

Developing a Model for Car Sharing Potential in Twin Cities Neighborhoods

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Abstract

To evaluate neighborhoods in the Twin Cities of Minneapolis and St. Paul, Minnesota for their amenability to car sharing, a study of the market and use of car sharing programs in the United States was conducted through interviews with managers of car sharing programs, focus groups of users of car sharing programs and an analysis of comparable neighborhoods where car sharing has been successful. Data from this research reflects previous studies, confirming that the following factors of neighborhoods appear to affect the success of a car-sharing program: a high density of individuals aged 21-39, a high proportion of residents commuting by transit or walking, and a high proportion of renters, non-family households and single-person households. In addition, parking appears to be a factor that should also be considered, and perhaps leveraged as an incentive to gain membership. Finally, criteria for selecting appropriate neighborhoods in a city without a car sharing service like the Twin Cities are proposed.

INTRODUCTION

“If you live in a city, you don’t need to own a car,” said William Clay Ford, CEO of the Ford Motor Company in 2000 (1). Car-sharing organizations and their supporters commonly repeat this quote from the heir to the pioneer in car ownership for the masses to demonstrate the viability of this transportation innovation. Car sharing, the sharing of one or more vehicles by many people in close proximity to one another, offers members of a car-sharing organization access to a car without the burden of ownership. Proponents of car sharing insist that it is the missing link towards an ecologically sustainable transportation system, giving transit users the flexibility and mobility that transit is increasingly unable to provide in the polycentric metropolises of the twenty-first century. Car sharing has been growing in Europe where it began and is showing degrees of success in a few American cities where it has been introduced since 1998. Skeptics may report that the impact of car-sharing appears to be minimal and that it only attracts a narrow demographic, yet car-sharing is new in the United States and improvements in technology over the last decade have transformed its potential. Furthermore, car sharing organizations continue to see steady increases in their memberships, and it may be too early to predict this alternative’s long-term impact on transportation choices in the cities of the 21st century.

The purpose of this paper is to understand the current state of the car-sharing business in the United States, as a basis for determining appropriate criteria for finding a market for car sharing in a market such as the Twin Cities of Minneapolis and St. Paul. The first section of this paper details the history of car sharing in the United States and provides an overview of significant findings in the current research on best practices in the industry. Data and conclusions from this section were gleaned from academic and industry research on the subject and from interviews with managers of car sharing organizations (CSOs) in San Francisco, Madison, Washington, Portland, Seattle, and Boston. Because the car-sharing industry is a competitive business, details of conversations with these managers are treated as proprietary information. Therefore, individuals are not cited in this report so as to preserve confidentiality. These CSO manager interviews were conducted in the spring of 2004.

The second section discusses the findings from car sharing user focus group sessions that the State and Local Policy Program at the University of Minnesota conducted in Seattle and Chicago in the summer and fall of 2004. Data and conclusions drawn from the focus groups are then compared to the previous and current research on car sharing and are explored in greater detail to reach more firm conclusions.

The third section is a Geographic Information System (GIS) analysis of Seattle neighborhoods with a strong presence of car sharing. Seattle is used for comparison because, of the cities where car sharing has achieved a significant presence, it is most similar to Minneapolis/St. Paul in terms of overall demographics and the maturity of its transit system, an indicator of the relative ease of living without owning a car. In this section, we used 2000 census travel behavior and demographic data to examine the demographic and travel behavior factors that appeared substantial in the literature review, CSO manager interviews, or focus groups. Those neighborhood factors that are significantly different from the rest of Seattle are considered those that will most effectively determine which neighborhoods should have the most potential for a successful car sharing operation based in the Twin Cities.

The analysis and conclusions in this study are based on the following overriding assumptions. A CSO in any city in the United States will operate under similar conditions as they have in other cities, and the early market for car sharing in a new city will be similar to the market where car sharing is currently established. This study relies on both quantitative and qualitative analysis. In the absence of detailed comprehensive studies of the car sharing business and the relatively small number of car sharing operations from which to sample, qualitative analysis provides the bulk of the data used in this study. These come in the form of interviews with managers, focus groups of users in Seattle and Chicago, and a summary of conclusions from the previous literature on the topic. The neighborhood evaluation attempts to quantify thresholds for success using the findings from this qualitative analysis. While this model is not a rigorous one based on extensive quantitative analysis, it could be used as a basis for determining geographic market criteria of start-up CSOs in markets like the Twin Cities that do not have successful car sharing programs.

This methodology is not without limitations that must be considered when using it as an implementation tool. The first is the relatively small sample size with which to work. Car sharing is still new in the United States, and the cities where it has been introduced are few and varied. It is therefore difficult to make generalizations about car sharing. Those characteristics of the car-sharing market that appear to be persistent across cities are considered in this study. Finally, the assumption that other cities should be similar to Seattle in the applicability of car sharing must be treated with some caution, as there may be some overriding factor that exists in Seattle that has been overlooked that affects the success of car sharing in that city.

STATE OF THE CAR-SHARING PRACTICE IN THE UNITED STATES

Current trends

Car-sharing programs have seen steady growth in the United States since 1998. Shaheen's survey of car-sharing operations shows that this growth is almost exponential. In 2003, the United States claimed over 25,000 car-sharing members and almost 700 cars in car-sharing programs (2). By the end of 2004 that number had more than doubled to over 60,000 members and cars (3). This should not be entirely surprising considering how new the technology is in the United States. Most of the growth in car sharing since 1998 has been the result of the aggressive expansion of Zipcar and Flexcar as well as the increasingly popular City CarShare in San Francisco. Zipcar has announced a plan to take its program nationally and introduce the service to a host of new cities. City CarShare has also expanded rapidly with low rates and generous support from non-profit and government funding sources (4).

Where is car-sharing effective?

According to CSO managers, neighborhood car sharing programs typically locate their cars in areas that have been previously favorable to car sharing. Businesses look for densely populated mixed-use areas well served by public transit. They are usually in areas of predominantly middle-income residents or areas of mixed income. As a car-sharing business expands its membership, most car-sharing organizations place additional cars in areas nearby its existing cars. This practice, known as clustering, allows users to choose from among a number of available cars within reasonable distance thereby increasing the geographic coverage of the program within high performance neighborhoods. It also serves to increase the visibility of the program in a particular area. In interviews, managers of all three of the major car-sharing operators in the United States reported that they began by placing their first vehicles in areas where they anticipated that they would find a market instantaneously. These are areas

- with a high number of residents who are in the middle-income range and are well educated,
- where parking is difficult or expensive,
- with excellent transit service,
- and have a high residential density and some mixed uses.

Who uses the service?

According to CSO managers interviewed for this study and previous literature on the topic, car-sharing users typically have some common characteristics:

- middle-income
- between the ages of 21-55, with the bulk in the 21-39 range
- live in households with no more than one car
- exercise more than the general population
- walked, biked, or rode transit to work
- high level of education

This last characteristic appears to be a key one. Flexcar reported that over 85 percent of its users have bachelor's degrees, 30 percent have master's degrees and 10 percent have doctoral degrees (5). This characteristic of car-sharing members is reported for all of the car-sharing organizations in the United States. Most CSO operators attributed this to the novelty of the idea in the United States; one manager stated that new products are usually adopted by people with more education before finally being accepted by a larger spread of the population. One would anticipate that this is beginning to happen and a study by Cervero on City CarShare in San Francisco confirms that the diversity of membership has indeed begun to increase as the program matures (6). In addition to the characteristics identified above, Cervero's study found that most early adopting City CarShare members

- lived in "non-family" households (more than seventy percent of users did not live in a household with children)
- were disproportionately employed in a professional occupation, with many of these professionals affiliated with the urban planning or architecture professions (7).

The most recent study on initial adopters of car sharing confirmed many of these conclusions. In his study of Philly CarShare, Lane found that early adopters universally had a high level of education and were frequent transit users. They are also most likely to not own a car. The largest percentages of early adopters in his study walked (43%), took transit (36%) or biked (21%) to work. Lane found all demographic data from Philadelphia to closely match Cervero's findings from San Francisco in terms of the use of alternative commute modes, living in non-traditional households, and being aged in the late 20s and 30s. While many once perceived income to be a strong predictor of

car-sharing participation, Lane found no significant relationship in his study of Philadelphia or in previous studies in San Francisco and Portland (8). Richard Katzev's study of Car Sharing Portland's first year also reached similar conclusions about the early market for car sharing programs in terms of age, income and travel behavior (9).

Another possible reason for the lack of diversity among the membership of car-sharing programs is the way in which the organizations market the service. According to CSO managers, CSOs all employ "guerrilla marketing" approaches to getting the word out about their service. Few have the resources to mount aggressive advertising campaigns. Word-of-mouth, press coverage, tabling at neighborhood street festivals, dropping off literature in apartment buildings, coffee shops, and some advertising in free weekly papers provides the bulk of marketing. This approach attracts new members who are similar to existing members. However, partnerships with existing institutions can help to bring in a new audience to pitch the service. All but one car-sharing operator uses the transit agency's resources to market to new members. These agencies usually provide free advertising on buses and bus shelters, include information on their websites, and sometimes facilitate membership in the car-sharing program through their commuter pass programs.

Trip purposes

Certain travel behavior characteristics appear to be persistent across all cities. Most individual members of car-sharing organizations commute to work by walking, public transit, or bicycling. Car sharing is rarely used for this purpose. If it were, it would fast become more expensive than owning a car. According to CSO managers, most members use the service to run errands, haul things within a neighborhood, and visit friends in a less accessible neighborhood. Few individual members use the cars to go out of town for a significant amount of time and instead use discounted rental cars that the organization has arranged with a rental car company. However, one manager of a large car-sharing operation reports that members take the cars out of town frequently, which poses few problems for it since this organization already has so many cars in its system. Perhaps as car-sharing services grow, the need to collaborate with rental car companies will disappear, as the impact of removing a car from the system for a few days would be minimal. About fifty percent of one for-profit organization's membership signs up for the service as a form of mobility insurance and rarely accesses the vehicles. These members typically pay a lower monthly rate (in some cases there is a no monthly fee option) that comes with a higher per-use rate. Some of these people might live in very dense neighborhoods with excellent transit accessibility and rarely need a car or are in a household with a car and sign up with the car-sharing organization as a backup second vehicle.

Forty percent of Flexcar members do not own a single car (5), and almost seventy percent of City CarShare members are car-free (6). Almost 70% of Philly CarShare members are also car-less (8). According to Cervero's study, over ninety percent of City CarShare members lived in 0-1 car households, a significantly higher proportion than the average for the Bay Area (7).

Business members

Most CSOs like to locate their cars in areas with a mix of high-density residential uses and employment. Managers report that this is due to the low car-ownership needs of individuals in such neighborhoods but also because businesses can use the cars during the middle of the day when there is little demand from individual members. In these arrangements, businesses, typically in Central Business Districts, often sign up with a CSO to replace a fleet of vehicles or to offer their employees an additional benefit and encourage them to take transit to work. This works particularly well for downtown businesses that already have a commute trip reduction program in place to encourage alternative transportation for their employees like commuter checks, free bus passes, vanpooling etc. Others simply market the service by becoming non-paying business members. In this case, employees are given information on the car-sharing program and their initial membership fees are waived by the car-sharing provider because of their association with a business member. A number of car-sharing organizations are also developing relationships with universities and other public agencies that are interested in reducing fleet costs. In one partnership, at the University of North Carolina Chapel Hill, the university uses the ZipCar technology and website and manages the fleet itself (10). While in the case of Madison's Community Car, the University of Wisconsin offers trial memberships to employees and eligible students and provides marketing assistance to Community Car but does not manage the fleet. When a business signs up with a CSO, it enrolls all or some of its employees who must go through the same background check and application process as an individual member. Managers report that participation varies within business establishments; some employees rarely use the vehicles while others use them considerably.

Impact on travel behavior

Cervero has undertaken the most applicable study on the impact of car sharing on travel behavior and the environment, as his study of City CarShare looked at a CSO most similar to successful neighborhood CSO's. This

study determined that vehicle miles traveled and per capita gasoline consumption initially increased and then later decreased while mobility for transit users increased as the program matured. In the one or two years since new members joined City CarShare, they used the vehicles less, and carpooled and trip-chained more as time passed as they adjusted their travel behavior to account for the new option (7). Cervero attributes this to an increased awareness of the cost of various modes of transportation. The induced vehicle travel that car-sharing programs may produce for previously car-free households is far outweighed by the reduction in use by users who forgo the purchase of a vehicle or sell a vehicle.

FOCUS GROUPS

Methodology

In August of 2004, the State and Local Policy Program conducted focus group interviews of Flexcar members in Seattle, Washington and I-Go members in Chicago, Illinois in August and October of 2004. These two programs were chosen primarily because this research was being conducted in cooperation with University of Minnesota research on location efficient mortgages in these two cities. We chose to use focus groups for this research instead of other more rigorous studies of user behavior such as surveys or trip diaries as, given that the Twin Cities did not yet have a car sharing program, we were interested in gaining the broadest data for the resources available to us. Focus groups allowed us to use open-ended and follow-up questions to discover points that we did not learn in the CSO interviews, and which would not be raised in a survey setting.

Participants in the Seattle interviews were solicited from a list of Flexcar members who lived in areas where Flexcar had a substantial presence. These are areas of the city in which a significant proportion of households are within walking distance of a Flexcar location. A control group of individuals who were not members of Flexcar but who lived within walking distance of a Flexcar location was also solicited but the study suffered from a low response rate from this group. While there were differences between the conversations of the control group and the Flexcar group, the small size of the control group prohibit its consideration in this analysis. Similarly, Chicago participants were solicited with the cooperation of I-Go who emailed its membership about the opportunity to participate. A control group was solicited using the same criteria as in the Flexcar case. The Chicago control group also suffered from a low response rate, though it was slightly better than for Seattle. Focus group participants were given a \$20 stipend for their participation. The focus groups range in size from 4 to 13.

Some significant differences exist between members from the two locations. Whereas Flexcar had close to 130 cars in its Seattle network and had been in that market for six years, I-Go had only recently launched full service in 2003. Therefore, all members interviewed in Chicago were early adopters, whereas some members interviewed in Seattle were early adopters and others had joined once the service had gained a significant market presence in Seattle.

Public transportation has a much greater presence in Chicago than it does in Seattle. While Seattle's public transportation system is made up almost entirely of buses, the "L" and Metra commuter trains both carry a relatively large amount of passengers in Chicago. Seattle was interesting to the research because it is most like the Twin Cities in this regard, and Chicago is interesting because I-Go service was relatively new at the time of the focus groups and so the Chicago responses revealed more about the decision-making and travel behavior of early adopters.

In both locations, participants were asked a series of questions about their travel behavior before and after becoming members and their reasons for joining, as well as questions about their neighborhoods and how they perceived that the character of their neighborhoods affected their travel. Participants were also provided an opportunity to comment on the service of their respective car-sharing organization. A summary of discoveries from the focus group participants follows.

Focus Group Observations

Among focus group participants, more than half joined for convenience, followed by environmental reasons and affordability. Still others joined because of a temporary need for a vehicle, often a truck to haul personal items. Indeed many members wished the program offered a wider variety of cars such as pickup trucks.

Focus group participants typically used the service for appointments to transit-inaccessible places; common trip purposes included shopping, volunteering, picking people up from the airport, emergencies, and to visit family in the suburbs. Members almost universally used the service to save up for "one big errand trip" to big box stores and supermarkets. One young lower-income user used the service to help friends who did not have access to a car with emergencies or errands. Some users enjoyed the opportunity to try out driving the new hybrid vehicles that had recently been introduced. To go out of town, some participants said that they used the partnership with Enterprise and Dollar rental car companies, but knowledge of this program was not universal among all participants. A number

of participants in Seattle acknowledged that they frequently took the cars if they were going to be out late and would return them in the early morning since use of the cars late at night does not incur hourly charges.

Members accomplished these types of trips before joining the car-sharing organization in different ways that depended on the kind of transportation access they possessed before joining. Those who did not previously have a car would have borrowed a friend's car, taken a cab (which many noted is more convenient and cheaper for one-way trips than taking the Flexcar or I-Go), or not made the trip at all. Most would not have bused for these types of trips, although a few did ride the bus to go grocery shopping. For out-of-town trips and for hauling things, most participants stated that they would have rented a car. Those who had a car previously would have driven their cars. One individual who rarely used the service but was a member said that he felt Flexcar to be too expensive for many of the trips he needs to make: "I don't use it much, why would I use Flexcar for \$9/hour when a cab is cheaper?" Such statements and the statements of others in the focus groups indicate that car-sharing replaces planned utilitarian trips more than spontaneous or recreational trips.

Members who previously owned a car either immediately before joining the service, or at some point recently, believed that they had become much more economical in the way that they travel. Instead of spontaneously making trips to do one thing, they would now plan ahead and think about all of the errands that they needed to make and trip chained more. These members said that they are much more likely to take the bus or walk instead of using the vehicles. Indeed walking became the preferred mode of travel for most daily activities.

Although not a characteristic of all members, a significant number of focus group participants were attracted to the predictable nature of the costs associated with membership in the car-sharing program. These members of Flexcar in Seattle take advantage of the pre-paid options where members pay a set amount per month and are allowed a certain amount of car use without incurring extra charges. These members contrasted this with the unpredictable costs associated with car ownership. According to one Flexcar member, "I was getting tired of trying to park downtown, getting tickets, so I sold it...I haven't regretted it, no insurance, no tickets, it's much cheaper and predictable, I can budget out exactly how much I need to spend on transportation and it never changes."

Among those individuals who did not regularly use the vehicles and only occasionally rented them out for a large shopping trip or an emergency were satisfied with the program's ability to enable them to continue to live without a car; "I don't panic about not having a car, I hope, for the rest of my life." These individuals typically walked or rode transit both before joining and after joining and lived in neighborhoods where driving was unnecessary. The spread out character of the metropolitan areas of both Seattle and (to an extent) Chicago made it difficult, however, to never require the use of a car. Car sharing gave these people the availability of a car in the few instances that one was necessary.

Members described their neighborhoods in ways that reflected the available transportation opportunities and constraints. The most common discussion centered on the lack of parking for themselves or for guests. It became clear that all of these members lived in areas where parking was expensive or difficult, indicating that this may be a key "push" factor in discouraging car ownership. Among those who had access to a free parking space with their condominium or apartment, at least two rented out their space or gave it to friends when they visited; even if an individual does not own a car, the lack of parking in the neighborhood can be a significant frustration for visitors.

Besides parking problems, most participants stated that they could walk to most things that they needed. Their neighborhoods included many restaurants, coffee shops, and small stores. Indeed, walking was probably the most common form of transportation among those in the Seattle groups. This was less clear in Chicago where people were much more likely to talk about using transit. But all of these individuals were aware of the effect that their neighborhood had on their transportation behavior; "I walk everywhere, the neighborhood reminds me that I can walk," said one Seattle member.

Indeed, the accessibility of their neighborhood to most services by foot or transit was the prime motivator for members' residential location decisions. Almost all focus group participants stated that they chose their current residence because of its location and not because of other qualities. In this way, members appear to be a self-selecting group of individuals who care deeply about the nature of their community environment and their location. Almost all members also acknowledged that living where they do was the reason that the car-sharing service worked for them, "living downtown is conducive to not having a car because of the parking issue; if I lived further out I would probably purchase a car." Still others in the Seattle groups stated that the availability of Flexcar is one of the reasons they are able to stay in their neighborhood since buying a car would add so much to their expenses that they would be forced to relocate to a less expensive neighborhood.

In addition to those discussed above, the following observations from the focus group sessions in Chicago and Seattle should also be considered by a car-sharing startup in any area without an existing CSO:

- Many of the members interviewed in both Seattle and Chicago joined Flexcar or I-Go when they either moved to the city or moved to a new neighborhood. The move played a big factor in evaluating their transportation/location options.
- While environmental/political reasons were not a driving factor for most to join in the first place, many mentioned it later on as something they felt good about in using the program. Participants were also enthusiastic about the new hybrid cars.
- Focus group participants preferred walking to any other form of transportation and lived in neighborhoods where they could walk to most things, and when walking was impractical, they generally used public transit.
- Most focus group participants matched other data on car-sharing users in that few mentioned living with children. Most lived alone or lived in small households with a partner or roommates.
- Chicago participants (all “early adopters”) were likely to mention knowledge of car sharing from other cities prior to joining I-Go, and many had joined I-Go upon moving to Chicago from neighborhoods where car-sharing existed in other cities on the East Coast.
- Members generally lived and worked in transit and pedestrian –accessible areas and used the cars to go to transit inaccessible areas like the suburbs.
- Seattle residents were more likely to have owned a car prior to joining, while Chicago residents were largely transit-dependent. This may be attributable to the quality of transit in Chicago as opposed to Seattle, but Cervero and Lane both also demonstrated that “early adopters” were more likely to be car-less.

Responses from the focus group sessions in Seattle and Chicago did not reveal anything entirely new about the car-sharing market that had not been discussed in previous studies such as those by Lane, Cervero, and Shaheen. But they highlighted a few factors that appear persistent in the literature or significant from a perspective of transportation choices. The main conclusions about neighborhoods and individuals attracted to car sharing include lack of parking in the neighborhood, a preference for walking or bicycling over other forms of transportation, high familiarity with the transit system, and the value of the convenience of using the car-sharing service over other motivations. One previously unexplored finding was that the decision to join the program appeared to be frequently associated with a move to the city or a move within the city.

While demographic data was not collected from the focus group participants and their small numbers would make most measurements insignificant, they did predominantly appear to match the profile described by Lane and Cervero and by CSO managers as likely to be highly educated and living in small or non-traditional households. There would be some bias in this result since individuals with children may be less likely to participate in a focus group than those living alone or with other adults.

EVALUATING NEIGHBORHOODS

Methodology

The academic literature, interviews with CSO managers and staff, and the focus groups provides a foundation for evaluating neighborhoods for their amenability to car-sharing in an area without an existing CSO. In doing so, such an evaluation should only consider those factors that were mentioned as significant in at least two of the manager interviews, the focus groups, or the academic literature. In evaluating neighborhoods, the following factors from the 2000 US Census may be appropriate:

- Percentage of individuals with a bachelor’s degree or higher;
- Median household income;
- Average household size;
- Percentage of total in non-family households;
- Population density of individuals aged 22-39;
- Percentage of workers who commuted by car, transit, walking, and bicycling;
- Percentage of households renting and owning their homes.

In determining the market for car sharing in the Twin Cities, we looked for a city that is closer in character to the Twin Cities. While Boston, New York, Washington D.C., and San Francisco all have extensive car sharing programs, they are more densely populated and have more fully-developed transit systems. However, the city of Seattle also has a highly successful car sharing program, but the maturity of its transit system was closer to the Twin Cities than other cities that had existing CSOs at the time of this study. To test whether these factors of users apply to the average characteristics for neighborhoods where a car sharing program achieves a substantial degree of

success, we compared these factors in the block groups within walking distance to Flexcar locations against the average for the city of Seattle.

The factors of Flexcar areas that appeared to be distinct from the city of Seattle as a whole were:

- a higher population density of individuals aged 22 to 39,
- higher proportions commuting by walking and transit,
- a higher proportion of non-family households,
- smaller average household size,
- and a higher proportion of renters.

These are characteristics of the neighborhood taken as a whole and are not necessarily characteristics of users of car sharing. Median income was not significant and the average income was actually lower in these neighborhoods than in the city as a whole. The education level was also not higher on average in these neighborhoods, despite the fact that the majority of car-sharing program users are highly educated. While Flexcar is most likely attracting highly educated (and perhaps middle-income) individuals to its program, these individuals are likely to live in mixed neighborhoods (11). It should be noted that while these neighborhoods had a higher percentage of renters than average neighborhoods, this does not necessarily mean that renters are more likely to join a car sharing program.

The Role of Parking

Since parking availability in car sharing use and this factor appeared to be so important in the focus groups and in some of the manager interviews, we examined the peak and average parking utilization on street blocks near or containing a Flexcar location in Seattle using a 1999 residential parking study conducted for the City of Seattle (12). The study recorded the average and peak parking utilization rate (the amount of available on and off-street parking space in use) for selected street blocks in neighborhoods throughout the city. Each block that lay within one block of a Flexcar location was considered. Not all Flexcar locations in Seattle were considered because the study only included a sample of street blocks in its study and so left out some areas with a Flexcar presence. A total of 187 records representing average parking use near Flexcar locations were considered in calculating average daily parking use on street blocks, and a total of 51 records were considered in calculating peak parking use on city blocks. The lower number of peak use records is because the study considered whole city blocks instead of breaking them into four segments as was done for average parking utilization (See Table 1).

On average, Flexcar locations were in areas with an average parking use rate of 75% and a peak-hour utilization rate of 84%. To put that in perspective, the Institute for Transportation Engineers Transportation Planning Handbook defines a parking utilization rate of 85% or more as an acute parking shortage; a driver would likely have to circle around the block numerous times before finding a parking space, causing significant frustration (13). This study confirms that Flexcar locates cars predominantly in areas with low parking availability. Of course, some of these locations do not have such a high parking shortage while others have a particularly extreme shortage, but the high average rate of utilization demonstrates that these neighborhoods discourage car travel because of the barriers due to lack of parking. Consequently, car sharing programs might be able to leverage the greater parking efficiency as an opportunity for growth. By partnering with local efforts to better manage parking, they could increase their visibility and market themselves as a solution to local parking problems. For instance, they might advocate neighborhoods eliminate free parking in high density areas in return for subsidized by revenues from street parking. This effort could even encourage residents or employees of businesses in these areas to choose other modes besides driving.

Developing a Model for Determining Promising Neighborhoods for Car Sharing

For the purpose of assessing the likelihood of successfully starting up a car-sharing operation in a city without a car-sharing program, such as the Twin Cities, we examined the primary demographic and travel behavior factors that were found to be significant in the Seattle case by plotting census data in a GIS format. Parking data was not available for the Twin Cities, but given its emerging importance, such data should also be considered if such data is available. This analysis can result in a ranking system by which block groups are evaluated by how much they deviate from the citywide average in all of these characteristics. (See Table 2 for an example of how such a system could be organized)

A start-up CSO could rank these characteristics assigning first priority to areas of the city that are significantly above average in every one of these characteristics. A CSO could use discretion in assigning second, third, and fourth priority districts but density of the young adult population is perhaps the most important factor since that should be the essential driver of the market for a new car-sharing program; a car-sharing start-up needs a

critical mass of this demographic group in order to gain significant traction. We would propose that transportation characteristics are the next most important, followed by household characteristics.

Additional Considerations

Any new car sharing organization may gain special knowledge of its local car-sharing market as it proceeds with its program and should use that knowledge to inform its decisions about where to place cars. One strategy that many CSOs use to determine future locations is an online form where individuals that are interested in the program can enter their addresses, which are then entered into a database. Once the database has a critical mass of interested parties in a particular area, the CSO will consider placing a vehicle in it. The availability of business members should also play a role in determining appropriate locations. The most obvious market for business members would be Central Business Districts since they often also share many of the same characteristics of households and transportation mentioned earlier. These are areas well served by public transportation, and where there are large concentration of public agencies and large corporate offices. University districts should also be a prime target for a business partnership both for its staff fleet and for possible use by students. Indeed, areas where a synergy exists between business and individual memberships would be ideal.

Besides membership of employers, a CSO can also forge partnerships with property managers who could similarly offer reduced fee membership to their tenants. Partnerships like these could provide the necessary “anchor” that would allow car sharing to become sustainable in these neighborhoods. As membership grows in each neighborhood, additional cars should be spread throughout the neighborhood to cover as large a market area as possible but not so far as to make it difficult for members in one area to walk to a vehicle if the one nearest their home is rented.

CONCLUSION

The market identified in this analysis is certainly not the only market that may benefit or be attracted to car-sharing. Many factors beyond this, such as the type of marketing that existing car-sharing providers use, have made car-sharing attractive to this limited demographic. Evidence from the growth of car-sharing on the East and West Coasts, however, shows potential for car-sharing in more diverse neighborhoods. Once a new CSO becomes self-sustaining through growing a membership in these high potential neighborhoods, it can use other approaches to further develop and diversify its membership. This can be done through altering its rate structure, partnering with public and non-profit entities to offer membership to low-income individuals and organizations, and pursuing targeted marketing strategies to gain members in less conventional districts of the metropolitan area that do not fit the profile described in this study.

It is this expansion of the service model that provides the greatest opportunities for further study. Low-income individuals have not adopted car sharing to a great extent, although some CSOs have received funding to subsidize targeting this population. Another aspect of this business that should receive more attention is the role of partnerships in service delivery. The car-sharing reservation/billing/management technology may have potential beyond its current use, and creative partnerships may expand this potential to previously unexplored market segments. This study has only used the experience of existing CSOs to inform the development of a new service in the Twin Cities; it says little about the long-term market potential of this kind of transportation option. As car-sharing grows throughout the U.S. and becomes more visible to a larger section of the population, new partnerships and markets will certainly be explored by CSOs and will demand scrutiny in further evaluating the costs and benefits of car-sharing.

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Table 1

Flexcar Neighborhoods	<i>Total Utilization</i>	Public	Private
Average Peak Utilization (51 records)	84%	85%	81%
Average Utilization (187 records)	75%	N/A	N/A

Table 2

Data Type	Description	City Mean	1 Standard Deviation from Mean
Density	Density of population aged 22-39	xxx/square mile	xxx/sq mile + 1 std deviation
Transportation	Walk commute	x%	x%+1 std deviation
	Did not commute driving alone	x%	x%+1 std deviation
	Transit commute	x%	x%+1 std deviation
Household	Non-family households	x%	x%+1 std deviation
	1-person households	x%	x%+1 std deviation
	Renters	x%	x%+1 std deviation