Investigation of the drivers and the barriers for travel behaviour changes

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Investigation of the drivers and the barriers for travel behaviour changes and analysis of the impact: a case study of car sharing in Australia

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Background

Increased concerns about environmental sustainability have sparked off the international agenda of moving towards sustainable consumption patterns in many areas, including urban transport systems. Initialised in 1992 in the Rio Earth Summit, sustainable consumption and production policies were subsequently developed in the World Summit on Sustainable Development in Johannesburg, 2002. These fifteen years of effort have shown their influence on the changing patterns of consumption in urban transport, by encouraging the use of more non-motorised modes of transport and public transport as a substitute for private vehicles. Moreover, other initiatives such as fuel tax, road tax, higher vehicle levies were also enforced to discourage the use of private vehicles.

Nevertheless, urban communities sometimes cannot fully rely on either public transport or non-motorised modes. Car sharing, thus, is introduced as an option which assists urban communities to move towards more sustainable transport systems. It is an alternative which fills the gap between public transport and private car option, where public transport and/or non-motorised modes of transport are not viable. It is a system where an organization allows its members to use its fleet of cars for their mobility without having to own a car, with easy access to the cars as they are usually parked in the neighbourhood. Car sharing offers flexibility in terms of the duration of use and car access. Members can use a car only for a few hours or for a longer period of time. Furthermore, they usually have a choice of car.

Car sharing is evidently operating very well in urban areas where public transport is well established. In Zurich, Switzerland, Mobility Car Sharing has more than 140 locations with over 300 cars and more than 10,000 members (Bergmaier, Mason, McKenzie, Campbell, & Hobson, 2004). Cambio, another one in Germany, has successfully offered a cross-border car sharing between Germany and Belgium, with almost 20,000 members in both Germany and Belgium (http://carsharing.us, December 2007). In the early 1990s, Austria and the Netherlands followed the success of Switzerland and Germany and since then, car sharing has spread to other European countries, such as Italy, Belgium, Great Britain, Scandinavia and Spain (Bergmaier et al., 2004).

In Canada, Communauto initiated in 1995 in Toronto, and was followed by 20 other car sharing companies which are operating in 50 cities (http://www.carsharing.net). Although just recently flourishing, car sharing has

also been growing in Asia, especially Singapore and Japan. In Australia, car sharing was first introduced in Sydney in 2003 and another car sharing company operated in Melbourne about six month later. In less than 5 years, there are now in total 6 car sharing companies covering 4 cities: Sydney, Melbourne, Brisbane and Perth; all together involving more than 5,000 members.

Various studies show that urban dwellers adopting car sharing are considered to be practising sustainable consumption. A study in the Netherlands showed that in 1997, the ratio between car and population of car sharing members is much lower than "non car sharing" members (there are 367 cars for every 1,000 car sharing members and 887 cars for every 1,000 "non car sharing" members) (Meijkamp, 2000). In Bremen, Germany, 90% of car sharing members did not have any car and 6% used car sharing to compensate their need for a second car (UITP, 2005). Furthermore, car sharing members are typically public transport users, they care about the environment and pollution, and they also practice sharing in other areas, such as laundries, kitchens, and gardens (UITP, 2005).

This paper examines the drivers and barriers experienced by car sharing members while adopting a car sharing option. It also investigates emerging travel behaviour changes due to the use of car sharing. While the idea of car sharing is to encourage sustainable consumption in mobility, this paper also examines the degree to which car sharing members are exercising sustainable consumption in other areas. The study is limited to a car sharing company in Sydney, Australia, and was conducted using a survey covering 294 responses and 20 interviews.

Car sharing concept

The following section highlights the differences between car sharing, car rental and car pooling in terms of access and personal values. Car sharing members can use a car for their mobility without the hassles of ownership, such as maintenance, insurance, parking and registration procedure; on the other hand, they cannot always get access to the car depending on the availability of the car. As opposed to car pooling, car sharing offers a level of personal mobility where in car pooling one car is used by several users who have the same travel destination. Compared to car rental, car sharing vehicles can be used flexibly by the hour or the day depending on the user needs. For car sharing, membership is an absolute requirement; each member must be pre-approved to be able to use the car.

When compared to other motorised transport systems, car sharing offers privacy and convenience with relatively limited access. After the analysis from sour data collection, in addition to the literature review (Bergmaier, Mason, McKenzie, Campbell, & Hobson, 2004; Transport 2000, 1992; UITP, 2005; Victoria Transport Policy Institute, 2007), we have plotted the positioning of car sharing among the other schemes in terms of access and privacy values as illustrated in Figure 1. A private car is always available almost every time the user needs it, giving its user total privacy. In terms of access, and compared to car rental, car sharing gives more flexibility as the member can use the car as long as they need it. In addition, the car is located in the neighbourhood and is easy to access. Car rentals, on the other hand, are usually located quite far away from residential areas and can only be booked on a daily basis. This limits the access to the car to a certain degree. Furthermore, public transport and car pooling offer

limited access due to limited operation times, range of access and availability. As the passengers share the space in the vehicle with other people, privacy is also limited.
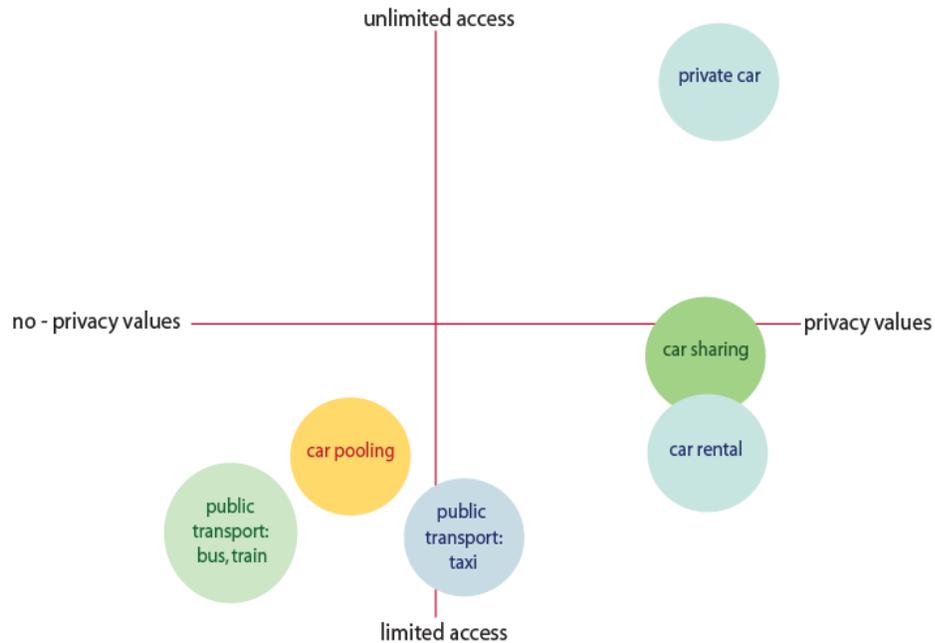

Figure 1: Positioning of different modes of transport

Car sharing is believed to give benefits to the different layers of the society. Figure 2 shows the multi-layered benefits for individual, neighbourhood, urban communities, businesses and government. From the individual's point of view, car sharing gives convenience, practicality, cost effectiveness and efficiency. For the community, due to its performance in reducing the number of cars on the road, it gives more space, and reduces the levels of pollution, noise and congestion. At macro level, for the businesses and the government, car sharing offers better economic and urban planning as a result of less space and infrastructure required for private vehicles (Bergmaier et al., 2004; UITP, 2005).
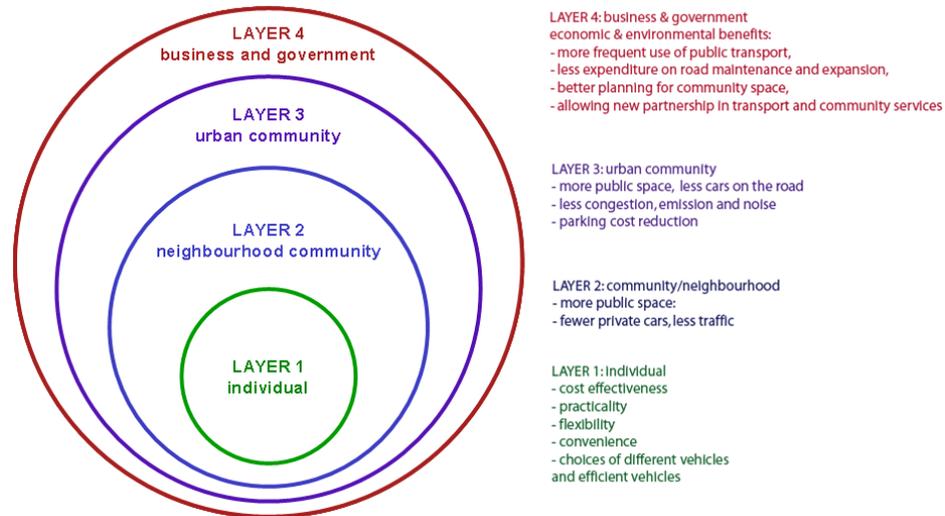
Figure 2: Multi-layered benefits of car sharing (adapted from Bergmaier et al., 2004 and UITP, 2005)

Car sharing in Australia

Being a geographically large country with a relatively small population and with settlements widely dispersed along the west and east coastal areas, Australia relies heavily on transport. Compared to European and North American countries, Australia has the tenth highest rate of car ownership, with an average of 509 cars per 1,000 residents (UNECE, 2004). In 2005, car ownership rate has increased to 537 per 1,000 resident population (ABS, 2005, 2007b). This figure places Australia as a "car culture" nation similar to the US, Italy, Germany, and other industrialized countries.

Although most European countries, Canada and the US have adopted car sharing schemes since early or mid 90s, in Australia the scheme has only been initiated in 2003. This late adoption occurs in favour of the car owner's conveniences. Overall, Australia has a low level of public transport services. The country has much lower fuel prices, higher rates of vehicle kilometres travelled by motor vehicle than European countries and is not fully supported by bicycle paths (Bergmaier, Mason, McKenzie, Campbell, & Hobson, 2004).

Firstly established by GoGet Car Share in Sydney in mid 2003, the car sharing concept grew slowly for the first two years and then started to grow exponentially. Five other car sharing companies were founded later: FlexiCar in 2005, CharterDrive in 2005, Nexus, SmartDrivers and GWhiz in 2007. To date, there are 4 car sharing companies in Sydney (GoGet, CharterDrive, SmartDrivers, FlexiCar), 3 in Melbourne (FlexiCar, GoGet and SmartDrivers), 2 in Brisbane (GWhiz and SmartDrivers) and 1 in Perth (Nexus). Those companies cover more than 5,000 members.

Despite similar types of service provided, each car sharing company has different schemes in pricing, car location and advertising policy. SmartDrivers, a new car sharing scheme in three big cities, targets those who work in the CBD areas by offering an attractive after work package. Flexicar offers flexibility for

those who like to travel long distances by charging high hourly rates, yet low kilometre charges. GoGet and GWhiz are more suitable for those who like to travel for short periods and short distances. Furthermore, the strategy for locating a new car is also different. For example, in Sydney, SmartDrivers chooses the CBD as its priority location, whereas GoGet prefers to allocate new cars to different suburbs (neighbourhood areas). In addition, SmartDrivers can offer low hourly rates as it uses advertising on cars and encourages other companies to place an advertisement on their cars to subsidize the cost.

Sustainable consumption pattern of car sharing members

Sustainable consumption is defined as consuming more efficiently, responsibly or simply consuming less, by taking into account key issues including needs, quality of life, material efficiency, waste minimisation, life cycle thinking, health, safety, and equality, for both current and future generations. The consensus tends to accept that sustainable consumption means consuming more efficiently which does not particularly mean consuming less (Jackson, 2006). However, many still assert that changing one's lifestyle by consuming less and opting for a less materialistic lifestyle would be more influential on the environmental impacts. Reducing consumption could be encouraged through policy making, by supportive institutions (Swedish Environmental Protection Agency, 2005) or simply if individuals practice voluntary simplicity (McDonald, Oates, Young, & Hwang, 2006; Robins & Roberts, 2006).

This paper attempts to analyse the sustainable consumption pattern of consuming less and preferring simple lifestyles. In the transport sector, the increasing trend of car use which definitely has impacted the environment should be reduced. The ability and availability to choose alternatives to shift to other modes of transport make possible the use of sustainable transport. The case study on car sharing is a small-scale study which has targeted a particular group of people who are willing to change or have already changed their lifestyle by minimising the use of motorised modes of transport. In other words, car sharing is for people who have attempted to get out of the car culture.

Voluntary simplicity (VS), a proactive choice of sustainable lifestyle, is an approach defined as having a preference for a low or modest consumption pattern with integrity, and fitting it into the balance of terrestrial daily life (Elgin, 1981). Elgin and Mitchell (1977) present five key values for the VS lifestyle, which include material simplicity, aiming for human-scale structures, increasing personal control, promoting environmental awareness, and developing personal growth. Etzioni (1998) categorises VS into three different levels from moderate (downshifter), to strong, and then to holistic simplification. Parallel to this categorization, McDonald et al. (2006) classify moderate and strong simplifiers as beginner voluntary simplifiers (BVS). The term BVS is used for people practising a moderate level of sustainable consumption as opposed to non-VS, for those who are adopting little or no sustainable consumption practices and VS for those who strongly reject materialistic norms. Holistic simplifiers, as defined by Etzioni, are categorised as voluntary simplifiers in the later classification. This is illustrated in Figure 3.

Pursuing this angle, the practice of VS can also be categorised correspondingly in the transport sector. Shaw and Newholm (2002) identified three main groups of people in regards to their travel behaviour. The first group is

for ethical consumers who deliberately do not own or use a car; the second one is for moderate users who own a car and use it modestly; and the last group for regular car owners who see no alternative to private cars as their mode of transport. In Figure 3 we integrate the categorisation of NVS, BVS and VS defined by McDonald et al. (2006) and its relationship to car usage maintained by Shaw and Newholm (2002).

Figure 3: The spectrum of voluntary simplicity
(adapted from McDonald et al., 2006 and Shaw & Newholm, 2002)

Methodology

The study was conducted based on three research questions: (1) what are the drivers and barriers experienced by car sharing members while adopting the scheme?; (2) what are the perceived values experienced by the members in the voluntary simplicity spectrum?; and (3) what travel behaviour changes have been made by the members after adopting the car sharing model?

GoGet CarShare has been selected for this case study as it is currently the largest such company in Australia, and also because it has introduced an environmental scheme for discouraging excessive travel with a high kilometre rate (35 cent per km). This is slightly higher than SmartDrivers 33c/km; Nexus 30c/km and FlexiCar 20 or 15c/km.

Focusing on Sydney, a survey and a series of interviews were administered to analyse the drivers, obstacles and perceived values of the members. Furthermore, the survey has been used to examine the travel behaviour changes in conjunction with a comparative study of internal (GoGet) and public databases. The survey was sent to all active members in March 2007 (791 members) and received 294 responses resulting in a confidence interval of CI=4.54% for the confidence level of 95%. Twenty interviews based on random selection of those who responded to the survey were conducted to further analyse car sharing users' values and characteristics.

Drivers and Barriers to Adopting a Car Sharing System

The survey was conducted in March 2007 covering 294 responses from a total of 791 members. The drivers and barriers to adopting car sharing were interpreted based on two open-ended questions: (1) What is your reason for joining GoGet? and (2) What is your most disappointing experience with GoGet Car Share?

Table 1 depicts the drivers and barriers to adopting car sharing. Coded into themes with possible multiple drivers for each response, there are ten drivers to adopting car sharing as a mobility option. These are: (i) practicality; (ii) cost

effectiveness; (iii) convenience; (iv) environmental concerns; (v) simple, slow lifestyle or downshifting; (vi) work purpose/business efficiency; (vii) trial; (viii) public transport reliance; (ix) family and social support; and (x) community support.

Practicality, cost effectiveness, environmental concerns, business efficiency, and community support were expressed by different groups regardless of their car ownership status. Convenience, reliance on public transport and trial are the drivers for those who did not own a car or who gave up their car, but not for those who still have access to a private car. Simple lifestyle and family or social support are the drivers for those who did not own a car or never had a car.

The practicality criterion covers the occasional need for a car and ease of access to it, for example, quoting a participant, "[I] do not own a car [and I] did not want to buy a car which I would seldom use". Cost effectiveness covers all the financial benefits of using car sharing, such as "I live in the inner city and do not need a car that often, so it is more economical for me to be a member of GoGet rather than buying my own car." One quote on having a simple lifestyle is "[I] didn't want to purchase a car just to go to the shops or weekend travel. [I] didn't want to put a new car on the road to support this luxury!" Most of the considerations of living simply are also supported by environmental concerns, for example "[I] wish to avoid owning a car in favour of car sharing philosophy and its positive environmental impact which reduces the number of cars on the road".

Some barriers that could lead to quitting the membership or opting for private cars include car availability, maintenance and cleanliness problems, customer service problems, administrative and booking system difficulties, and inconveniences caused by other members. Some other minor barriers are pet restrictions and booking periods. Two other problems related to the access of the car are parking problems and cost and insurance issues.

The barriers to adopting car sharing are expressed in the same way by different groups regardless of their car ownership status. Although in average members are satisfied with the overall service quality provided, 60% (of 294 respondents) expressed their problems regarding the use of car sharing. For those experiencing a barrier (either major or minor), the availability of the cars is the most expressed one. Most members understood that the unavailability occurred due to a last minute booking which meant that the car was booked by another member. Parking problems were the second biggest barrier followed by issues connected with the administrative and booking system, such as inaccurate billing, automated booking difficulties, and mistakes in the booking period. Sharing problems regarding the condition of the car (cleanliness, damage, or flat battery) and the inconveniences caused by other members (returning a car late, or lack of care) are expressed by few respondents. Customer service problems such as lack of responsiveness or courtesy, unclear cost and insurance policies, pet restriction and problems and booking period are the minor articulated barriers.

Table 1: Drivers and barriers to adopting car sharing (based on 294 responses allowing multi-responses)

Drivers	no. of responses	Barriers	no. of responses
Practicality	125	Car availability	41
Cost effectiveness	100	Parking problems	35
Convenience	79	Administrative and booking systems	23
Environmental concerns	69	Car problems - maintenance and cleanliness	20
Simple lifestyle/downshifting	31	Being inconvenienced by other members	19
Work purpose/business efficiency	24	Customer service problems	17
Trial	19	Cost and insurance policies	11
Public transport reliance	16	Pet restriction and problems	4
Family and social support	12	Booking period	2
Community support	7		

Values against the concept of VS

GoGet CarShare is obviously used by different types of people with respect to their sustainable consumption practices, as illustrated in Figure 3. Figure 4, on the other hand, shows the values and expectations from different groups of users ranging from non-voluntary simplifiers, beginners, to voluntary simplifiers. The chart was constructed from the expressed expectations, the profiles gathered, the sustainable consumption practice responses to the survey, and also from the statements and views expressed during the interviews.

Consistent with the earlier supposition, nineteen of the twenty GoGet members from the interview agreed that car sharing gives convenience, when compared to private car use, because there is no obligation for maintenance and registration. In addition, they maintained that GoGet provides a friendly and easy to use service, and that staff are very helpful. Those values are not plotted in the figure as they are common values for all NVS, BVS and VS.

Further points from the interviews show that there is a wide spectrum of values and expectations for different types of people. A late 40s' female, replacing the second car in the household with car sharing, is categorised into the boundary between NVS and BVS (See Figure 4). She revealed that driving is a pleasure. She sometimes missed her former luxurious car but tried to rationalise that she only needed its mobility function.

A late 20s female, giving up her car but still keeping her motorcycle represents a beginner voluntary simplifier (downshifter). Back to study after working, she tried to be more responsible in her consumption while she still wanted to enjoy convenience and the good feeling of driving. She has been using GoGet car sharing for travelling in bad weather or during night time, for visiting relatives and when she needed space or freedom.

Another young female, 26 years old, preferring to use her bicycle or public transport to work, shows strong simplifier characteristics by using GoGet car sharing for her sport and social activities. She uttered that GoGet is an option for community support and for sharing resources, as it helps her in arranging big household shopping trips with her flatmates or other friends. She used GoGet

occasionally and is categorised into a non-car owner, as well as a casual car sharing user (See Figure 4).

Two mature age holistic simplifiers (female, late 40s and male early 50s) are mapped on the right hand side of Figure 4. They did not have any car in the household and prefer not to use a car. They ride their bike to work and use GoGet car sharing to support elderly parents, and always try to use it very infrequently. Both of them felt sorry to increase their vehicle kilometres travelled (VKT) as their VKTs were extremely low prior to joining GoGet.
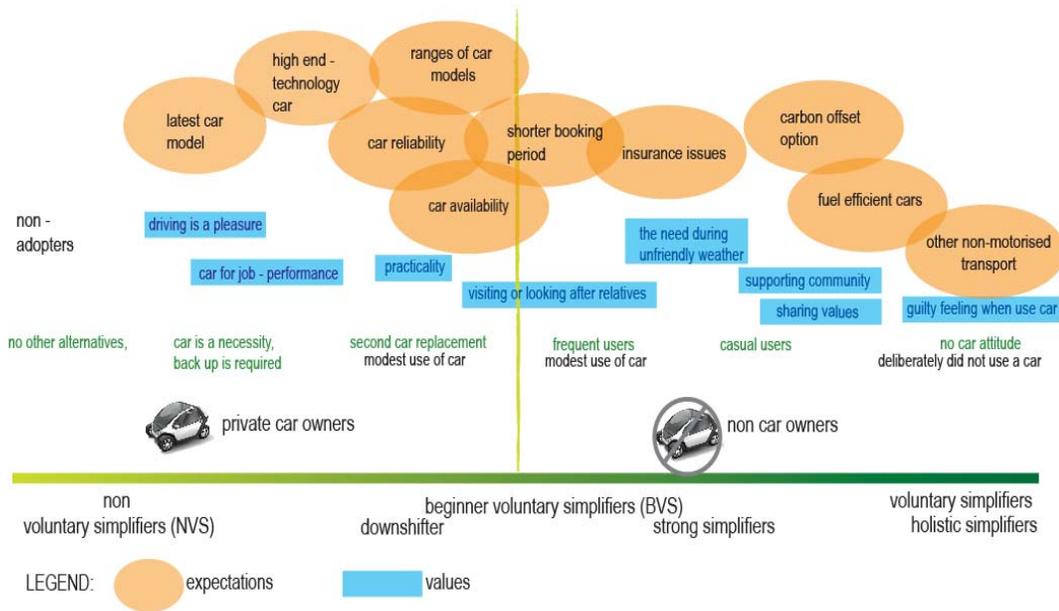

Figure 4: Car sharing members' values and expectations

Travel behaviour changes

The aggregate travel behaviour by GoGet members and the comparison with other car sharing practices have been studied using the company's and public databases, and the survey results. Members use fewer resources as one car is shared between 16 members in Sydney and 12 members in Melbourne (data from GoGet in December 2007) and car sharing members have much lower annual mileage than non-adopters. A pre-joining survey from GoGet shows that, of the 2,800 members (both members who are still active and who no longer use the service) 74% did not own a car, 15% planned to give up their only car, and 4% cancelled buying a car. While the GoGet CSS members have a slightly higher car ownership status than car sharing members in Bremen - 90% did not have a car (UITP, 2005) -, but the ratio achieved is still praiseworthy.

The car occupancy rate for car sharing is slightly higher than for private vehicles but not markedly so. From the survey, the occupancy rate for a GoGet car averages 1.9. This is higher than the Australian average which is 1.3, but it is slightly lower than StadtAuto, a car sharing company in Germany, which is 2.0 person per car (Shaheen, Cohen, & Roberts, 2005).

A previous study about the life cycle assessment of vehicle emissions shows that although a passenger car gives significant emissions, the use of car sharing, which in essence is combined with public transport, gives one of the lowest environmental impacts for daily travel modes. (Ramirez & Nawangpalupi, 2006). In addition, car sharing members are significantly reducing frequency of travel as well as having very low annual mileage rates compared to the average Australian. Internal data from GoGet indicates a significant travel distance reduction (55% reduction) from members who gave up their car prior to joining up car sharing. Moreover, the average annual VKT (vehicle kilometres travelled) of GoGet cars is 16,172 km which is slightly higher than the average VKT of Australian passenger cars, 14,600 km (ABS, 2004). However, given that each GoGet car is used by an average of 16 persons, the annual VKT per person is only approximately 1,000 km.

Some other impacts investigated in the survey revealed that most of the members who do not own a car tend to use the GoGet car only when it is extremely necessary, such as when destinations are inaccessible or inconvenient to reach via public transport, when the trip is to be made at an odd time of the day or the night, or even when they had to carry a lot of goods. The decision is made based on different reasons, such as: the cost, whether it is 'environmentally wise', or availability of a car. The majority of the members commute to work by public transport or by bike, and some of the respondents have started to shop more locally after joining car sharing, while a few of them have tended to shop even farther away as they now have access to a car. The remaining members stated that they did not change their shopping behaviour because, either they have been doing their shopping in their local area most of the time, or they could not find what they were looking for locally.

Discussions

Generally, car sharing members have concerns about sustainability. Concerns expressed ranged over low, moderate to high levels of impact. However, the number of car sharing adopters is still not yet significant. For a total number of 2,632,009 active C-class drivers in mid 2007 in Sydney (ABS, 2007a; Roads and Traffic Authority, 2007), there are only 1200 GoGet members and approximately another 500 members for other car sharing companies (data based on telephone conversations with FlexiCar, SmartDrivers and CharterDrive in December 2007). This adoption rate is still much lower than the one in Switzerland, which is 2.3% (Bergmaier et al., 2004). Nevertheless, the exponential trend of joining members indicates that car sharing in Sydney has a long way to go before it reaches maturity.

Sustainable consumption is practiced in mobility by using a car only when it is really needed and then taking as short a trip as possible. This kind of behaviour is exemplified by car sharing members and has been followed by reducing consumption in other areas, particularly in shopping behaviour (by shopping locally for example). Nonetheless, reducing adverse environmental impacts would be even greater if behaviour was supported by cars that could offer very low emissions or non-petrol vehicles. Moreover, discouraging the use of private vehicles by introducing higher levies and law enforcement to reduce car use could also be alternatives to reducing the adverse effects of the internal combustion engine and over-consumption of resources in general.

Conclusions

The above analysis shows that the use of car sharing is creating lower environmental impacts and could lead to a change of culture, from non-sustainable to more sustainable transport. Regardless of the consumption pattern that the members are now practising, car sharing offers the values of convenience, practicality and cost efficiency. Members also do believe that by using car sharing, they reduce their ecological footprints. For a few members, using car sharing causes greater travel distances or VKTs. Nevertheless, in the big picture, car sharing members travel fewer kilometres than non-members. Moreover, although car sharing offers greater privacy (compared with public transport), it still has a higher occupancy rate when compared with private car use.

Besides the current positive impacts, there is still a need to widen and mainstream car sharing in order to achieve large-scale benefits. The fact that car sharing has been adopted by different types of users in terms of their consumption patterns and that most of them are currently satisfied with the system, reinforces the thought that car sharing could easily be accepted by other people sharing similar values.

In order to broaden and extend the environmental benefits of car sharing, the following factors should be considered. Firstly, by overcoming common barriers, such as providing cars equally distributed across many locations, anticipating the occurrence of inconvenience experienced by staff or members, and improving the booking and administrative system, car sharing could prevent its members to quit the service. Secondly, by providing a service that attempts to overcome private vehicle inconveniences, such as better designated parking spaces for car sharing vehicles, car sharing might attract private vehicle users to adopt the service due to its added value. These factors, although they are undoubtedly prospective improvements, should be carefully analysed and developed.

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