1998) reports: "For a long time, CarSharers were regarded as ecological fundamentalists who did without a car to protect the environment. In fact, ecological motives really were important in the early days. More than one quarter of the clients who joined a CarSharing organization before 1994 did so for the sake of the environment. As early as 1995 and 1996, the proportion of those who joined for ecological reasons fell to 9 percent, 1997 it even fell to 6 percent. Practical reasons have become much more important…"

Table 8. Primary Reason for Joining CSP

Response	Frequency
Needed vehicle	17
Don't own a vehicle	11
Don't want to own a vehicle	8
Support concept	7
Environmental reasons	5
Save money	7
Convenient to use	5
Other	3
Missing or N/A	1
Total	64

As before, a sizeable majority (56%) or the members indicated that they were largely motivated to join CSP because it met their need for a vehicle or that they didn't own one or didn't want to. They often reported their need for a vehicle occurred because of a unplanned change in their life, e.g. their car broke down, they obtained a new job, or moved to a residence close to a CSP vehicle station[12] or their automobile insurance premiums increased. While environmental and financial concerns were also important goals for some members, the evidence indicates these factors were of somewhat lesser importance than their periodic need for a vehicle. This is reflected in the following sample of comments made by the members in response to questions on the Year End Survey on this topic.

[12] One member reported that he and his wife sought a new home that was close to a CSP vehicle station. He said that the money they would save by not owning a car made it possible for them to afford to buy a house that otherwise would not have been possible.

Member Reports of Reasons for Joining CSP

- *I am a strong advocate of anything than can help reduce automobile dependence. Car sharing is an important first step..*
- *Sick of owning a car.*
- *Ability to eliminate (sell) my second car and use CSP vehicle instead.*
- *My car was totaled.*
- *My car insurance payment was due and more than I could afford to pay.*
- *To support an alternative to everyone having to own an automobile.*
- *My car was too "sick" to keep, so I sold it for parts.*
- *Relieves me of the responsibilities of owning a car; reduces environmental impact.*
- *Ability to transport more cargo than possible on bike or bus.*
- *I bought a car and realized how expensive it was, considering how infrequently I used it.*
- *CSP vehicle station became available close to my home.*

Reasons for Not Joining CSP

Table 2 also indicates that at the end of the first year, there were 75 individuals who had not joined the organization, although they had completed the formal application process. Subsequently several (14) of these did in fact become members, but there were still a sizeable number of applicants who never became members even though their application had been approved.

Taking account of those who were not approved for membership (N = 11), and a small group of courtesy members (N = 5) and those currently under review (N = 5), there were 40 approved applicants who had not yet joined CSP by the end of February 1999. To find out what prevented them from completing the membership process, an effort was made to contact each one by telephone.

Information was obtained from 22 successfully completed calls.[13] The overwhelming majority still spoke very positively about car sharing and professed a desire to join CSP. The factors that prevented them from completing the membership process at the present time fell into the following categories shown in Table 9.

Table 9. Reasons for Not Joining

Reason	Frequency	
Could not afford the $500 Membership Deposit	5	
Unspecified, but still planning to join		4
Vehicle station not in their neighborhood	3	
Kept a car they had intended to sell	3	
Moved out of town		2
Purchased a car	2	

[13] Several individuals could not contacted because their telephone had been disconnected or they did not respond to 3 attempted calls, after which no further calls were made.

Objected to the no-animals-in-car policy	1	
Did not like the Neon		1

Unlike a study of carsharers in Europe, we did not find that these prospective CSP members were concerned about the organization's professional status, limited services or that they felt it was too impractical or complicated study (Lightfoot as quoted in Shaheen, Sperling & Wagner, 1998). Rather the majority still hoped to acquire the funds required for the security deposit and/or was still hoping to join in the near future.

Profile of CarSharing Portland Member

Recognizing that each member is unique, we can nevertheless summarize the evidence obtained on the early adopters with a very general profile. In Portland, car sharing seems to have the widest appeal for individuals with the socio-demographic characteristics shown in Table 10.

Table 10. CSP Member Profile

• Age	Mean = 37yrs; bimodal peaks @ 30 & 50 yrs.
• Income	$3,000 - $4,000 per/month
• Education	College graduate
• Occupation	Professional & service sectors
• Vehicle Status	Do not own vehicle
• Household Status	Rent home or apartment
• Membership Goal	Periodic Need for Vehicle
• Yearly Vehicle Mileage	Less than 4,000 miles[14]

Naturally, it is very unlikely that many individuals will match in all respects a profile with as many features as this one. Rather the profile is intended to be representative of a fair number of current members. The profile may also be useful in identifying future segments of the population who will be most responsive to future recruiting and marketing programs.

[14] Based member First Year Survey estimates of number of miles driven in personal, CSP, rental and all other (family and friends) vehicles during the past 12 months.

Chapter 4
Usage and Demand Pattern

Having a CSP car within a 5 or 10 minute walk of my apartment is practically as good as having my own car on hand for occasional errands or if something comes up unexpectedly. If I had kept my car, I surely would have done more driving, even when it was unnecessary.
Seth Gallant CSP Member

Overview

This chapter presents a description of member trips in CSP vehicles and an analysis of usage predictors during the first year of CarSharing Portland's operation. Three broad areas of service utilization are examined:

- Characteristics of member trips in CSP vehicles
- Temporal demand pattern of bookings
- Activity at CSP stations

The evidence collected during the first year indicates that the members vary widely in the number of CSP trips they take each month. This is true over time, as the pattern changes the longer they have been members. It also varies from month to month, as the member's circumstances change. Indeed, it is not uncommon for some members to go an entire month without taking a single CSP trip.

The goal of this analysis is to identify the factors that govern this variation. Table 11 lists the measures of CSP trip behavior that were collected during the first year. It also lists the variables that were most closely associated with these measures.

Table 11. Factors Governing CSP Vehicle Trips

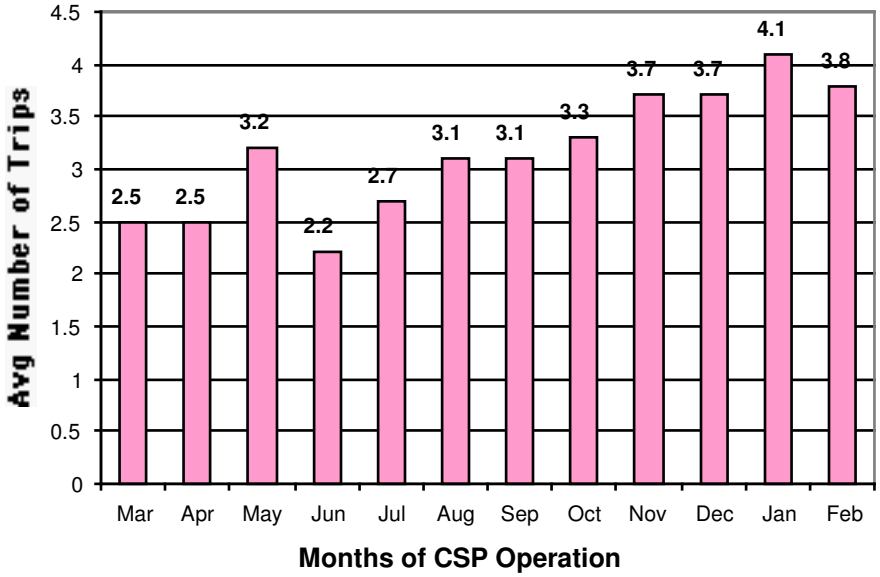
Member Trips in CSP Vehicles	
Predictors	**Trip Measures**
Length of Membership	Frequency
Distance to Station	Distance
Vehicle Ownership	Duration
Gender	Purpose
Season of Year	

Vehicle Trip Measures

Trip Frequency
Figure 3 depicts the average number of trips made by members during each month that CSP has been operating. There was a gradual increase in average trip frequency during each month of CSP's first year. During the first 6 months, CSP members took on the average approximately 2.6 trips per month. During the last 6 months, this increased to 3.6 trips per month, peaking at 4.1 trips during the month of January 1999.

This finding may not reflect an actual increase in the average frequency of trips by individual members. Rather with each succeeding month there have *more and more new* CSP members. Evidence to be presented in the second half of this chapter indicates that *new* members are more likely to use the service than those who have belonged to CSP for
a longer period. Thus, the increase in average number of member trips by depicted in Figure 3 may be due to the gradual increase in the number of new members who, at the outset, take far more trips than they do after they have been members for awhile.

Figure 3. Average Number of Member Trips Per Month



As we noted, some members go an entire month without using a CSP vehicle. Over the course of the past 12 months the average percent of CSP members who did not book a reservation during a month was 30.6%. Figure 4 plots the percentage of "zero use" members during each month of CSP's operation.

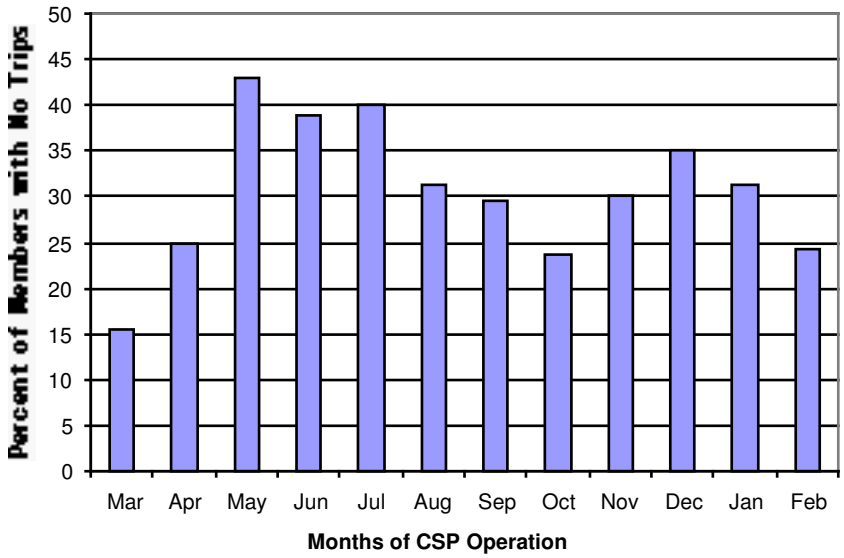


Figure 4. Percent of "Zero Use" Members Per Month

Trip Duration

Figure 5 plots the average trip duration, as well as the hours reserved during the first 12 months of CSP's operation. Trips ranged in length from 3 to 4 1/2 hours with the exception of two months (June and July, 1998), when the members reserved a car slightly longer than they actually used it. However, the difference between these two measures was never very large, as most members make fairly accurate estimates of their trip travel time.

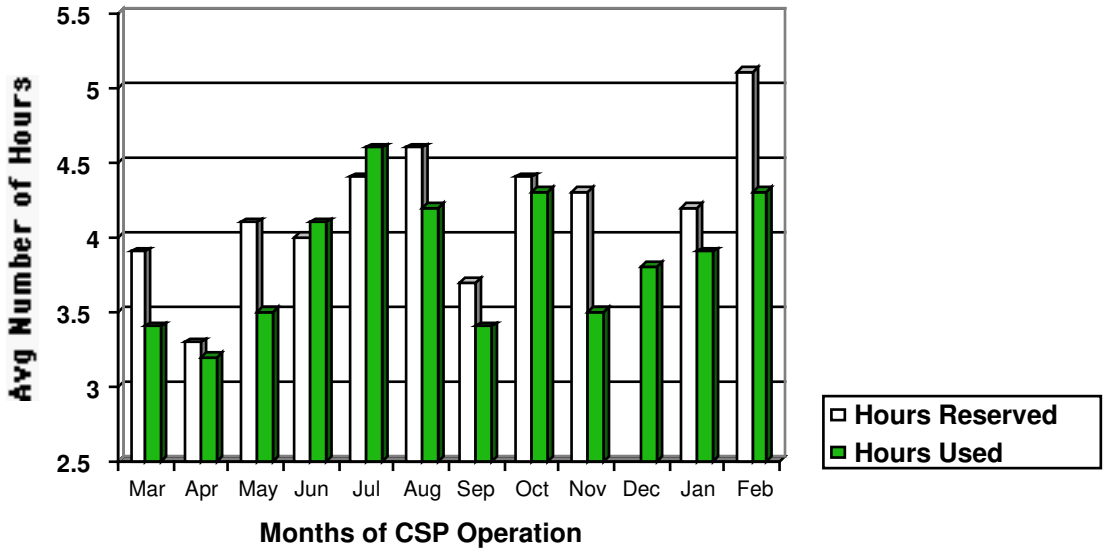


Figure 5. Average Trip Duration and Hours Reserved Each Month

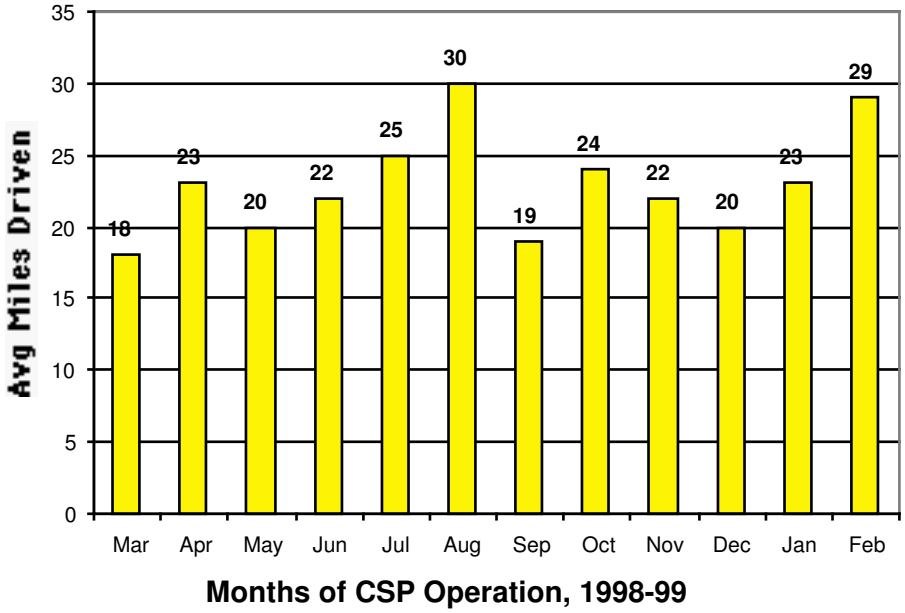
This should not be surprising as CSP policies impose a large fine on members for returning a vehicle late. In addition, since members are aware that they are billed for the hours they reserve a vehicle, rather that trip duration per se, they may try to maximize the value of each trip by using the vehicle for the full reservation period.

There was also a good deal of uniformity in the duration of trips during each day of the week. With the exception of Friday, when the vehicles are reserved for almost a full hour longer than they are actually used, there is also a fairly close correspondence between the time the cars are reserved and used. In addition, the average trip duration of 4.5 hours varies little from one day of the week to the next.

Trip Distance

The average distance of a trip with a CSP vehicle varied from 18 miles to 30 miles with an overall mean of 22.66 miles. These findings are shown in Figure 6 which also reveals a peak driving distance during the June-August period, corresponding to the summer months when longer driving trips might normally be expected.

Figure 6. Average Trip Distance Each Month



Longer trips might also be expected to occur on the weekends, say, for an extended shopping trip or out-of-town excursion. The findings for daily trip distances are shown in Figure 7 which displays the average number of miles driven per trip during each day of the week.

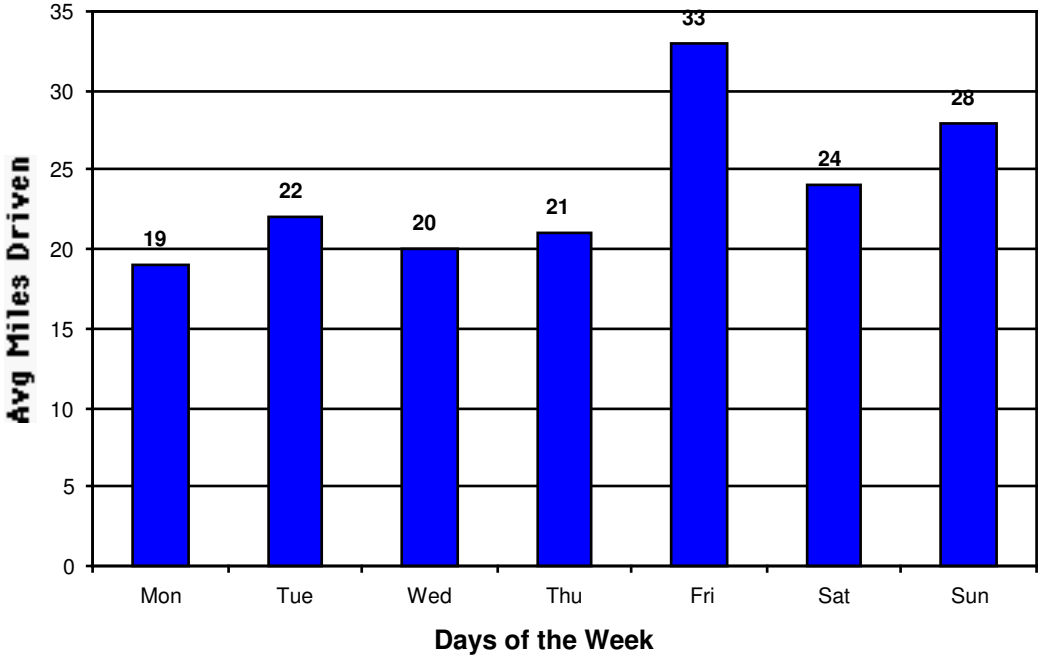


Figure 7. Average Trip Distance Each Day

Unlike the relative stability observed for the measure of daily trip duration, Figure 7 indicates there is considerable variability on the measure of daily trip distance. Sunday and Friday appear to be days where members take the longest trips, with Monday and Saturday the days for the shortest ones. However, when the average trip distance for both Saturday and Sunday is combined, the overall Weekend travel distance did not differ significantly from the average Weekday distance.

Trip Purpose

Members use CarSharing Portland's service for a variety of reasons. This information is obtained from the Trip Ticket that members complete at the end of each trip. Table 12 summarizes the evidence obtained from these reports during the last 12 months.

Table 12. Trip Purpose

Purpose	Frequency	Percent
Entertainment/Dining	314	19
Shopping/gErrands	567	34
Commute	55	3
Business	322	20
Medical/Dental	90	6
Other	255	16
Missing	45	2
Total	**1648**	**100**

These results show that the majority (53%) of CSP trips is for entertainment and shopping, while not surprisingly, the fewest are for commuting (3%). These trends have remained relatively stable throughout the first year of CSP's operation. They are also in agreement with those reported for members of Mobility CarSharing Switzerland, who also tend to use the service primarily for entertainment and shopping (Munheim, 1998).

Demand Pattern

Time of Day

Figure 8 depicts the frequency of CSP trips as a function of four daily time periods. Not surprisingly most of the trips (76%) take place during either the morning (37%) or afternoon hours (39%). The remaining trips occur in the evening (19%) or early morning (5%) hours. This distribution of usage is not unlike the normal pattern for personal travel and, once again, reinforces the view that a shared fleet service can quite readily meet the an individual's mobility needs that are usually provided by a personal vehicle.

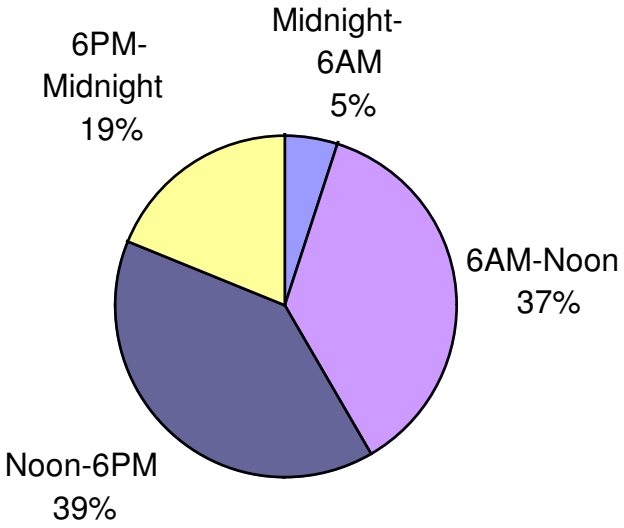


Figure 8. Frequency of Use During Each of Four Daily Temporal Intervals

Weekday/Weekend Ratio

Figure 9 compares the weekday/weekend ratio of CSP trips during the past 12 months. Our interest in this question is based on the report from Auto-Com in Eastern Canada (1996) that they are sometimes unable to satisfy weekend demand for their vehicles.

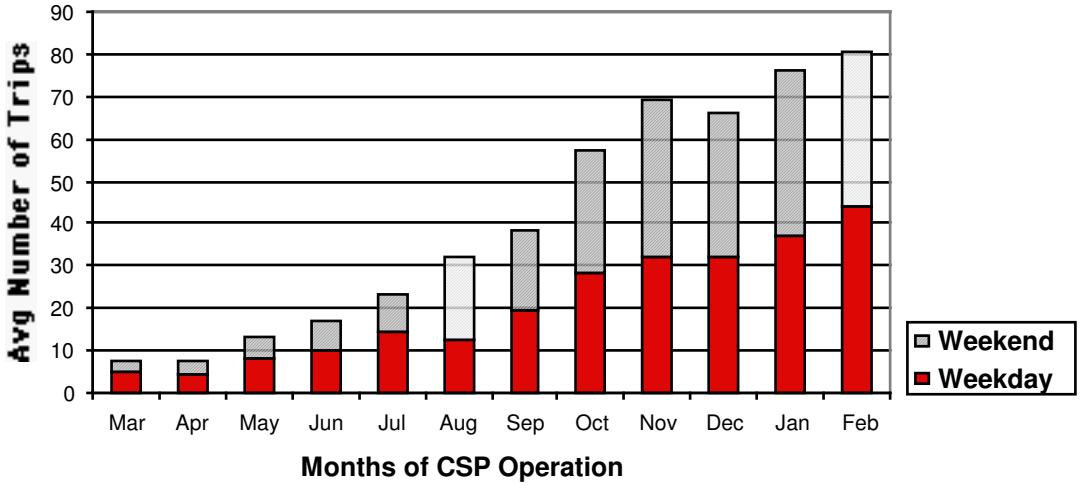


Figure 9. Weekday/Weekend Trip Frequency Ratio By Month

The results shown in Figure 9 indicate that at the end of the first year the weekend/ weekday demand ratio[15] was approximately the same. During the first quarter, slightly higher weekday use was observed. But at no point during the first year has CarSharing Portland experienced the kind of excessively heavy weekend demand reported by the Canadian organization.

Booking Behavior

Before CSP was launched, there was some concern that many reservations would be made on the "spur of the moment," once members decided to travel somewhere by automobile. The data collected on this behavior indicates that there is little basis for this concern. Table 13 summarizes this evidence on member reservation behavior that we were able to analyze.[16]

These findings reveal that approximately 60% of the reservations are made at least 1 or 2 days prior to usage. In contrast only 13% reflect "spur-of-the-moment" (30 minutes or less) decisions, while 5% represent standing reservations which book a vehicle on a consistently regular basis.

Table 13. Reservation Behavior

Time Between Reservation and Use	Frequency	Percent
Immediate Requests (30 minutes or less)	118	13
Hour (30 – 60 minutes)	56	6
Day (1 - 24 hour period)	365	40

[15] This ratio was calculated by dividing the weekend trip frequency by 2, for Saturday and Sunday, and the weekday trip frequency by 5, corresponding to the 5 days of the week.

[16] Table 3 depicts the characteristics of member reservation activity summed across the first 7 months only of CSP's operation, as data was unavailable after August, 1998.

2 or more days	174	19
Standing Reservation	41	5
Unknown	157	17
Total	**911**	**100**

This suggests that a good deal of planning precedes the decision to book a vehicle from CarSharing Portland. Indeed, as we will show in Chapter 6 Mobility Effects, the members report doing a good deal more trip planning than they had before joining CSP. Some commentators have suggested that membership in a car sharing organization will create a greater awareness of the true costs of travel behavior and thereby, lead members to defer unnecessary trips or plan more carefully those they take. Our findings on reservation behavior may be a reflection of this process.

Service Utilization

Station Demand

At the end of its first year CSP had stations at 7 separate sites with 2 in SW, SE and NE quadrants of the city and 1 in the NW. At that time there were 3 vehicles located at the NE 16th site and 1 in each of the remaining 6 locations. The street location of each station is shown on the map of CSP Vehicle Locations reproduced as Figure 1 in Chapter 2.

CSP has promoted its service in SE Portland longer than other section of the city. Thus, it should not be surprising that the two SE sections have experienced the greatest demand. The number of monthly trips at each SE location has risen from the beginning of CSP's operation. This pattern of steady growth has also characterized the SW5th site, where a vehicle was placed in August 1998. In contrast the demand at the remaining stations has been somewhat variable from month to month.

The cumulative demand at each station during the past 12 months is shown in Table 14. Three measures of demand are shown, along with the number of months each station has been in service.

Table 14. Cumulative Monthly Usage Data by Station

Station (Months in Service)	No. of Trips	No. of Miles	Hours Reserved
NW 23 (6 mo.)	170	3740	775
NE 16 (9 mo.)	421	12515	1982
SE 21 (12 mo.)	370	7709	1474
SE 36 (12 mo.)	466	9036	1623
SW 5 (7 mo.)	195	4227	961
SW 19 (1 mo.)	17	325	69
NE 10 (1 mo.)	9	233	46
Total	**1,648**	**37,785**	**6,930**

Time in Use

Measuring the amount of time the vehicles are on the road is another way to assess the demand pattern for CSP vehicles. Reports from Mobility Car Sharing Switzerland,[17] indicate that their vehicles are in use a sizeable portion of both the day and night-time hours. Such usage would be characteristic of a highly efficient shared fleet system which could meet the mobility needs of its members and maximize vehicle usage at the same time.

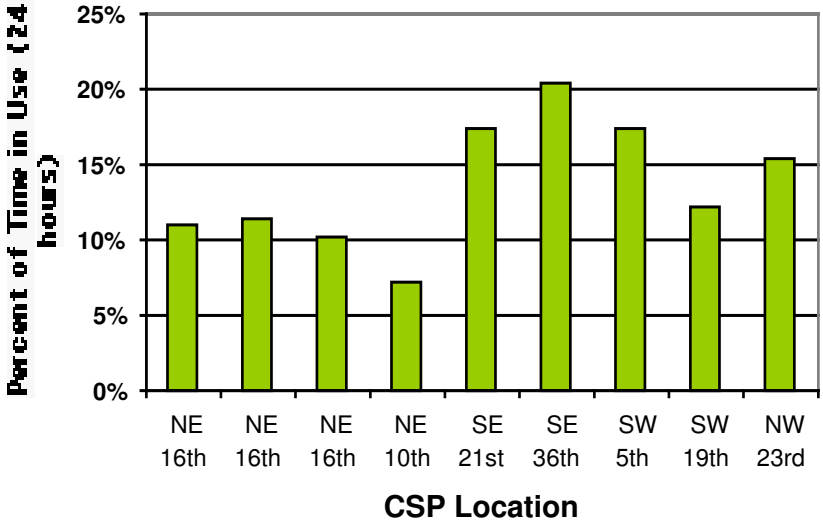


Figure 10. Average Percent of Each Daily 24 Hour Period Vehicles In Use

Figure 10 (shown above) plots the overall percent of time during each 24 hour interval that the vehicles in the CarSharing Portland fleet were in use during the past 12 months. The data shows that each of the vehicles is on the road only a small fraction of an average 24 hour day. Even the two at the SE lots (#106 & #107), where the greatest concentration of members reside, are on the road approximately 20% of each daily period.

[17] Conrad Wagner, Personal communication

Our findings in this area contrast with recent evidence from CommAuto in Montreal and Auto-Com in Quebec City (1996), where the vehicles are utilized 50% of the time they are available. The car sharing co-op in Vancouver has also reported 50% utilization of its vehicles.[18] It is important to note, however, that these car sharing organizations have been operating a good deal longer than CSP. There is every reason to believe that Car Sharing Portland will also attain a comparable level of vehicle utilization as it becomes a more mature mobility service.

[18] Tracey Axelsson. Personal communication.

Predictors of Usage

Length of Membership
During the past 12 months, it has become apparent that there are three classes of users—low, medium and high users of CSP's service. The analysis of these user groups is complicated by the fact that the member's trip behavior varies a great deal from month to month. A person can be a low user one month and a high user the next.

While it masks this variation somewhat, we have attempted to characterize CSP's membership in terms in terms of these user groups by taking the *average number of trips they took each month* since they joined the organization. Table 15 describes each group and lists the number of members in that user category.

Table 15. Three User Groups:

Group	Average Monthly Trips	Number (%) of Members
Low User	1 or fewer trips p/mo.	36 (33%)
Medium User	2-3 trips p/mo.	48 (44%)
Hi User	4 or more trips p/mo.	25 (23%)

There were some unexpected differences the average membership duration between these three groups. The members of the Low User group had been members of CSP for a longer period of time than both the Medium or High User groups[19]. It appears that the longer individuals belong to CSP, the *fewer* trips they to take. They also appear to take *shorter* trips.[20]

We had not anticipated these outcomes. That is, we thought that increasing familiarity with the service would foster greater use. This was based on the belief that over time individuals would *learn* to appreciate the convenience and cost savings of car sharing. In turn, this would increase the likelihood that they would make greater use of the service to meet their mobility needs.

In fact, that is not what we observed during the first year of CSP's operation. Members appear to be learning something quite different, namely the true costs of individual automobile trips. Prior to reserving a CSP vehicle, they may be aware of the costs of their forthcoming trip in a way they never were before. This may lead them to think twice about whether or not to travel by car and, instead, defer the trip or chose other means of transport.

We would expect the impact of membership length on usage to be most clearly exhibited by those who have been members for the longest period. This is confirmed by the trip data of those who joined during CSP's first month. Of the 12 CSP members who have belonged for the entire first year (12 months), 9 took more trips during their first three months than they did during the last three.

It is premature at this time to analyze the effect of membership length on the entire group of CSP members, since most have belonged for only a short time. In fact, more than 2/3 of CSP's current members has belonged for 6 months or less. It appears that the tendency to take fewer and shorter trips in CSP vehicles develops gradually during the course of the membership period. Thus, a more powerful test of this relationship will be

More than 2/3 of the current CSP members has belonged for only 6 months or less.

[19] Separate t-tests revealed that membership length of the Low User Group was significantly ($p = .002$) greater than the Medium User group.

[20] Membership length is significantly correlated with trip duration ($r = -.01$, $p < .001$).

possible over time, as the length of the membership period increases for more and more members.

Distance to Station.
Utilization of CSP vehicles is also a function of the distance from the member's household to the various stations where the vehicles are parked. The impact of this variable is seen most clearly at the two SE stations, where the largest numbers of CSP households are clustered. Table 14 indicates that the two SE stations rank 1 and 3, respectively in terms of the number of trip bookings.

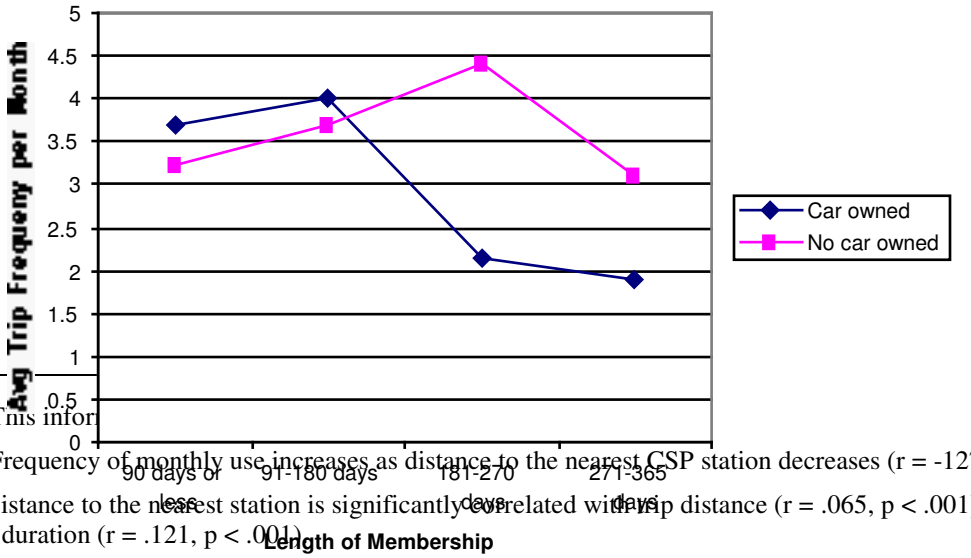
In response to a question on the Year End Survey, the members reported they live on the average 14.35 blocks to the nearest CSP station. They also reported it took them an average of 10.75 minutes to get to the nearest station. Over three quarters (76%) reported they walked to the station, while 15% said they biked there.

To determine the impact of proximity on usage, an independent measure of the member's distance to each of the CSP stations was calculated.[21]. *Distance to the nearest station was a significant predictor of the frequency of usage, with the further a member's household from the nearest station, the fewer trips they took*.[22] This relationship was significant even though not all trips are taken from the station closest to the member's household residence. For example, reservations are sometimes made for a vehicle at the station closest to the member's place of work.

The important role of distance to station is also shown by its relationship with both trip mileage and trip duration. With increasing distance to station, there is a parallel increase in both such measures.[23] Perhaps, the added time and effort required to get to a more distant station leads users to try to maximize the efficiency of each CSP trip even more than they would be if they lived closer to the station and could, thereby, more readily reach the vehicles.

Vehicle Ownership
The relationships between membership length and distance to station on CSP trip usage are more clearly seen by considering how both *interact* with vehicle ownership. By itself, CSP usage is not influenced by whether or not a member has a personal vehicle. But usage is influenced by the way in which vehicle ownership moderates the effect of membership length and distance to station.

This can be understood by considering the relationship shown in Figure 12 between the average number of trips per month and the length of CSP membership. It is evident that the impact of membership length varies as a function of whether or not a member owns a personal vehicle.



[21] This infor

[22] Frequency of monthly use increases as distance to the nearest CSP station decreases (r = -127, p = ,003).

[23] Distance to the nearest station is significantly correlated with trip distance (r = .065, p < .001), as well as trip duration (r = .121, p < .001).

Figure 11. The Effect of Membership Length on Trip Frequency as a Function of Vehicle Ownership

Figure 11 reveals that the longer a member has belonged to CSP the fewer trips they are likely to take. This relationship is strongest when members own a personal vehicle. And while it also appears to be true, if they do not own one, with the limited data available at this time, the relationship here is not statistically significant.

Similarly, vehicle ownership also moderates the effect of distance to station. The interaction is shown in Figure 13 which depicts the relationship between the average number of trips per month and distance to the nearest station as a function of vehicle ownership.

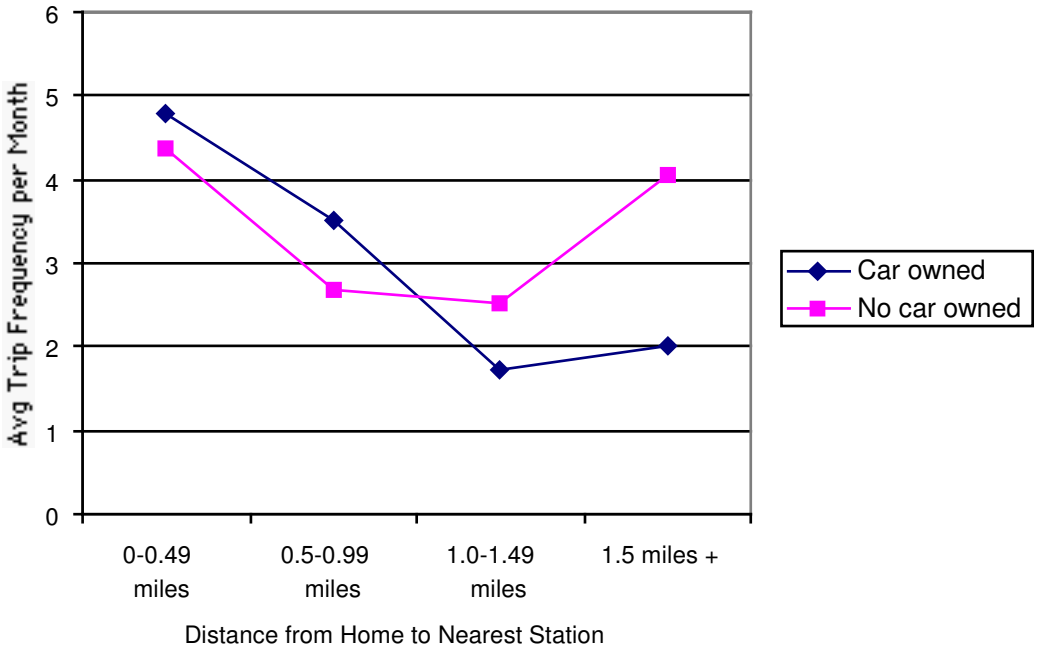


Figure 12. The Effect of Distance to Station on Trip Frequency as a Function of Vehicle Ownership

Figure 12 reveals that if a member owns a car, the frequency of CSP trips decreases the further away he or she lives from the nearest station. But if a member does not own a car, frequency of usage is not affected by distance to station.

In summary, the evidence suggests that the impact of both length of membership and distance to station on CSP trip usage depends critically on whether or not a member owns a personal vehicle. If they do, these factors play a far less important role than they do if the members do not own a vehicle.

In the latter case, vehicle need is the major factor governing CSP vehicle trips, regardless of how long they have belonged to the organization or how far they live from the nearest station. On the other hand, if the members own a vehicle, they are far more likely to be influenced by the length of their car sharing experience and the effort required to reach the station. Perhaps, under these conditions, members conclude that they might as well arrange to use their personal vehicle, given the additional cost of a CSP vehicle trip or the long walk to the vehicle station.

Gender and Season

There are two additional factors that are associated with CSP trip usage—gender and season of the year. Table 16 presents trip usage data for men and women members of CarSharing Portland. On an absolute basis women took more trips (861) than men (702). But as Table 16 shows, this difference is proportional to their larger numbers (47 women vs 40 men) in the organization. However, Table 16 also shows that women did take longer trips than men.[24] The average trip duration for women was 4.21 hours, while for men it was 3.89 hours. At the present time there is nothing in our data base to point to any obvious reason for this finding.

Table 16. Gender Differences in Trip Usage

	Trips		
Group N (%)	**Total**	**Percent**	**Mean Duration**
Women 47 (54%)	861	55%	4.21
Men 40 (46%)	702	45%	3.89

We also observed a seasonal effect on trip duration.. Table 17, which lists the mean trip duration for each season, indicates that trips taken during the winter and summer were longer than they were in the spring and fall.[25] However, there was no difference in the duration of trips taken during the summer and winter seasons.

Table 17. Seasonal Influences on Trip Duration

Season	Mean Trip Duration (In hours)
Spring	3.35
Summer	4.31
Fall	3.72
Winter	4.32

Perhaps the greater length of summer trips reflects the fact that they are more likely to involve out of town travel. And that during the winter, individuals attempt to complete a as many tasks as possible on any single trip in order to avoid additional trips in inclement weather. But here again we have no real evidence in our data base to confirm either conjecture.

[24] The statistical comparison revealed that trip duration for women CSP members was significantly greater than it was for men CSP members ($p = .007$).

[25] The statistical comparisons indicated that trip duration during the summer was significantly greater than it was in the spring ($p = .004$) and fall ($p = .021$). The mean trip duration in the winter was significantly greater than it was in the spring ($p = .001$) and the fall ($p = .001$).

Chapter 5
Service Satisfaction

This car sharing thing…it looks like it just might work.

Susan Hauser
Wall Street Journal Reporter

Introduction

Year End Survey
The future growth of CarSharing Portland depends critically on the member's continuing satisfaction with its performance. This is especially true during its first year, when potential members have little basis for judging the quality and reliability of its service. Indeed, when people first hear about car sharing, they have few questions about the concept, but a great many about the practical details involved in booking a vehicle and insuring that one will be available when they need it.

To determine the level of service satisfaction among the current members, we posed a number of questions about CSP's performance on the Year End Survey. The following topics were considered:

- Performance expectations
- Transportation cost savings
- Service features
- Vehicle availability
- Facilitators of usage
- Overall advantages
- Overall disadvantages
- Recommendations

In most respects, the members were highly satisfied with CSP's service and the way in which it met their mobility needs. In this chapter we review the evidence which documents their highly positive appraisal.

Initial Expectations
At the outset we were interested in knowing whether or not CSP successfully met the expectations members had about car sharing, and if not, what features of the program disappointed them. Table 18 reveals the member's response to this question.

It is clear that all (81%) but a few of the respondents felt that the service had measured up to their expectations about what it would be like to belong to CSP. Only 1 individual said

it did not, while the remaining 10 (16%) expressed a certain degree of disappointment by indicating it had met their expectations only partially.

Table 18 indicates that these concerns were most often expressed about the number of vehicles and stations, as well as the cost of the service and occasional scheduling problems.

CSP met the expectations of 81% of its members.

Table 18. Member Expectations

Question Has car sharing successfully met your expectations	
Response	Frequency
Yes	52

Somewhat	10
No	1
Missing or N/A	1
Total	64
If not, why?	
Need more cars	6
Need more locations	3
Scheduling problems	3
Expensive	3
Other	1
Missing or N/A	48
Total	64

Transportation Cost Savings

Many members were motivated to join CSP because of the potential financial savings they expected to derive from reduced transportation costs. On the Year End Survey we asked the members if these savings had been realized. Table 19 shows the results of a set of questions on this topic.

Table 19. Perceived Transportation Cost Savings

How important were financial savings in motivating you to join CSP?	
Extremely	30
Moderately	24
Not important	9
Missing or N/A	1
Total	64
Do you believe those savings have been realized?	
Yes	48
No	5
Missing or N/A	11
Total	64
If so, estimate an average month of savings	
Mean	$154.14

While a few respondents may have felt the usage fees were expensive, an overwhelming majority (75%) thought they had been able to achieve the savings in transportation costs they anticipated from joining CSP. The respondents estimated they saved an average of $154 per month in transportation costs that they might have otherwise incurred, had they been responsible for insuring and maintaining a personal vehicle.

Member Satisfaction

75% of CSP members achieved their anticipated savings in transportation costs.

Service Features
As described in Chapter 2, there are a number of operational procedures associated with the utilization of CSP's service. At the end of the first year we asked the members to evaluate the most important of them. The results are shown in Table 20.

Table 20. Satisfaction With Service Features

Feature	Frequency of Response		
	Excellent	Good-Fair	Poor
CSP member handbook manual	49	15	0
Reservation system	38	24	0
Vehicle key lock box	27	32	1
Trip ticket recording	27	29	5
Billing system	36	24	2
Current vehicle types	31	25	3
Pickup trucks	23	8	1
Vehicle cleanliness	47	14	0
Proximity of vehicle station	34	22	6
Helpfulness of CSP staff	55	7	0
Vehicle availability	29	30	2

Without only three exceptions, the majority of the members judged the quality of each such feature as excellent. Trip ticket recording and vehicle availability were the only two areas where there was a slight departure from this dominant trend, with only a marginal difference of 1 or 2 members on these features. It is also evident that were only a few ratings of "poor" and that these were not centered inn any one service area, although "proximity of vehicle station" was most likely to receive such a rating.

CSP operational procedures and user requirements were very favorably evaluated by a majority of the members.

Vehicle Availability
When people first hear about a car sharing service, the most widely voiced concern is whether or not a car will be always be available when they want to use it. Even with a favorable vehicle member ratio of ten to one, a standard ratio for car sharing organizations, there are bound to be occasional booking conflicts. The preceding member satisfaction rating shown in Table 20 suggests this may have occasionally been a problem during the first year. Tables 21 – 23 confirm this supposition by revealing the member's responses to three related questions about vehicle availability.[26]

Table 21. Availability When Booking More than 24 Hours in Advance

Question: How many times were you unable to reserve a car *more than 24 hours* in advance at your preferred time and station?	
Never	17
Rarely	25
A few times	14

[26] Exact figures about the number of reservations which could not be confirmed due to vehicle unavailability could not be obtained from the reservation service employed during the first year. The data in Tables 21-23 are based on member estimates only.

Frequently	4
Missing or N/A	4
Total	64
What percent could you reserve at another station?	
Mean	71.43%
N	42

Even with 24 notice, it appears that there were a few reported occasions when a member was unable to obtain a car at his or her preferred time and location. At total of 39 (61%) of the respondents reported this happened either a few times (14) or rarely (25) with the implication in the later case that it occurred at least once. Table 21 also indicates that the members reported that 71% of their denied first choices could be successfully booked at another station.

Table 22 indicates a similar pattern for reservations made with *less* than 24 hours notice. In this case, 23 (36%) of the respondents reported there were "a few times" when they could not successfully book a vehicle, while a smaller number, 17 (27%), reported that it also happened to them less ("rarely") frequently. As before a substantial number (65.9%) of such denied first choices were successfully booked at another station.

Table 22. Availability When Booking *Less* than 24 Hours in Advance

Question: How many times were you unable to reserve a car *less than 24 hours* in advance at your preferred time and station?	
Never	9
Rarely	17
A few times	23
Frequently	8
Missing or N/A	7
Total	64
What percent could you reserve at another station?	
Mean	65.89%
N	4

The ability to extend an existing reservation is another measure of vehicle availability. Table 23 indicates that, while this occurred rarely, there were 17 members who did were not able to extend such a booking. When this occurred, they either returned the vehicle to the station or changed their plans.

Table 23. Availability When Extension Requested

Question: How many trips were you *unable to extend* the length of your reservation because someone else had booked the car?	
Mean	.66
SD	1.05
N	53
What did you do?	
Returned car	8
Changed plans	6
Other	3
Missing or N/A	47
Total	64

Taken together, it appears that the availability of vehicles was never a serious problem during the first year, although there were a small number of booking where the member's first choice was refused. At the same time, the evidence indicates that the majority of such bookings could be confirmed at the member's second choice of either time or station.

Usage Assessment

Facilitators of Usage

As noted in the previous chapter, most CSP members take, on the average, 3 or fewer trips each month. In the First Year Survey we asked a set of questions about the conditions that might lead them to use the vehicles more often. The results are shown in Table 24.

Table 24. Conditions Facilitating Usage

Question: Would your usage of CSP vehicles increase if:	
The vehicles were close to your home?	
Yes	31
No	29
Missing or N/A	4
Total	64
There were a greater variety of vehicles?	
Yes	21
No	37
Missing or N/A	6
Total	64
Describe factors that would lead you to take more trips.	
Factor	Frequency
Cheaper rate/cost	18
Availability	7
Location	4
More cars	2
More trucks	2
Other	11
Missing or N/A	20
Total	64

The findings shown in Table 14 indicate that lower usage fees, as well as closer vehicle stations, might be expected to increase the frequency of CSP trips. In addition, most members did not believe a greater variety of vehicles would facilitate their usage.

In short, while the members have on the whole developed fairly stable patterns of usage, it is safe to say that some might be led to take more CSP trips, with closer vehicle stations and a less expensive fee structure than the one currently employed.

Overall Evaluation

CSP Advantages
The members were asked two questions on the Year End Survey about the major benefits and most attractive features of belonging to CarSharing Portland. Since there was some overlap between the questions, the member's responses have been combined in Table 25.

Table 25. Benefits/Most Attractive Feature of Membership*

Benefit	Frequency	Most Attractive Feature	Frequency
Access to vehicle	18	Access to vehicle	12
Not owning a vehicle	14	Cheaper/savings	9
More independence	8	Not owning vehicle	7
Cheaper/savings	7	Nice cars	6
Less stress/hassle	3	Locations	5
Environment	2	No vehicle maintenance	4
Support concept	2	Environment	4
Other	7	Less stress/hassle	3
Missing or N/A	3	Other	7
		Missing or N/A	7
Total	64	Total	64

*Note: The first response offered was coded & is shown in the table.

Vehicle access ranked as the most frequently listed benefit in response to both questions. Not owning a vehicle also ranked in the top four responses to each question. So did the realized savings in transportation costs. Several members also commented that belonging to CSP gave them much greater independence than they had previously experienced. The cars employed in the fleet also received favorable comment, ranking 4th in the list of most attractive transportation features. The members were very liberal in their praise and expressions of satisfaction with CSP's service. The tenor of their remarks is illustrated in the following sample of comments from the Year End Survey.

Access to a vehicle is judged the most attractive feature of membership in CarSharing Portland.

Member Comments on CSP Benefits

- *Feel superior to people who pay a lot of money to own their own car! I make a very small environmental impact and don't support oil and auto industries.*

- *Pride in supporting car sharing.*

- *I have saved a lot of money and not having to worry about maintenance and insurance has saved me a lot of stress.*

- *Having no vehicle …puts a stress on your relationships with friends who own cars. With car sharing, I can do my part and no always rely on other people to get places that Tri-Met just doesn't go. In this way,… CSP has been a great relief to me.*

- *Let's me avoid having to own a car.*

- *Security of second vehicle readily available if needed.*

- *Able to sell one vehicle of the two we owned.*

- *Less hassle dealing with car ownership, repair, etc.*

- *I have enjoyed watching car sharing grow. I have not bought a second car. Without car sharing, I would have a second car for my household.*

- *Having convenient, affordable autos available without the hassles of ownership.*

- *The security and peace of mind knowing that is there for me. All I have to do is call in and walk over there.*

- *Being part of a bold, wonderful experiment.*

CSP Disadvantages

The members were also asked a corollary pair of questions about the disadvantages and least attractive features associated with belonging to CarSharing Portland. As before, since the questions overlap, the member's responses have been combined and are shown in Table 26.

Table 26. Disadvantages/Least Desirable Feature of Membership*

Disadvantage	Frequency	Least Desirable Feature	Frequency
Location/distance	9	Locations	11
Deposit	8	Access/Availability	9
Schedule/planning	8	Planning	10
Expense	6	Time constraints	5
Other	8	Expense	3
Missing or N/A	16	Other	10
		Missing	16
Total	64	Total	64

*Note: The first response offered was coded & is shown in the table.

Once again there is a good deal of consistency in the members responses to these two questions. The location of the vehicle stations ranked as the most disadvantageous feature of the service. This obviously reflects some displeasure over the distance required to reach a vehicle station and, by implication, a corresponding desire for an increase in the number of stations in their immediate neighborhood.

Distance to the vehicle station is judged the most disadvantageous feature of membership in CSP.

In agreement with an earlier discussion of vehicle availability, the members also considered the occasional difficulty they had in booking their first choice to be one of the main disadvantages of CSP's current service. It ranked in the top three list of concerns on both questions. The membership deposit and planning required to book a reservation were also among the most commonly cited disadvantages. A sampling of the members views about the main disadvantages of CSP's service are listed below.

Member Reports of CSP's Disadvantages

- *If the vehicle closest to me is booked, it takes a long time to get to the next available car.*

- *It turns out to be quite expensive with the new price rises* [pick up truck]. *I had used the truck for a few long tips before I was made aware of the price rise to $2 an hour.*

- *I don't get as much exercise with the bicycle as I used to.*

- *Planning ahead and the walk to the car in the cold, wet weather.*

- *The billing discourages longer trips, so I use my own car for trips to Salem or further.*

- *I am almost never able to make a reservation more than an hour ahead of time and a few times I was unable to get a car.*

- *Having to walk home in the dark when using the car in the evenings.*

- *Currently there is no nearby car available about 50% of the time when attempting a reservation.*

- *When I get last minute freelance jobs, it has been difficult to get a car near my house. Then I have to take a taxi and from the car, which defeats the purpose to me and is pricey.*

- *Inconvenient access and cost per hour when parked for several hours while attending meetings or social events.*

- *Not being spontaneous.*

- *Car is often unavailable, even if I call 3-4 days ahead.. Also once the car wasn't' there after I had scheduled it.*

- *Frustration about car locations. CSP is still great, but it would be so much better for us with a closer location.*

- *I keep thinking as I drive the car—"Maybe we should just get a car."*

Recommendations

The last question on the Year End Survey solicited the member recommendation's for making CarSharing Portland more attractive. The respondent's first recommendation was coded and the resulting list is shown in Table 27.

Table 27. Member Recommendations

What recommendations do you have to make CSP more attractive?	
Recommendation	Frequency
More vehicles	20
More locations	10
Change deposit structure	4
More vehicle variety	4
Change pricing structure	3
High technology (www scheduling, gas cards)	3
More information/ advertisement	2
Other	6
Missing or N/A	12
Total	64

These results reveal there is considerable consensus among the members about the features that would make CSP more attractive. The first recommendation of almost one third of the respondents was an increase in the number of vehicles. Although there is some overlap between the two, this was followed by a recommendation for a greater number of vehicle stations, which was ranked first by 10 of the 64 respondents. A variety of other changes were also listed first and the frequency this occurred is shown in Table 19. The flavor of the member's ideas in this important area can be appreciated by the following sample suggestions.

Top Two CSP Member Recommendations

32% recommend a larger vehicle fleet.

16% recommend more vehicle stations.

Member Recommendations

- *Referral bonus to existing member.*
- *Reduced rates when carrying a passenger.*
- *If* [the rates were] *a little more reasonable for over night trips of longer distance, I would use the car more.*
- *Secure bike parking would be nice.*
- *Hot red sports car convertible.*
- *More cars at the locations where they are used most.*
- *Allow pre-authorized credit car charges over time to accumulate depost in installments.*
- *Vehicles at outer limits of major transit corridors and other major transit stations.*
- *I would still like to see a real person answering the phone for reservations.*
- *Tell people how it works in your advertising.*
- *Take trade ins of autos for deposit.*

Summary

When taken together, the evidence indicates that the members of CarSharing Portland were generally quite satisfied with the service it provided during its first year of operation. While some concerns were expressed over occasional problems, e.g. vehicle availability, these were not common and did not appear to generate widespread discontent. And while some members did cite a disadvantage or undesirable service feature associated with their membership, the missing data in Table 26 shows that far more chose not to mention any. In contrast almost all of the respondents did mention at least one benefit or desirable feature of their CSP membership. Indeed, as our earlier discussion of pre-membership expectations and ratings of various service features demonstrated, a preponderance of the members were very pleased with the service provided by CSP and judge very favorably the procedures and activities required to utilize the vehicles in the fleet.

Chapter 6
Mobility Effects of CSP Membership

If people own a car full time, they are typically going to use it full time, without ever using the alternatives for their personal needs. With car sharing we're opening the door to the alternatives…

Tracey Axelsson
Co-operative Auto Network (CAN)

Introduction

On the basis of evidence from the European car sharing organizations (Shaheen, Sperling & Wagner, 1998) and previous analyses (Axelsson, 1997) of the potential effects of car sharing on members, we anticipated that CarSharing Portland would have a number of positive influences on travel behavior of its members. We expected car sharing would:

- Reduce the frequency of vehicle trips and the total vehicle miles of travel
- Increase the use of transit and other alternative transportation modes
- Reduce the vehicle ownership needs of members, leading them to dispose a vehicle they already owned or avoid a contemplated purchase.
- Lower the current transportation costs of members

Methods

To determine if these predicted outcomes were observed during CarSharing Portland's first year, we developed two very general instruments to measure the members travel behavior. In both cases, they were administered on two occasions, initially before they began using the service and then again at the conclusion of the first year.

The Pre Membership survey, shown in Appendix H, obtained basic demographic and travel mode information about the members, while the year-end First Year Survey shown in Appendix I was a more extensive assessment of how satisfied members were with the service, as well as how it had influenced their daily travel behavior.

Mobility Measures

Vehicle Miles of Travel
Trip Frequency
Travel Mode
Vehicle Ownership
Transportation Costs
Member Perceived Impact

The members were also asked to complete one week Trip Diaries, shown in Appendix G at the beginning and end of the first year. They were asked to record all vehicle and non-vehicle trips during a full week, including those made in a CSP vehicle on their second record-keeping trial. Thus we had a pre and post test measure of the impact of car sharing on travel behavior. In addition, a small group of non members (Control Group) was asked to complete the Trip Diaries at the same times in order to compare the travel behavior of members and non-members during a comparable period of time.

Trip Diary Analysis

Eight volunteer non members (Control) completed both forms of the diary, while 33 members of CarSharing Portland did so. The diaries provided evidence on the following travel behaviors for the *week*

when they were completed, with the exception of the last measure which was the respondent's *estimate* of their total yearly *vehicle* miles of travel:

- Frequency of personal vehicle trips
- Frequency of other vehicle trips (bus, taxi, CSP vehicles)
- Frequency of non-vehicle trips (walking, biking, etc.)

- Travel mileage (all vehicle and *non vehicle* modes)
- Vehicle mileage (all vehicles, including CSP vehicle travel)
- Yearly vehicle mileage (estimate of total vehicle miles traveled in year)

Control Group Comparisons.
The comparisons between the travel behavior of CSP members and non-members (Control) Group are shown in Table 28. The data was obtained from 8 Control Group respondents and 33 CSP respondents who completed *both* the initial and year-end Trip Diaries. It is clear from these comparisons that non-members drove a good deal more than members.

Table 28. Pre Post Mobility Comparisons of Control Group and Members

Travel Measure	Control (N=8)		Members (N=33)	
	Pre	Post	Pre	Post
	Mean	Mean	Mean	Mean
Personal vehicle trips	17.25	26.37	4.33	3.24
Other-vehicle trips	7.75	3.00	11.57	14.42
Non-vehicle trips	10.12	9.75	15.06	16.51
Total travel mileage	242.81	179.35	112.84	107.96
Vehicle mileage	249.33	153.50	41.53	51.95
Year mileage estimate	12027.13	12483.63	1957.57	2266.66

An analysis of these results indicated that the frequency of personal vehicles trips, total weekly vehicle mileage and the yearly total mileage estimate were significantly higher in the Control Group than for CSP members. These differences were observed during the initial administration of the Trip Diary and persisted when it was completed approximately one year later.

However, the analysis also indicates there were no statistically significant differences in any of the pre-post comparisons of travel behavior for either the Control or the CSP member groups. In other words, there was a fair degree of stability over time in the travel behaviors sampled by the Trip Diaries.

Thus, we could find no evidence to indicate that CSP members drove *less* after they had become members than they did before joining. In fact, if anything, the evidence in Table 28 suggests that CSP members actually took *more* other vehicle trips during the post test period.[27] They also drove slightly *more* vehicle miles at the end of CSP's first year than they had at the beginning. Both such changes are a function of the additional trips they took in CSP vehicles

In short, members of the Control Group show little change in their mobility behavior, while CSP members, when taken as a whole, appear to be driving more at the end of the first year than they were before they joined. Can we attribute the CSP trend to the *non-vehicle* owner members? It should not be surprising to learn that those who *do not*

Control Group Trip Diary Results

- Non-members take more trips than members.
- Non-members travel more miles than members.
- Non-members estimate more miles than members.
- No pre post changes in travel behavior.

[27] This difference approaches statistical significance at the .058 level.

have vehicles drive more once they have access to them. What about those who do have cars? The evidence from Europe suggests that these individuals should drive a good deal less. (Steininger, Vogl & Zettl, 1996)[28]

Vehicle Owners & Non-Owners.
To determine the role of vehicle ownership[29] on the mobility behavior of CarSharing Portland members, we compared the pre and post Trip Diary records of vehicle owners and non-owners. The relevant data for CSP *members only* is shown in Table 29.

As expected, on each of the Trip Diary measures, CSP members who had a car drove more than those who did not. CSP vehicle owners took more personal vehicle trips, drove more miles during the week they completed the Trip Diary and estimated their yearly vehicle mileage was greater than non owners. They also took *fewer* non vehicle trips than non owners. Each of these differences was observed during *both* administrations of the Trip Diary and all such comparisons were statistically significant.

Table 29. Pre Post Mobility Comparisons of CSP Car Owners and Non-Owners

	Car Owners		Non Car Owners	
Travel Measure	**Pre**	**Post**	**Pre**	**Post**
	Mean	Mean	Mean	Mean
Personal-vehicle trips	9.53	6.733	0.00	0.33
Other-vehicle trips	13.46	16.06	10.00	13.05
Non-vehicle trips	8.86	11.00	20.22	21.11
Total travel mileage	139.86	127.05	90.33	92.05
Vehicle mileage	103.33	84.38	0.33	24.92
Year mileage estimate	5790.90	7230.00	50.00	138.88

Table 29 also indicates *there was very little change in the pre and post trip diary measures regardless of whether a person owned a vehicle or did not*. There is one exception to this trend. Namely, the vehicle mileage during the week the Trip Diary was completed did *increase* sharply in the non-car owners. The non-owners also took more other vehicle trips, which reflected those they were now able to take in CSP vehicles. However, *only the increase in vehicle miles was statistically significant.*

Some of the comparisons between the two periods were consistent with the expectations derived from the European evidence. Thus the owners did take *fewer* personal vehicle trips, *more* other vehicle trips, and did drive *fewer* miles at the end of the first year. Similarly, CSP members who did not own a vehicle, did take more other vehicle trips (presumably a CSP vehicle) and did estimate they drove more miles during the year. But in each such case, the differences were small in no case were they statistically significant.

Summary.
The only statistically significant *change* in travel behavior that could be detected during the second administration of the Trip Diary was the increase in the non-vehicle owner miles of travel (VMT). While these members drove more, those who had a car did not drive much

CSP Members Trip Diary Pre Post Changes

- Increased VMT in non car owners
- Small decline in car owner VMT
- Small decline in car owner vehicle trips
- No significant net VMT change

[28] This study is the only other published Trip Diary analysis of car shar authors report that the VMT reductions of their sample of the members organization vehicle owners was large enough to overcome the increase This led to an aggregated net reduction in the overall mileage of the Au

[29] In this analysis, vehicle ownership is based on the information provi Membership Survey. Thus, it does not take account of any vehicle that member between the two administrations of the Trip Diary.

less. In fact, in some cases the easy access of an additional vehicle may have led some of these members to also drive more. When combined with the increasing mileage of the non-owners, the *aggregate net effect of membership in CSP was either no change or a slight increase in VMTs.*

The absence of any clear trend in the Trip Diary data is consistent with the reports of members on the Year End Survey. At the end of the year, the members were asked to make an overall assessment of the number of miles they drove after becoming a CSP member. Their responses are shown in Table 30.

Table 30. Perceived Vehicle Miles of Travel

How many vehicle miles of travel have you driven since joining CSP?	
More	12
About the same	16
Less	33
Missing or N/A	3
Total	64

While most of the members thought they drove less, almost as many said they drove about the same or more. Here again, the estimated decline for about half of the members many have been cancelled out by an increase for the other members.

Member Reports of Increased Vehicle Travel
Indeed, the following reports from the Year End Surveys indicate some of the various ways in which CSP actually promoted increased vehicle travel by the members.

- *I am now able to shop at a wider variety of places…I get out of town more often and for further distances.*

- *My auto use has increased because I had no access to a car prior to CSP and had to figure out ways to get places or spend hours on public transit to get to places like Home Depot. Now I shop more at discount places.*

- *I have been riding a bike for years now and haven't had a car for 3 years. Since my job change, I travel more and need a car for transporting equipment.*

- *It has enabled us to get out of the city in the summer for swimming, day trips, enjoyment of Oregon's wilderness. Our main use of carshare vehicles is to visit outlying thrift stores, impossible to get to efficiently on the bus. As we already commute by bike and shop close to home, CSP has not affected this. CSP has increased our mobility and carrying capacity.*

- *I used to shop locally for groceries, which I think is a good thing, supporting local merchants, etc. Now I take the CSP car out about once per month to go to grocery stores all over town. This is not necessarily a change for the better, but it's fun.*

Survey Analysis

Additional information about the member's mobility behavior was obtained from both the Pre Membership and Year End Survey. Evidence was obtained on the:

- Effect on transit ridership and alternative, non vehicle travel
- Changes in private vehicle ownership
-

Travel Mode Effects.
I it is widely reported in Europe that carsharers make greater use of public transit and alternative travel after becoming a member of a car sharing organization. In The Netherlands Lightfoot (1997) reports the following changes:

- Train ridership + 7%
- Bicycle use +5%
- Bus use + 18%

Similarly, Munheim (1998) reports that after becoming members of Mobility Car Sharing Switzerland, there was a "reduction of no less that 72%" in use of a vehicle for transport. Instead, public transportation was used for over 50% of all mileage traveled, with the remaining miles traveled by means of bicycle, motor-scoters and walking.

Although the magnitude was considerably less, somewhat similar effects were found among the members of CarSharing Portland,. On the Year End Survey, the members were asked about their use of public transit and bicycle ridership. Table 31 indicates the finding on these two travel modes.

Table 31. Transit and Bicycle Usage

Since joining CSP do you take public transit?	
More	17
About the same	39
Less	8
Missing or N/A	0
Total	64

Since joining CSP do you a bicycle?	
More	11
About the same	44
Less	6
Missing or N/A	3
Total	64

While a sizeable increase was not observed for either travel mode, quite a few respondents reported they used these alternative modes more often. This finding is consistent with additional analyses of the travel mode estimates reported on both the Pre Membership and Year End Surveys.

The members were asked On both Surveys (Appendix H & I) the members were asked to indicate the number of days per week they used various methods of travel for commuting, shopping, and personal errands. The results indicated there were significant *changes* in the frequency members reported using the following alternative travel modes after joining CSP.

- Frequency of weekly bus trips increased significantly
- Frequency of weekly walking trips increased significantly
- Frequency of weekly bicycle trips increased significantly
- Frequency of weekly carpool trips *decreased* significantly

A comparable trend was also observed in the Trip Diary data, where there was a small, increase in the number of "non vehicle" trips taken by both vehicle owners and non owners after they had become members of CarSharing Portland. In this respect our findings agree with the reports from Europe that carsharers use "green transportation" more than they did before they had joined a car sharing organization.

Vehicle Ownership.
A sharp reduction of vehicle ownership is also one of the most widely observed effects of car sharing in Europe. In a review of four commercial car sharing projects in The Netherlands, Lightfoot (1997) reported a 44% decrease in the number of car owners among the 847 participants of those programs. Munheim (1998) reports that among the members of Mobility Car Sharing Switzerland," 60% of the former car owners no longer have their car after a few years."

While the magnitude is not as large, we found a similar effect among the vehicle owners of CarSharing Portland. Of the 64 Year End Survey respondents, 17 (26%) reported they *sold* a personal vehicle after joining CarSharing Portland. An additional, 34 (53%) reported that membership in CSP led them or their household to *avoid purchasing* a personal vehicle. Indeed, almost all of the individuals (N = 16) who said, on the Pre Membership Survey, they intended to sell a personal vehicle after joining CSP, did in fact do so.

Reduced Vehicle Ownership

• Netherlands	44%
• Germany	23%
• Switzerland	60%
• San Francisco	14%
• Portland	26%

Evidence from an evaluation of the STAR program indicates that it also had a large impact on vehicle ownership among its members (Walb & Loudon, 1986). The overall level of vehicle ownership among STAR users declined by 15.4 % during the first year of the project, with 8.2% of the households reporting a shift from two to one vehicle and 9% reporting a shift from one to zero vehicles. The members of STAR indicated that this reduction was entirely attributable to their membership in the program. Further, a sizeable number of households (43.1%) reported that they decided to delay or cancel a planned vehicle purchase as a result of the availability of those in the STAR fleet.

However, the STAR user surveys indicated, as we observed with the CSP Trip Diary measures, that the frequency of STAR member vehicle trips either increased or remained the same as a result of the availability of the STAR vehicles. In addition, the data also indicated that STAR was associated with a *decrease* in both transit ridership and carpooling. While vehicle mileage data was not collected, these findings, like those reported for CSP, suggest there was "an increasing level of vehicle miles of travel" after individuals became members of the STAR organization (Walb & Loudon, 1986).

General Summary

In summary, contrary to expectations, a reduction of vehicle ownership did not directly lead to a reduction of vehicle miles of travel for the members of either

Private Car Mileage Reductions in European CSOs

Austria	53%
Switzerland	60%
Netherlands	36%
Germany	58%

STAR or CSP. Nor was there anything in the membership surveys of either organization or in the CSP Trip Diary data to indicate a decline in vehicle miles of travel

These results from the only two systematic evaluations of car sharing organizations in the United States, stand in contrast to those widely reported for the European car sharing organizations (CSOs). The fact that the findings were replicated over a span of more than ten years makes them even more provocative. How should they be viewed?

Methodological Caveats

First it is important to note that, with one exception, the published travel behavior data from Europe is based on the retrospective estimates of selective samples of various car sharing organizations. Such reports, like those of the American car sharing survey respondents, are not immune from any of the potential sources of error and bias that can intrude on their accuracy (Schwartz, Groves & Schuman, 1998). This is not meant to imply they are not valid or reliable, but rather, like all other recollections of the frequency of distant events that are not normally coded with numerical precision, they should be viewed with some degree of caution.[30]

Second, it should be remembered that the Trip Diary evidence we obtained was based on a relatively small sample of 33 *volunteer* respondents, who constituted only 27% of CSP's membership. In addition, it was recorded during two weekly intervals that for most of the respondents were not separated by a great deal of time. We set a minimum of 3 months between the two administrations of the Trip Diaries. In some cases it was longer, but only for those who had joined CSP during its first few months. Ideally, we would have preferred a much larger sample of individuals, who had been CSP members a good deal longer than we were able to obtain. Travel behavior evidence obtained in this fashion would have greatly strengthened out confidence in the obtained results.

Transportation Systems

Finally, in spite of these methodological concerns and the provisional nature of the data, there may be some very real transportation-based constraints that make it difficult at this time to replicate the European car sharing mobility effects in this country. We can only point to the dense transit infrastructure that exists in most European cities to suggest how much more convenient it is to avoid traveling by automobile there than it is in most American urban communities. As a result, members of European car sharing organizations are much less dependent on vehicles, either their own or those in the organizational fleet, to meet their mobility needs. Changes in mobility attitudes and shifts to alternative means of transport that develop once one becomes a member of a car sharing organization, are much more readily translated into action in Europe than they are in the United States. Perhaps it is inevitable, therefore, then, that until this situation changes, it will be some time before we are able to demonstrate the robust VMT reductions that have been so widely reported by the European car sharing organizations.

Limits of Mobility Data

- Subject to retrieval biases
- Selective sample of respondents
- Short exposure to car sharing experience

[30] In an e-mail exchange with the author, David Brook cogently expressed this concern: "My underlying concern about the trip diaries is the reliability of the reporting of the number of trips taken. It's not as if people are carrying these things in their hip pockets. Correct me if I'm off base here, but I would imagine that, even when people faithfully fill them out every evening, there is likely to be some editing of "non important trips"—such as visiting the 7-11 for a quart of ice cream, or some method of reporting all intermediate destinations when chained trips occur."

Chapter 7
CSP Economics and Management

(Written by David Brook, President and
General Manager of CarSharing Portland Inc.)

CarSharing is an excellent alternative to owning a car. We recommend that consumers check, whether or now owning a car makes their life easier in view of their circumstances, and how much they could save with CarSharing.

Simonetta Sommaruga
Swiss Organization Consumer Rights

Introduction

The start up of any new business, but especially one for which the market is unknown, inevitably raises the question: will it succeed financially? This chapter will look at the unique management hurdles faced by CarSharing Portland, how they were addressed and provide an overview of the basic finances and economics of car sharing.[31]

CarSharing Portland began operation with a proprietary business plan based on much of the work done by Scott Engineering in the DEQ Business Planning Study (Scott, Peters & Burkholder, 1997). In spite of our best efforts, at start up on March 1, 1998 the actual costs of many services and revenues to be derived from the enterprise were uncertain at best.

It may seem obvious, but it's worth remembering that as an enterprise any car sharing service faces an inherent supply and demand conflict. In order to generate revenue to pay the bills, the vehicles have be used by customers; but if they're used too much then they won't be available when another member wants to use them. When a sufficiently dense network of vehicles is established, several vehicles will be readily accessible to any member, mathematically increasing the likelihood that a nearby vehicle will be available when desired. The overhead expenses of scheduling, vehicle cleaning and maintenance, marketing and administration must distributed over a large enough pool of customers to allow the rates to be competitive.

From the customer's point view, member/drivers balance the lower cost of car sharing and other benefits, such as not having to perform vehicle maintenance tasks, against the greater convenience of private ownership of a vehicle. The essential challenge of running a car sharing venture, then, is expanding the business so there are a sufficient number of member/drivers to distribute overhead, controlling costs and making the service convenient to the largest number of customers. From the business perspective, CarSharing Portland would not be where it is as this is being written without the hard work, dedication and enthusiasm of its two employees, General Manager Russell Martin and Marketing and Membership Coordinator Maren Souders. Russell's perspective as a former staff member of the Short Term Auto Rental (STAR) project in San Francisco in the 1980s has been invaluable. The encouragement and sage advice over the years of Dr. Richard Katzev has been of immense value, and sometimes comfort, as we've grown.

We would not be where we are today without the enthusiastic support of Nina DeConcini of the Oregon Department of Environmental Quality and Francie Royce of the Portland Bureau of Transportation who wrote the initial grant to Region X of U.S. Environmental Protection Agency (EPA). Special mention also goes to Colleen Kawahara of VPSI Commuter Van Pools, Inc. the company through which we rent our vehicles. Finally, the inspiration of Conrad Wagner, founder of the company that is now Mobility CarSharing Switzerland and who is now working to promote new mobility options including car sharing in the United States for CalStart/WestStart in California.

Vehicle Utilization

[31] For proprietary reasons, full profit and loss and balance sheet information is not included in this report.

CSP figures that with our cost structure, vehicles need to be used an average of 6 hours per day to be profitable. At the end of the first year we're not there yet, as the vehicles are in use on the average only 20% of each daily 24 hour period. (See Figure 10 in Chapter 4.)

Another description of a car sharing service is the member to vehicle ratio. During this growth phase at CSP we've been quite consistent in maintaining a 13.3:1 ratio. As has been noted elsewhere in this report, the small numbers involved in a first year start up magnify the effects of small changes. Simply adding a new vehicle to a small fleet changes the member to vehicle ratio considerably.

But system-wide averages can be misleading since some vehicles, particularly those in downtown and Northeast Portland, have fewer members living close by while others, especially those in Southeast neighborhoods, have more. Our specialty vehicle, a pickup truck, is also counted in the member to vehicle ratio even though it appears to be only rarely used as a backup vehicle for the sedan, partially because of its higher cost per hour.

Pricing

CarSharing Portland copied the hourly and distance pricing for vehicle use employed by the European and Canadian car sharing organizations. It would be a daunting survey effort to realistically determine potential members' "willingness to pay" for a service that they had little to compare with.

CarSharing Portland marketing materials, like those of most other car sharing groups, often show calculated comparisons between vehicle ownership, auto rental, car sharing and taxis. This is an attempt to overcome the lack of knowledge most people have about how high the actual costs of car ownership are. Such comparisons typically show that if a person's annual vehicle miles traveled is less than about 10,000 miles per year, car sharing will be less expensive than owning a similar new car.[32]

Splitting the revenue between hours and miles is an attempt to somewhat equitably allocate the charges so that a member who keeps the car a long time but drives only a few miles and a member who drives many miles in a short trip.[33] In fact, based on CarSharing Portland average trip figures, about 1/3rd of the revenue are generated from hourly fees and 2/3rd from mileage fees.

After several months of operation an in-house member survey revealed that some members were continuing to rent vehicles from local rental agencies for higher mileage trips. Our rate was slightly adjusted with a "distance discount" that dropped the mileage fee in half for miles past the first 40 of any trip. Although more equitable, it because cumbersome to explain and comparisons of longer trips by members revealed that similar benefits could be offered by simply offering a "daily rate" with unlimited miles. Starting in August 1999 the daily rate will have a 300 miles per day cap to control gasoline costs (additional miles over this cap will be charged at 20¢ per mile). This will provide hassle free access to most places in the Northwest, including weekend trips to the Coast, southern and central Oregon.

A less obvious aspect of pricing involves other fees, such as dues and security deposit. To keep pricing as simple and easy to explain and understand as possible, CarSharing Portland decided not to charge a monthly or annual membership fee nor a new member initiation fee as is typical of other types of membership "clubs". This deprived the company of significant cash flow, which had been anticipated to come from spending a portion on security deposits until the business became profitable.

During the first year the fully-refundable security deposit became an area of concern for at least some of the new members, who sought assurances that they would get their security deposit back in the even of bankruptcy. To address this concern, it was decided to segregate security deposits and not spend 50% of the deposit on operations as originally projected.[34] As noted in Chapter 3, the ability/willingness to pay the $500 security deposit is a barrier for some potential members, perhaps more so in the first six months of

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[32] Exact comparisons are impossible since a car owner does not charge themselves as hourly fee when the drive as they pay when using a car sharing vehicle. To make a meaningful comparison, the estimate usually assumes that the hours based on the average trip duration made by car sharers.

[33] Although it could be done, no attempt was made to calculate any sort of time of vehicle usage based on lease cost. Mileage fees are set in relation to the direct operating costs of gasoline, maintenance etc.

[34] Canadian car sharing cooperatives typically spend between 25% to 75% of the security deposit.

operation than later on. Several months after launch it was decided to offer a $250 security deposit option with a $10 per month non-refundable service charge. This option has not selected by many members and will likely be replaced by a time payment plan allowing new members to begin driving with only a $100 security deposit and minimum payments of $55 per month until the $500 level is reached.

Scheduling

Scheduling is the heart of any car sharing service. The process must be easy and quick for the customer, reliable, and provide management with data needed for billing and analysis. Canadian groups typically use a 24-hour answering service/call center for vehicle scheduling. In addition, to Interactive Voice Response ("touch tone") systems, European car sharing companies are beginning to offer Internet reservations as well.

After our initial three month shake-down period, we contracted with a local answering service that promised to be able to develop a computerized scheduling system at very low cost. While this was under development they would continue the paper and pencil system schedules we started. Unfortunately, the service was never able to deliver the database system promised and their ability to maintain accurate schedules on paper led to an on-going series of double bookings, leaving members very unhappy and only rudimentary management information.[35] In addition, charges of about $1 per minute meant that a typical of reservation call of 2-3 minutes meant there was almost no profit in a one hour trip. Add to that a certain number of calls to cancel trip, mean that our scheduling system was a huge cash drain.

In April of 1999, just after the first full year of operation, a Computerized Automobile Reservation Systems (CARS) developed by Wilder Engineering (www.wilderengineering.com) was brought on line. No option for voice scheduling is provided, although 24 hours access to a live operator for emergency assistance is available. It is a tribute to the developer of the touch-tone telephone software that the switchover resulted in only a few complaints, mostly from people who were in a hurry and not listening to the voice prompts. The average call length is about 2 minutes, less time than people were spending with the operators at the answering service. There have been no problems with double bookings.

Overall Financial Picture

An abbreviated profit and loss and balance sheet statement for CSP appears in Appendix J. At our cost structure it appears that we still have another year to go before breakeven (about 300 members). The company's low capitalization, a concern of the ODEQ from the start, continues to restrain the CSP's ability to put more vehicles on the street, to be discussed below.

Perhaps the best way to judge the financial success of any company is how well its actual performance matches its business plan. In general I think we have done pretty well, considering all the assumptions and uncertainties that were made in the development of the business plan to begin with. As noted above, we had major cost overruns with an answering service before we were able to bring online the highly functional touch tone CARS vehicle scheduling system. Experience has shown that we also under budgeted telephone and bookkeeping expenses. CSP now has 4 phone lines (2 for scheduling, 1 each for phone and fax). Bookkeeping costs are running about $600 per month, which includes auditing Trip Tickets and invoicing customers for usage.

On the revenue side, perhaps the major disappointment is not being able to recruit the 20 new members per month that we projected. Although we had no way of knowing what a realistic number of new members might be when we started, as noted in Chapter 3, we've typically brought on 10-15 members per month. It appears that for most of the people who have received information about car sharing, the possible monetary savings do not outweigh the perceived uncertainty about the availability of vehicles and lack of convenience not having one's own car in the driveway. Not infrequently people who contacted us months before, join CSP when their existing transportation situation changes in some significant way: they have an

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[35] One might ask if the service was so bad, why we didn't end our relationship with the answering service earlier? It appeared that other answering services couldn't do any better, the problems were sporadic and we usually felt that each time we had finally solved the "problem". Nor were we large enough to provide this service in-house. Any change involves notifying all members of a new phone number and procedure for scheduling the vehicles, which is a major task, not without pitfalls.

accident or their car needs major repairs or they have a job or personal change that leads them to join car sharing at that time.

Future Plans

But the uncertain road of any start up seems to be smoothing out. As with any new business a major part of start up was developing the systems needed for a smooth operation, which Russell Martin and Maren Souders have done and continue to do admirably. We are expecting to negotiate with some of our suppliers for better rates, especially vehicle insurance. As noted above, a major hurdle of our first year was spent getting finding a reliable, economical scheduling system.

During the first year we were fortunate receive a small grant from the Oregon Office of Energy enabling us to hire a professional advertising agency, Hucksters Inc., to develop an impressive marketing brochure that incorporates global climate change and environmental message. A sample of the brochure is shown in Appendix E. This brochure provides major boost for the credibility and image of CarSharing Portland.

Attracting new members remains the major challenge in getting to breakeven. We will be concentrating in two areas:

- It appears that the adage from the movie *Field of Dreams,* even though trite, may not be far from the truth: If you build it they will come. In this case, it appears that placing more cars in service and marketing their availability is the most effective way to get new members and reach breakeven.
- In addition, we will be concentrating additional effort on working with developers and apartment building managers, especially in Portland downtown and the rapidly developing areas of the Pearl and River Districts.

Finally, a perhaps most importantly, CarSharing Portland will be seeking outside investors to provide a capital cushion to allow it pursue these goals more rapidly than it might otherwise be willing to commit to.

Chapter 8
Review and Discussion

We're encouraging people to look into CarSharing as an alternative. It can't alone solve the problem, but every little bit helps in the Northwest.
Marc Zolton Chief of Staff for Commissioner Charlie Hales

Overview

Before CarSharing Portland was launched, there was more than a little uncertainty about whether it would succeed. Now that it has completed its first year, most of these doubts have been removed. In this chapter we will review the principal findings that justify this conclusion. We will also consider how the car sharing experience affected the members and the way in which it changed their mobility behavior. Finally, we will consider the degree to which CarSharing Portland achieved the goals it had established for its first year of operation

Principal Findings

The principal results of the first year evaluation can be summarized in general areas:

- Members of the organization
- Satisfaction with the service
- Utilization of the service
- Effects on mobility behaviors

In reviewing these results, it is important to keep in mind that very few members of Car Sharing Portland have belonged to the organization for a full year. Only 12 of the current members joined during CSP's first month and the average period of time that individuals have belonged to CSP is only 5.7 months. Thus, the organization and the majority of the members have had a relatively brief exposure to the car sharing experience. As a result, whatever results we report for the organization or the members must be viewed as first-stage effects only. At this time, it remains an open question whether or not these initial observations will characterize later stages of the car sharing experience.

Membership

Outcome Measured	Finding
Membership: Number, pattern of growth, reasons for joining and key demographic characteristics	120 members at end of first year, with member/vehicle (9) ratio = 13.44 Average of 33 new members each quarter Increasing number of inquires & applicants

	Occasional need for vehicle principal motive for joining Members are highly educated, evenly divided in gender, with median monthly income between $3,001- $4,000. Average age of members is 37 years, with bimodal peaks at 30 and 50 years 41% own a vehicle, 59% do not. 61% rent a home or apartment; 39% own their residence

After operating for 12 months, CSP has established a stable, growing base of members who find the organization appealing because it meets their occasional need for a vehicle. The market segment of the first-year members constitute a highly educated cross section of the population throughout the metropolitan areas of Portland, most of whom serve in professional occupations.

Service Satisfaction

Outcome Measured	**Findings**
Member satisfaction with service: Expectations, cost savings, service features, vehicle advantages, disadvantages and recommendations	81% felt it had measured up to their initial expectations 75% achieved their anticipated transportation cost savings In most cases a sizeable majority rated each service feature to be excellent. Booking a vehicle at the preferred time and location was occasionally a problem, even with 24 hours notice. Not owning a vehicle and occasional access to one were the highest ranking advantages Distance to station and trip planning were the highest ranking disadvantages. More vehicles and locations were the most common recommendations.

The early members of CarSharing Portland expressed a uniformly high degree of satisfaction with its operation and the various features of its service. Indeed, they expressed considerable pride in their membership and commitment to the car sharing concept. While they occasionally experienced difficulty in obtaining a vehicle at their preferred time and preferred location, this was not a serious problem. The member's recommendations focused on expanding the service by increasing the number of vehicles and vehicle stations.

Service Utilization

Outcome Measured	Findings
Usage of service: Frequency, distance and duration of trips, demand pattern and usage predictors	Trip frequency varies widely between months and members with an overall average of 2.5-3.5 trips per month The average trip duration ranged from 3 – 4.5 hours. The overall mean trip distance was 22.6 miles. The majority of trips were for entertainment and shopping. 76% of the trips are taken between 6am-6pm. Trip frequency declines slightly with increasing length of membership. Trip frequency declines as distance to the nearest station increases. Effects of membership length and distance to station are less important for vehicle owners than non-owners. Trip duration is greater for women than men. Trip frequency and duration are influenced by season, with the highest usage in the winter and summer

A considerable degree of service usage variation was observed during the first year. The pattern of usage differs widely between members. During each month that CSP has been operating, an average of 30.6% of the members did not use the car at all. Usage was also influenced by season of the year, distance to the nearest vehicle station and the length of time members have belonged to the organization. These later two variables exert their greatest influence on members who do not have a personal vehicle.

Mobility Effects

Outcome Measured	Findings
Travel Behavior: Vehicle ownership, vehicle miles of travel, trip mode	Increased VMT in non vehicle owners No significant change in VMT for vehicle owners 17 members sold a personal vehicle; an additional 34 attributed to CSP their decision to avoid purchasing a vehicle Increased transit ridership, walking and bicycle use among members

The initial attempt to measure the impact of CSP membership on vehicle travel, employing Trip Diary methodology with a small sample of volunteer respondents, indicated either no change or a slight increase in VMTs. However, the members reported greater use of alternative transportation after they had joined the organization. In addition, 17 (26%) of the respondents to the Year End Survey reported selling their personal vehicle while another 34 (53%) said they were able to avoid purchasing one as a result of their membership in the organization.

Psychology of the Car Sharing Experience

Requirements of Sharing Cars

In a provocative challenge to the introduction of car sharing in this country, Martin Bernard, the Executive Director of the National Station Car Association has written: "Remember, car sharing starts out with at least six negatives:"

- First, a user has to plan their trips in advance, in most cases. So spontaneity is lost.
- Second, the user has to remember to, and take the time to, make a reservation.
- Third, the car is probably parked further from the user's residence than their personal car would be.
- Fourth, the user has to leave it clean, every time, even if he/she is in a hurry.
- Fifth, the user has to deal with some form of paper work, pin numbers, lock boxes, etc, every trip.
- Sixth, the user has to worry about getting the car back on time—another loss of spontaneity.

With such a set of hurdles to overcome, it is hard to imagine that car sharing would ever appeal to very many people. Yet, these "negatives" did not deter the members of CarSharing Portland from joining the organization. In the light of a year's experience sharing cars with other individuals, we wondered how they now felt about these so-called "negatives." Their responses to such a question on the Year End Survey are shown in Table 32.

Table 32. Member Attitudes about Car Sharing Requirements

Compared to personal vehicle ownership how inconvenient have you found the following requirements:			
Feature	Extremely inconvenient	Somewhat inconvenient	Not Inconvenient
Traveling to the vehicle station	4	25	32
Planning a trip in advance	0	31	31
Spending time making a reservation	0	12	47
Obtaining a vehicle key	2	15	45
Filling out trip ticket	0	17	45
Insuring the vehicle is clean when done	0	7	53
Returning car on time for next user	1	36	25

It is clear that only a very few of the members found any of these tasks terribly burdensome. On the contrary, most were not judged to be inconvenient. And while two of them, trip planing and returning the car in time for next user, were felt to be "somewhat inconvenient" in both cases, almost as many members said they were not inconvenienced by having to perform them.

In short, that the majority of CarSharing Portland members did not report being distressed by the requirements of booking and using a car in the fleet. Whatever concerns they might have had about these "negatives" before joining, never developed into serious problems after they began to utilize the service. To be sure, in the beginning, a number of new tasks had to be learned. But the learning process appears to have been rapid so that the majority of the members adapted quickly to these requirements. And however burdensome they may have felt them, most did not let that interfere with the satisfaction they derived from the car sharing experience.

"Happiness lies in sharing; for example, a block of neighbors should pool their money and buy a single lawn tractor."

Juliet Shor
The Overspent American

Mindfulness of Transportation Costs

In discussing the apparent decline of service usage with increasing length of CSP membership, we speculated that perhaps this reflected the member's increasing awareness of the true costs of their automobile trips. Both the empirical evidence and this interpretation are consistent with a similar observation for the members of Mobility Car Sharing Switzerland.

In an analysis of the three year period between 1996 and 1998, Munhiem reports (1998):

"The longer clients are with CarSharing the less they drive a CarSharing car because the CarSharing principle promotes this behavior actively. It brings transparency to the cost of a car. This leads to an economical use of the car and to taking full advantage of alternatives. The clients often take better advantage of public transportation, use the bicycle more often, or combine several trips into one."

On the Year End Survey we asked the members about this matter directly. Their responses are shown in Table 33.

Table 33. Mindfulness of Transportation Costs

Since joining CSP are you more aware of the costs of personal vehicle trips than you were before you became a member?			
Yes	49		
No	14		
Missing or N/A	1		
Total	64		
If so, to what extent has cost awareness influenced travel in a			
	Greatly	Somewhat	Not at all
Personal vehicle	12	13	16
Family or friend's car	6	24	17
CSP vehicle	16	24	10
Bus or public transit	11	26	15
Bike or walk	19	20	13

Table 33 indicates that 75% of the survey respondents reported an increasing awareness of travel costs since they had become CSP members. In turn, 62% said this influenced either somewhat (N =24) or greatly (N = 16) the likelihood would use a CSP vehicle. And while a small minority reported their travel behavior was not affected by this knowledge, the majority of members said it did have very general influence on their travel in other modes, as well.

This is both "good and bad news." On the one hand, the fact that car sharing promotes a greater degree of awareness of travel costs should prove in the long run to have a positive impact on reducing automobile travel. On the other hand, that reduction may also reduce car sharing vehicle usage and, thereby, the revenues of the very organization that induces this greater degree of cost awareness.

As long as the organization continues to add new members, who at the outset are the highest users of the service, this should not be a serious financial problem. But once this growth diminishes, the organization may have to confront the prospect of declining usage levels with increasing length of membership.

Finally, the increasing awareness of transportation costs was an often-voiced theme in the self reports of members about the ways in which CSP led them to change their customary transportation habits. A good deal more trip planning, errand "bundling" and short trip avoidance was reported. Some of these influences on long standing patterns of travel behavior are illustrated by the following member comments on the Year End Survey.

Member Reports of Mobility Effects

- *I "bundle" errands now, so overall I spend less time shopping. I also changed grocery stores to eliminate miles driven. On the downside, I see outlying friends less frequently—a short visit is impractical and I don't like to think about the per hour charge while the car is parked.*

- *Made my partner and I plan our trips better.*

- *With my own car I was more (very) spontaneous. With the necessity of a reservation, walk to the car location, and returning on time, much more planning is required*

- *I no longer drive to work. I can use car sharing at my lunch hour for errands.*

- *We (my husband and I) take a closer look at our vehicle trips. Better use of planning makes trips less frequent. By eliminating our 2nd car, we now do not have to park on the street which makes our neighborhood look more inviting….CSP's cost analysis of vehicle use showed us clearly the savings that could come from less car usage….All these factors and more, have really narrowed our auto usage, so much that we haven't needed a CSP car for several months.*

- *I no longer have to borrow a car from family or friends on the odd occasion that I need a car.*

- *Order more goods over the internet or by mail order which are shipped or delivered rather than go shopping in a vehicle.*

- *I browse less when I shopping with the car and plan more.*

- *Just have to put more thought into timing the car use accurately—how long will the trip take, when should the reservation start, when should it end?*

- *I don't drive out of town anymore. I don't drive short errands.*

Conclusion

CarSharing Portland sought to achieve a number of very broad goals during its first year. They included:

- Establish a shared vehicle mobility service in several central Portland neighborhoods
- Insure the operational and financial viability of the organization
- Be attractive to a sufficiently large segment of the population to insure a stable and steady growth in members
- Meet the mobility needs of members with a high degree of satisfaction

- Reduce member vehicle ownership needs and vehicle miles of travel (VMT)

The findings presented in this report indicate that, CarSharing Portland has, in most respects, effectively met each of these objectives. An organization has been formed, its membership is growing, and the members seem very satisfied with the service it provides. A firm financial foundation has also been laid and it is clear that the concept of sharing cars is not only appealing, but that is workable in this country.

While not all of the original mobility goals have been met, that may be more a function of the provisional nature of the evidence than anything else. So while a statistically significant reduction in vehicle miles of travel was not observed, there were other noteworthy positive effects on the environment.

Seventeen members sold a personal vehicle, while 34 more avoided purchasing one. When multiplied across a large number of future CSP members, the cumulative impact of a reduction of vehicles of this size on traffic congestion, parking and transit ridership should be sizeable. In addition, comparable reductions in automobile pollutants can be expected, if the cars in the CSP fleet are new, smaller and better maintained than the ones the members might have otherwise kept or bought.

Members also became more aware of their transportation costs and began changing their customary mobility habits by planning vehicle usage more carefully and "bundling" together trips that might have formerly been taken separately.

Car sharing also led to significant changes in the use of alternative transportation. After joining CarSharing Portland, individuals took the bus more often, rode their bicycle more and did more walking than they had before.

Taken together, the results of CarSharing Portland's first year should give rise to a good deal of optimism about its future and the positive impact it's growing membership will have on urban environment.

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