



Ministry of Infrastructure and the
Environment

Carsharing in the Netherlands

Trends, user characteristics and mobility effects

KiM | Netherlands Institute for Transport Policy Analysis



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Summary

The Netherlands has approximately 90,000 carsharers and 14,000 shared cars

Approximately 1% of Dutch people aged 18 and over have used one or more types of carsharing. This amounts to approximately 90,000 carsharers, who collectively account for 0.02% of the total number of car trips made in the Netherlands. Approximately 14,000 shared cars are currently available in the Netherlands. Carsharers are predominately young and single or have families with small children. Moreover, they are often highly educated, do not own a car and live in cities. The use of shared cars is not evenly distributed across the Netherlands, but concentrated in urban areas, such as Amsterdam and Utrecht. Shared cars are used only occasionally and primarily for visiting friends and family. Approximately 10% of all carsharing trips are made during the morning peak (between 8.00 and 9.00 a.m.). The percentage is markedly lower (3%) during the evening peak.

Carsharing has positive effects

Carsharers in the Netherlands currently own approximately 30% fewer cars than they did before they started carsharing. In most cases, carsharing is used instead of a second or third car. Carsharers drive approximately 20% fewer car kilometres than before they started carsharing, mainly because people who have disposed of their own car will drive less. Most of the trips made with a shared car were previously made by train, privately owned cars or borrowed or rented cars. Because carsharing results in less car use and lower car ownership rates, it reduces the associated CO₂ emissions in the Netherlands by an average of 8–13%. Moreover, carsharing means that less space is needed for parking, saving an area of around 120,000 m², or about 24 football pitches. The social cost-effectiveness of carsharing is more or less zero: depending on the context, it is either just about cost-effective or just fails to be cost-effective to society.

Potential of carsharing in the Netherlands

Although the extent of carsharing currently remains limited, nearly 20% of Dutch people stated that they were open to one type of carsharing or another. These people represent the theoretical potential of carsharing, but because only a proportion of these people will ultimately switch to carsharing, the actual potential is less. The intention of having 100,000 shared cars available by 2018 (as stated in 2015 in the ‘Green Deal on carsharing’) can therefore be deemed overly optimistic. If half of the 20% of potential carsharers use a carsharing service to some extent in the future, this would amount to approximately 800,000 carsharers. It is uncertain how soon this figure could be reached, but if it is reached in 2020, it would then account for a 0.5–1% reduction in the number of car kilometres travelled. However, many factors affect this potential.

The carsharing market depends on many factors

Assessments of the potential carsharing market are generally based on traditional carsharing services. However, the peer-to-peer concept was only recently introduced in the market and the number of cars on offer has increased sharply in recent years – and not only in the four major Dutch cities. Peer-to-peer carsharing schemes are still relatively unknown in the Netherlands and so their use could develop differently from traditional carsharing services.

Technological developments (such as automated vehicles), the marketing strategies of car rental companies, car manufacturers and mobility services suppliers (e.g. NS:Dutch Railways and MobilyMixx), as well as the emergence of ride-sharing (carpooling, paid-for trips, UberPop, etc.), will all have an impact on the extent to which people will use carsharing services and the speed at which these services can become established and grow.

From numerous studies of carsharing schemes in other countries and stated preference research, six main factors have been found to influence the use of carsharing:

1. local transport policies that favour carsharing, such as parking permits for shared cars and higher parking fees for private cars;
2. high building densities, so that many people have access to a shared car within close proximity, which is an important user preference;
3. convenience and flexibility of the service: it must be accessible and not too expensive; arrangements for payment must be straightforward; the carsharing company or organisation should take care of everything else (such as breakdowns, fines, cleaning, etc.); and a free-floating system in which the car does not need to be returned to the same place offers greater flexibility and freedom than a station based scheme;
4. coordination and linkage with public transport, such as dedicated parking bays for shared cars at railway stations and public transport stops;
5. marketing to specific target groups (such as young people or hipsters);
6. establishing carsharing schemes as social enterprises or cooperatives so that the users feel they have a stake in the organisation.

Behaviour must not be underestimated

Peoples' behaviour is also a factor that must not be underestimated. Private ownership is still the norm and people stick to their habits. As long as there is a car parked outside the house, most people will see no reason to consider another option. The challenge is to put the positive aspects of carsharing in the limelight. Key to this are the public interest aspects of carsharing: it improves liveability, reduces CO₂ emissions and reduces the amount of space occupied by cars.

The government can bring the importance of carsharing to the attention of the Dutch public through image and awareness-raising campaigns as well as by highlighting the convenience and flexibility of carsharing. In addition, local parking policies that favour carsharing can complement a national policy of increasing the cost of car ownership and reducing the cost of car use.

1

Introduction

What trends can be observed in carsharing and what is the current size of the carsharing market? Who uses carsharing services and for what purposes, and what are their motives for doing so? What are the effects of carsharing on car ownership, mobility and sustainability? What lessons can we learn from examples of carsharing schemes in other countries, and how can we expect the trend in carsharing to develop in future? These are the main questions this report seeks to answer.

Carsharing first arrived in the Netherlands in 1972, when Luud Schimmelpennink introduced the Witkar ('white car') in the centre of Amsterdam as a sustainable alternative to the private car. The Witkar project failed, but the carsharing idea was born. Interest in carsharing in the Netherlands started to grow at the beginning of the 1990s, when the then Ministry of Transport, Public Works and Water Management introduced an incentive scheme. The idea behind this was that carsharing could help to achieve the two important objectives of reducing car use and reducing harmful vehicle emissions (Ministerie van Verkeer en Waterstaat, 1988). At that time, expectations of the growth in carsharing were high. A feasibility study published in 1993 stated that carsharing could reduce the number of car kilometres driven by 3.5 to 4 billion in 2010, and that 40% of Dutch car drivers, or 2 million people, would use a carsharing scheme (AGV, 1993; Adviesdienst Verkeer en Vervoer, 1996). Today there is still interest in carsharing among both the public and policymakers. This is in part due to the Energy Agreement for Sustainable Growth¹ and the Green Deal on carsharing, which sets a target for 2018 of 100,000 shared cars with low average emissions. However, the carsharing phenomenon has not yet become a fully fledged competitor to the private car, as was expected in the 1990s.

Much has changed since the 1990s. The digital society and sharing economy (paying for use rather than ownership) give carsharing a whole new dimension. Technological advances have made carsharing more accessible and the sharing economy has spawned digital platforms that have expanded and diversified the carsharing market. In addition, electric cars are gaining ground and are now used in some carsharing schemes.

Little is yet known about what effects the trend from car ownership to carsharing will have in the Netherlands. The carsharing market is still a niche market and little or no empirical research has been done on the use of the various products and services on offer. If the trend from car ownership to carsharing continues, what would this mean for accessibility and sustainability? If these trends lead to the national car fleet shrinking (or not getting any larger), this could have positive effects on traffic flow and even on the use of space in urban areas. Such a trend could also have sustainability benefits by reducing vehicle emissions. It is conceivable that growing numbers of people will switch from owning to sharing, but less positive scenarios are also conceivable. High levels of carsharing could prompt some non-drivers learning to drive. Carsharing is cheaper than owning your own car, making driving a financially viable option for these people. The result could be a shift from cycling or public transport to carsharing (Efthymiou et al., 2013), and if it suits these new drivers, the carsharing experience could even stimulate them to buy their own car.

¹ In September 2013 more than 40 organisations signed the Energy Agreement for Sustainable Growth. A Standing Committee to the Energy Agreement for Sustainable Growth, consisting of representatives from all parties to the Agreement and chaired by Ed Nijpels, was established to keep the implementation of the Agreement under continuous review.

These trends could potentially have a major effect on the travel behaviour of the Dutch population, and thus on the accessibility and sustainability of the transport system in the Netherlands. It is important to understand more about these effects, because carsharing can help to meet the accessibility and sustainability targets set by the Ministry of Infrastructure and the Environment. The results of this study provide the ministry with potential leverage points for policy interventions to make progress towards these targets.

Goal and research questions

The goal of the research is:

To gain insight into the trends in the use of various forms of carsharing, the factors that influence these trends and the associated opportunities and constraints, and to explore the possible effects of these developments on car ownership, mobility, sustainability, the use of space and economic welfare.

This goal has been broken down into the following research questions:

1. What trends can be seen in the use of carsharing services in the Netherlands and other countries?
2. What is the current size of the carsharing market in the Netherlands and which social groups use shared cars?
3. What are the motives and preferences for and constraints on carsharing?
4. What are successful examples of carsharing?
5. What are the effects or possible effects of carsharing on car ownership, mobility, sustainability, the use of space and economic welfare?
6. How is carsharing expected to develop in the future?

Definitions and scope

In this study the Netherlands Institute for Transport Policy Analysis (KiM) defines carsharing as follows: the phenomenon in which consumers make paid local use of cars that are made available for this purpose by either a commercial operator (business-to-consumer service) or a private party (consumer-to-consumer service) via an intermediary organisation. The study excludes lending a car to family members, friends and acquaintances. Renting and leasing cars are also not considered to be forms of carsharing in this study, and neither are forms of 'ride-sharing' (also known as lift-sharing and carpooling, i.e. when two or more people share a trip by car). Traditional taxi services are by definition not part of the sharing economy, and this also applies to services such as Uber, UberPop and similar services (these are essentially taxi services available through an app).

Approach

For this study we made use of several research techniques and data sources. An extensive literature study gave us an understanding of developments in carsharing in the Netherlands and other countries. To identify 'successful' examples we examined several cases and held interviews with experts in the Netherlands and other countries. The interviewees are listed in Appendix 1. The case studies allowed us to identify the 'critical factors' for the various types of carsharing schemes. To determine the current size and potential of the carsharing market in the Netherlands we used data from the carsharing survey 2014 by TNS NIPO (Monitor autodelen). This survey was held among a representative sample of Dutch adults (over 18) in possession of a driving licence (n = 853) during May to July 2014.

To identify the mobility and environmental effects of carsharing, TNS NIPO and PBL Netherlands Environmental Assessment Agency carried out a further questionnaire survey of 363 current carsharers in December 2014. Current carsharers are defined as adults who have used a shared car at least once in the past year. Within this group, a distinction is made between carsharers who rented a car from an organisation (such as Greenwheels and Car2Go) and carsharers who rented a private car (via an intermediary organisation such as Snappcar). Adults who indicated that they are seriously considering using a carsharing service within one year were also surveyed. Both surveys give further information about the profiles of carsharers in the Netherlands, their trip purposes, distances travelled and the time of day they used a shared car.

To discover the motives behind people's decisions to use carsharing services (opportunities and constraints), two focus group sessions were held with carsharers and potential carsharers in Amsterdam. The results of these focus groups sessions (Ter Borg & Schothorst, 2015) were used, among other purposes, for a study of 500 respondents to identify which demographic and social characteristics determine why people choose a certain carsharing scheme. The respondents were given various alternative carsharing schemes to choose from (stated preference). Discrete choice model techniques were used to obtain an understanding of the possible opportunities and constraints facing potential carsharers in their daily travel behaviour (Dieten, 2015).

Structure of the report

The rising popularity of carsharing is part of a wider trend: the growth of the sharing economy in many countries around the world. What developments can be seen in this area and how does carsharing fit in (at both the user and the supply end)? These questions are discussed in Chapter 2 of this report. In Chapter 3 we look at the size of the carsharing market in the Netherlands. Which social groups in particular use carsharing services, where do these users live, what types of trips do they use shared cars for, and what distances do they cover? The motives for carsharing and the opportunities and constraints facing users are examined in Chapter 4, where we describe the profiles of potential users that determine their choice of carsharing service in their daily travel behaviour. In Chapter 5 we discuss a number of examples of carsharing schemes in the Netherlands and in other countries. The examples show the strengths and weaker points of these schemes. Chapter 6 examines the mobility and environmental effects of carsharing. Does it change levels of car ownership, how much does the total distance travelled by car decline when drivers switch to carsharing, and what effect does carsharing have on other modes of transport and on the reduction of CO₂ emissions? In this chapter we also look at the influence of carsharing on the use of urban space and the possible economic welfare effects. Finally, in Chapter 7 we discuss the possible growth of carsharing in the Netherlands and end with several conclusions and lessons learned.

2

Trends in the Netherlands and other countries

The sharing economy is on the rise worldwide, including in the Netherlands. All sorts of things, such as tools, are now shared via online networks. Cars are also shared, sometimes via organisations that have their own fleets ('traditional' carsharing) and sometimes directly between private individuals ('peer-to-peer' carsharing). Carsharing first started in the Netherlands in the 1990s and by 2015 there were 14,000 shared cars for private use. The Green Deal on carsharing, agreed in 2015, sets a target of 100,000 shared cars in 2018.

2.1 The emergence of the sharing economy

The sharing economy worldwide

An international study of the modern consumer society and the emerging sharing economy (Havas Worldwide, 2014) indicates that a new economic model is being constructed that is based on community and collaboration. Young people in particular (aged 16–34) are more open to the idea of using consumer goods rather than owning them. A large proportion of the respondents have a positive attitude towards sharing. On average, 46% agreed with the proposition 'I prefer to share things rather than own them', although the results differ considerably between countries (from 18% in Japan to 75% in Indonesia). A larger proportion of young people agree with this proposition (51%) than older people.

This positive attitude is not necessarily reflected in people's behaviour, though. The study shows that less than a third of those who are positive about the sharing economy actually take part in it, but 4 out of 10 people expect to do so in the future. This depends on the product to be shared: 42% of average consumers are prepared to share tools, but for more personal things like the home and the car, the proportion drops to 15% (Havas Worldwide, 2014).

Driving forces behind the sharing economy

The emergence of the sharing economy is attributed to economic, social, cultural and technological developments (Böckmann, 2013):

- Economic stimuli. The economic crisis is thought to be a determining factor in why people share goods. In economically difficult times, young people in particular have little opportunity to buy and maintain expensive consumer goods, including cars (Berman et al., 2013). And the costs of running a car are rising. In 2010, experts from around the world mentioned 'saving money' as the most important reason for people to start using carsharing services (Shaheen & Cohen, 2013).

- Social and cultural stimuli. The shift towards sustainability, taking greater responsibility for environmental protection and a growing sense of community are thought to be driving forces behind the sharing economy. The consumer society is changing (Cohen, 2009) and a new mindset is emerging in which it feels much more natural to share goods than it did in the past. People under 35 in particular are said to be more inclined to use things rather than own them and may attach less importance to material possessions. They are a new generation of consumers who are happy to be released from the 'burden of ownership' (Moeller & Wittkowski, 2010; Chatterjee et al., 2013).
- Technological stimuli. Various internet platforms, smart phone apps and GPS tracking and navigation technology open up new possibilities for matching supply and demand more quickly and easily. Social networks (e.g. Facebook) make it easy to quickly establish peer-to-peer contacts and new advanced payment systems ensure rapid and reliable payment (Böckmann, 2013; John, 2013; Leismann et al., 2013).

These new technological capabilities also make it possible for people to establish relationships of trust. Although sharing with an unknown person is in principle always risky, sharing platforms reduce these risks because they show users' comments about vehicle lenders and users. This positive and negative feedback shows lenders and users alike which users take good care of the shared product and which lenders are reliable (Schor, 2014).

The sharing economy in the Netherlands

We do not yet know how big the sharing economy will become in the Netherlands. Several trendspotters, activists, academics and politicians have high expectations and predict a world in which people no longer buy things, but pay for services instead. They see a world of 'possessionless avant-gardists' wearing leased jeans and with leased laptops, who hang rented pictures in their homes and get a drill when they need one from the Peerby borrowing platform. They are 'free of possessions and free of cares': if they do not like the product, they simply exchange it (Hulshof & Van der Veen, 2013).

Much is expected of product sharing – also called 'sharification' or 'collaborative consumption' (Botsman & Rogers, 2011; Leismann et al., 2012; Merckies, 2012; Leismann et al., 2013). The sharing economy is said to be the answer to resource scarcity, as people will have to make more efficient use of raw materials, water and agricultural land, use consumer goods for much longer and reuse them. The sharing economy is seen as the path towards a sustainable future. In the Netherlands 'shareNL' is one of the main promoters of the sharing society (<http://www.sharenl.nl>).

How far away is this future in the Netherlands? Different studies point in different directions, depending, among other things, on how 'sharing' is interpreted. The National Committee for International Cooperation and Sustainable Development (NCDO) asked a sample of the Dutch population what they understood by 'sharing'. Many of them associated it with 'togetherness'. For 75% of the respondents, sharing does not involve any exchange of money and it is something you do mostly with your immediate family and friends. Just 4% of the respondents share things with strangers (Carabain et al., 2013). Most respondents, 82%, said they share things or services with other people (mainly family and friends). The main reason they gave for this was 'helping other people' (53%). 'Saving money' was mentioned by just 13%. The study also throws light on the types of things people share. The most popular things the respondents shared were food (49%), newspapers and magazines (47%), information and expertise (39%), care (28%), DVDs and CDs (23%) and books (22%). These results suggest that the sharing economy is flourishing in the Netherlands.

If the sharing economy is interpreted in a narrower sense – *paid* transactions between consumers – it appears to be still in its infancy (ING Economisch Bureau, 2015). About 8% of Dutch households participate in the sharing economy, which makes up 0.01% of Dutch GDP. Compared with other countries, the term 'sharing economy' (*deeleconomie*) is now fairly well established in the Netherlands, although actual participation rates have not kept pace with the familiarity of the concept itself. Cars are popular things to share (like tools and homes), but the Dutch share fewer cars than other Europeans. Measured by the percentage of the population that offers products for sharing, the Netherlands is 12th on a list of 13 countries. The Dutch appear to be a bit more attached to their possessions than other

Europeans: 64% agree with the statement 'I don't like other people using my things', whereas the average score for Europe is 56%.

Another study, into sharing *via online networks*, came to similar conclusions. In an online consumer survey, Multiscope (2015) observed that the Netherlands is not yet fully convinced by the sharing economy. Sharing with friends and family is commonplace, but sharing with strangers is not. The study observed that the Dutch are not very willing to share their possessions. Ninety per cent have never borrowed, used or offered to lend a product or service via an online network. Consumers mentioned various objections, such as the risk of things being broken (57%) and not being returned (51%), the bother of making appointments and agreements (33%) and not trusting other people (28%). The 10% that do have experience with the sharing economy said it is easy, cheap and ideal for things you only need once. More than a third said they will never use products or services that can be borrowed from online networks. The things consumers are most prepared to loan or borrow via online networks are expertise (32%), tools (31%) and DIY services (31%). They are least comfortable about lending or borrowing clothes, shoes and accessories (5%). The most important reason for sharing is that it is free or costs very little (38%). Other main reasons are reuse (24%) and sustainability (23%). When it comes to sharing their own things, the Dutch are most prepared to share or offer their expertise (68%), books (59%), help with housework (56%) and DIY (53%). They are least prepared to lend their cars (26%), and if they do they expect some payment in return.

Interest in the sharing economy appears to be concentrated in the main cities, such as Amsterdam, where many residents are prepared to share products and services. They are willing not only to share things like drills and bicycles, but also cars, trips, meals, gardens, accommodation and skills. On average, 44% of Amsterdammers are willing to participate as a user and 32% as a lender, although these figures vary depending on the type of product or service – for cars, for example, the figures are 38% and 25% respectively – but 84% of the respondents are willing to share at least one of the products or services mentioned above (Van der Glind, 2013).

A large proportion of the residents of Amsterdam are familiar with the phenomenon of the sharing economy. This was the outcome of two focus group sessions with carsharers and potential carsharers held as part of this study in March 2015 (Ter Berg & Schothorst, 2015). Unprompted, the participants in these discussions mentioned a range of areas in which the sharing economy is active, such as lending tools, offering places to sleep (via Airbnb), borrowing clothes and sharing food. The degree to which they themselves make use of these possibilities varies. Some use Airbnb or share tools. The Amsterdammers see the sharing economy as an emerging phenomenon.

2.2 What does 'ownership' mean to people?

Will 'use' ever completely replace 'ownership'? It does not seem likely. First, consumption has 'external effects' on other people (Mason, 1992). One is the display of wealth. People like to show off expensive things, such as cars, to gain social status. This phenomenon has been observed in all societies. Also, people do not want to be outdone by others. This can be seen, for example, when a Dutch household wins the National Post Code Lottery and the neighbours respond by buying more cars (Kuhn et al., 2011). A second effect is the snob effect, in which people acquire scarce and exclusive products. Similarly, some people buy certain goods and services to belong to a certain social group. However, there are also academics who see sharing as 'innate behaviour', as second nature (Botsman & Rogers, 2011), in which status and expressing a certain identity can play a role: 'you are what you own' could possibly be replaced by 'you are what you share' (Belk, 2014).

Second, experimental studies have found indications that the ownership of luxury goods contributes more to a person's satisfaction with life than (temporary) use (Hudders & Pandelaere, 2015). To a certain extent, ownership appears to generate more satisfaction than use. But in turn, ownership is surpassed by 'experiences'. Many studies show that experiences (going to concerts, eating out, holidays) make people

happier than possessions (clothing, television, car). The enjoyment people obtain from a new possession, such as a car, soon fades, whereas the positive memories of experiences remain (Carter & Gilovich, 2014; Gilovich et al., 2014).

Ownership and experience are not entirely distinct, though. For many people, a car is not only an attractive possession, but also a means of having experiences. Driving a car is an experience in itself because 'going for a drive' is pleasurable and because a car allows you to travel to unknown destinations. Whether a car is a *possession* or an *experience*, therefore, depends on the chosen 'frame', and it does not matter whether someone has 'the experience' with their own car or with a shared car. Research also shows that this high valuation of experiences is associated with the social nature of experience (Caprariello & Reis, 2013), such as going on holiday with family or going out for a meal with friends. Possessions do not have this social aspect to the same degree. Someone can take their friends for a drive in their new car, but most of the time they will use the car on their own (e.g. for the daily commute).

Advantages and disadvantages of ownership

Ownership has both advantages and disadvantages. For example, if you own a house you have the right to use the house, decide what to do with it and enjoy living there. The house is for the exclusive use of the owner, which is considered to be a major benefit. The house is directly available – and the same can be said for a car. Research shows that owners of second homes are unwilling to let them because they want to use them themselves; letting them seems to be a violation of their privacy. Besides, letting your second home makes it less available for your own use (Weinert et al., 2007). Ownership gives full control of the owned object, whereas letting it or lending it to someone involves relinquishing some of that control. A feature of renting and lending is that the tenant or renter can use the product (for a payment), but only for a specific period.

Besides advantages, there are also disadvantages to ownership, referred to as the 'burdens of ownership'. Owners of products run the risk of having bought something they will later no longer need or of buying the wrong product. Moreover, owners are responsible for maintaining and repairing the product and have to bear the full costs, even if the product is only used now and again. Products also have to be stored or kept somewhere (for cars, a parking place). These disadvantages are why a growing number of people are choosing to share instead of own (access rather than ownership). They enjoy the benefits without having to bear the burdens (Chatterjee et al., 2013).

2.3 Carsharing worldwide

The sharing economy may well be on the rise, but in many ways it is not a new phenomenon. This is particularly true for carsharing. The first carsharing scheme, the Schweizer Selbstfahrergenosenschaft (SEFAGE), was launched in Switzerland in 1948. The idea was picked up later in other countries, such as France (Procotip, 1971–1973), the Netherlands (Witkar, 1974–1988), England (Green Cars, 1977–1984) and Sweden (Bilpoolen, 1976–1979).

Various types of carsharing

At least seven types of carsharing schemes are described in the literature (Shaheen et al., 2012). At one end of the spectrum are the commercial car rental firms (e.g. Hertz and Avis) and at the other end are private individuals who share their cars directly, via internet, without going through an intermediary (an example in the United States is RentMyCar). In this study we distinguish between six types of carsharing services, consistent with the classification by CROW/KpVV (2015).

Traditional carsharing

Traditional carsharing involves a fixed fleet of cars owned by a company (an example in the Netherlands is Greenwheels). The company is fully responsible for the cars. The cars are parked at fixed locations and must be returned to those locations after use.

One-way

As in traditional carsharing, one-way schemes are run by operators with their own car fleet (examples in the Netherlands are Car2Go in Amsterdam, a subsidiary of Daimler). However, in these schemes the cars have no fixed parking bays. They can be dropped off anywhere and so they can be used for one-way trips.

Private carsharing

The oldest type of carsharing is between private individuals, such as friends, acquaintances and neighbours. External parties have no part to play and there is no profit motive involved.² In contrast to traditional schemes and peer-to-peer carsharing, private carsharing has no commercial aspect at all.

Peer-to-peer

In the peer-to-peer version of carsharing, individuals offer their car for rental via an online platform (examples in the Netherlands include Snappcar and WeGo). The online platform operator takes care of the legal and administrative aspects.

Business car pools

Pool cars are the carsharing equivalent for the business market and are usually part of a comprehensive 'mobility package' for employees.³

Car rental market

In addition, there is still the 'old fashioned' car rental market, in which many small and a few large companies are active, such as Avis, Hertz and EuropeCar.

Table 2.1 summarises the features of the different types of carsharing and car rental schemes.

Table 2.1 Features of the different types of carsharing schemes. Source: CROW/KpVV (2015).

Type of carsharing	Traditional	One-way	Private	Peer-to-peer	Pool cars (business)	Car rental subscription service
Organisation	Operators with their own fleet	Operators with their own fleet	Private individuals	Open marketplace	Employers or operators	Car rental companies
Examples in the Netherlands	Greenwheels, Connektcar, MyWheels (partly)	Car2Go	MyWheels offers support	SnappCar, MyWheels (partly), WeGo	Alphabet, Greenwheels, MobilityMixx	Call-a-car

Private carsharing, business car pools and the car rental market are not included in this study.

Growth of carsharing

Shaheen and Cohen (2013) have shown that the number of countries where traditional or newer types of carsharing are found and the number of carsharers are both gradually increasing (Table 2.2). In 2010 carsharing schemes had been introduced in 1,100 cities in 26 countries on five continents (Asia, Australia, Europe, North America and South America). In 2014 the number of members had almost reached the five million and the number of shared cars exceeded 100,000. But compared with the total of more than a

² In the Netherlands the VGA (Vereniging Gedeeld Autogebruik, the carsharing society) provides support to people who want to provide this type of carsharing service. For example, the VGA provides assistance with setting up a carsharing group so that several people can use a single car, helps people obtain carsharing insurance, gives legal advice and acts as an agent when applying for extra parking permits in certain cities in the Netherlands (VGA: <https://deelauto.nl/>). Because no research has yet been done into this type of carsharing, there is no information about developments in this area (AEF, 2014).

³ The main players active on this market in the Netherlands are the mobility services providers, such as NS and MobilityMixx. They work with GreenWheels or Connektcar.

billion serviceable cars worldwide, this is still a relatively small number. The authors note that carsharing has developed into a 'mainstream transportation mode' and will continue to grow. More than 70% of the experts consulted by Shaheen and Cohen (2013) assumed that carsharing would continue to grow further in the period to 2020.

Table 2.2 Carsharing survey. Source: Shaheen & Cohen (2013), period 2006-2010; * presentation by Shaheen, GreenDeal, Utrecht, 3 June 2015 (years 2010, 2012 and 2014); ** Navigant Research (2013).

Year	Interviewed experts	Countries with carsharing	Continents	Countries where introduction is planned	Members worldwide	Vehicles worldwide
2006	33	18	4	9	346,610	11,501
2008	22	22	4	7	670,762	19,403
2010*	25	26	5	7	1,163,405	31,967
2012*					1,788,027	
2013**					2,300,000	43,554
2014*					4,842,616	104,125

In 2014 a total of 4.8 million people worldwide took part in carsharing programmes. Research consultants Navigant estimate that this will rise to 12 million in 2020 (Navigant Research, 2013).

Peer-to-peer carsharing

Peer-to-peer carsharing has attracted the attention of researchers. In Europe studies have been carried out in Germany, England, Italy, Portugal and Ireland. The phenomenon has also been studied in the United States, Canada and China. Most of these studies focus on carsharing in specific cities (see Chapter 5). Worldwide, the growth of peer-to-peer carsharing has attracted the most attention. In 2012, 33 organisations were active in various types of peer-to-peer carsharing (Shaheen et al., 2012).

2.4 Traditional carsharing in the Netherlands

Carsharing first took hold in the Netherlands at the beginning of the 1990s (Adviesdienst Verkeer en Vervoer, 1996), partly as a result of incentives by the Ministry of Transport, Public Works and Water Management. The ministry commissioned a feasibility study and helped to set up carsharing projects.

An optimistic scenario: two million carsharers

In the period 1990–2000 the carsharing phenomenon was examined and studied from all angles (Mesken & Veenema, 2000b). The findings of the feasibility study of carsharing for the Ministry of Transport, Public Works and Water Management (AGV, 1993) were positive: carsharing could supplement the existing traffic offer; it could also reduce the number of car kilometres travelled by 3.5 to 4 billion in 2010, when 40% of Dutch drivers, or 2 million people, would use a carsharing service.

The first carsharing initiative was launched in 1994 in Leiden (Huur-op-Maat). This initiative was evaluated, as were later initiatives (Autodelen in Amsterdam and Greenwheels in Rotterdam). These studies also identified potential target groups. The results indicated that the 'leisure' ('hedonists') and 'environment' target groups or segments, which accounted for 16% and 18% of non-carsharers, were most receptive to the idea of carsharing (Wilbers, 1996). The other non-carsharers (66%) were not interested in carsharing.

In 1995 the Dutch carsharing foundation (Stichting voor Gedeeld Autogebruik) was established to provide information, support projects and give advice. In the same year, there were at least 16 types of carsharing scheme under different names in about 160 Dutch municipalities. In mid-1996 the various national schemes had between 12,000 and 15,000 members or subscribers (Sweers, 1996). This development was welcomed by the Ministry of Transport, Public Works and Water Management, because it was thought carsharing could help to reduce the growth in car use. In 1997 the term ‘autodate’ was introduced for a type of carsharing that met a number of conditions: the car had to be available day and night and easily available to members at fixed points in the neighbourhood.

Examples of carsharing schemes



Carsharing in the Netherlands evaluation programme

Under the ‘carsharing in the Netherlands’ evaluation programme a number of carsharing projects were analysed (Meijkamp et al., 1995a; Meijkamp et al., 1995b; Meijkamp & Aarts, 1997; Meijkamp & Theunissen, 1997; Meijkamp, 2000). The researchers concluded that:

- car ownership among members declined from 37% to 20%;
- use of the car was more planned (no longer available outside the house);
- the car was used less (down from almost four to two times a week);
- the number of kilometres travelled declined by 33% (from an average of 8,450 to 5,660 per year);
- shared cars are used intensively, have a shorter life and have to be replaced more often. This has positive effects for the environment: a higher turnover means more newer and cleaner cars on the streets.

The conclusion is that the evaluated schemes make a positive contribution to meeting government objectives such as reducing car ownership and car use.

Evaluation of the carsharing incentive policy

The Dutch government’s incentive policy was evaluated in 2003 (Ligtermoet, 2003). This led to a few surprising conclusions. First, expectations of the number of people making use of carsharing services turned out to have been unrealistically high for many years (2 million carsharers was thought to be a reasonable figure). In 2000 the potential number of members or subscribers was drastically reduced to 200,000–400,000 (Mesken & Veenema, 2000a), but even that proved to be too optimistic. In 2002 there were about 34,000 members of carsharing schemes in the Netherlands. Second, the reduction in the number of car kilometres travelled had to be regularly adjusted downwards. In 1997 a 30% reduction in car kilometres travelled per average member was assumed, but in 1998 this was adjusted downwards to 13%.

The overall conclusion of the evaluation was that carsharing only adds social value in very specific situations. Carsharing is only received well in the big cities where parking is a problem and car ownership is not essential for participating in social life.

Situation in 2015: peer-to-peer carsharing on the rise

Does carsharing still have potential in the Netherlands? Will it remain a niche product, or will it become a dominant form of mobility? There is still interest in carsharing, among both the public and policymakers. This can be seen, for example, in the Energy Agreement for Sustainable Growth, an agreement made in 2013 between more than 40 organisations and the government. It lays the foundation for a broadly supported and future-proof energy and climate policy. Part of the agreement addresses the mobility and transport sector, including a proposal for a long-term public campaign to change the ‘mobility culture’, making it more natural to take public transport or use a carsharing service (Kusiak, 2013). This proposal was taken a step further in the Green Deal on carsharing, signed on 3 June 2015, in which various parties (including operators, insurers, municipalities, businesses and central government) set a target of making a network of 100,000 shared cars available by 2018 (www.rijksoverheid.nl/nieuws/2015/06/03/over-drie-jaar-honderdduizend-deelauto-s-in-nederland.html). They also agreed that in 2025, 10% of the Dutch national car fleet (800,000 vehicles) should be shared cars.

Increasing provision

This study examines three types of carsharing: the traditional type of carsharing service, the one-way variant, and peer-to-peer sharing between consumers (the shaded columns in Table 2.3).

Table 2.3 Focus on three types of carsharing scheme. Source: CROW/KpVV (2015).

Types of carsharing	Traditional	One-way	Private individuals	Peer-to-peer	Pool car (business)	Car rental subscription service
Organisation	Operators with their own fleet	Operators with their own fleet	Private individuals	Open marketplace	Employers or operators	Car rental companies
Examples in the Netherlands	Greenwheels, Connektcar, MyWheels (partly)	Car2Go	MyWheels offers support	SnappCar, MyWheels (partly), WeGo	Alphabet, Greenwheels, MobilityMixx	Call-a-car

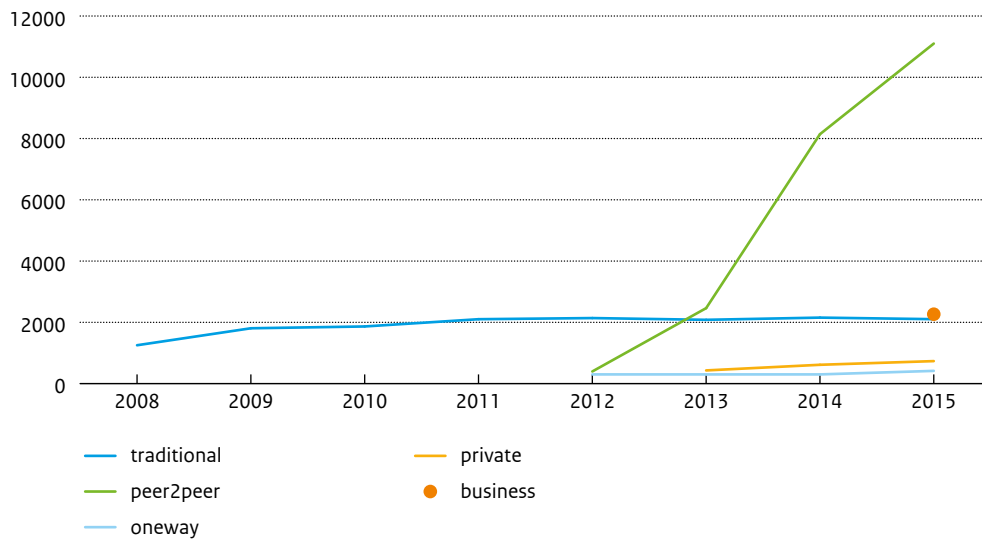
The number of shared cars in the Netherlands has grown considerably in recent years, particularly in the peer-to-peer segment (see Figure 2.1). Nevertheless, the number of car owners that share the use of their car with strangers is a very small proportion of the total. A survey conducted at the beginning of 2015 for the environmental organisation Natuur & Milieu showed that 1% of the respondents made their own cars available for rental via platforms like SnappCar and MyWheels (Kien, 2015).

Peer-to-peer carsharing makes up a rapidly expanding proportion of the total carsharing market (see Figure 2.1), but it still accounts for only a very small proportion of all cars in the Netherlands. Sheeran et al. (2012) asked experts what people find to be the barriers preventing them from sharing their car. The two most important barriers concern insurance and anxiety about strangers using their car. In particular, the high cost of car insurance is a major constraint preventing peer-to-peer carsharing taking off. The interviewed experts consider that many people are still afraid to lend such a valuable possession to others (‘the private vehicle is among an individual’s most valued possessions’). Drivers are not convinced all will end well. However, a screening procedure could take away their fears, for example via a ‘user rating and feedback system’ (Shaheen et al., 2012).

Currently in the Netherlands there are more than 14,000 shared cars available for use by private individuals, 15% of which (about 2,100) in ‘traditional’ schemes and 77% (more than 11,000) in ‘peer-to-peer’ schemes (CROW/KpVV, 2015). The traditional segment has displayed little growth since 2011 and numbers have remained relatively stable. The growth in the provision of shared cars is mainly to be

found in the peer-to-peer segment. In the business segment⁴ there were almost 2,300 shared cars available in 2015.

Figure 2.1 Trends in the numbers of shared cars by type of carsharing scheme in the Netherlands. Source: CROW/KpVV (2015).

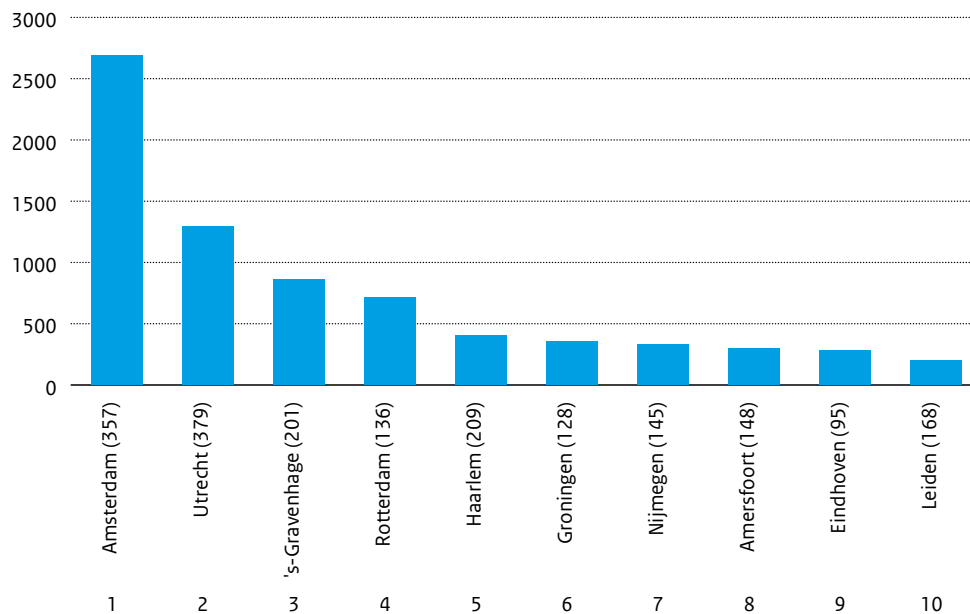


The carsharing market is biggest in the high-density urban areas. Amsterdam has the biggest number of shared cars (2,687), while the highest density of shared cars is found in Utrecht: 379 per 100,000 inhabitants (Figure 2.2). The provision of shared cars is concentrated in the urban areas, although numbers in the rural areas are rising, which can probably be explained by the growth of the peer-to-peer segment since 2012.

⁴ The business carsharing market comes in different forms:

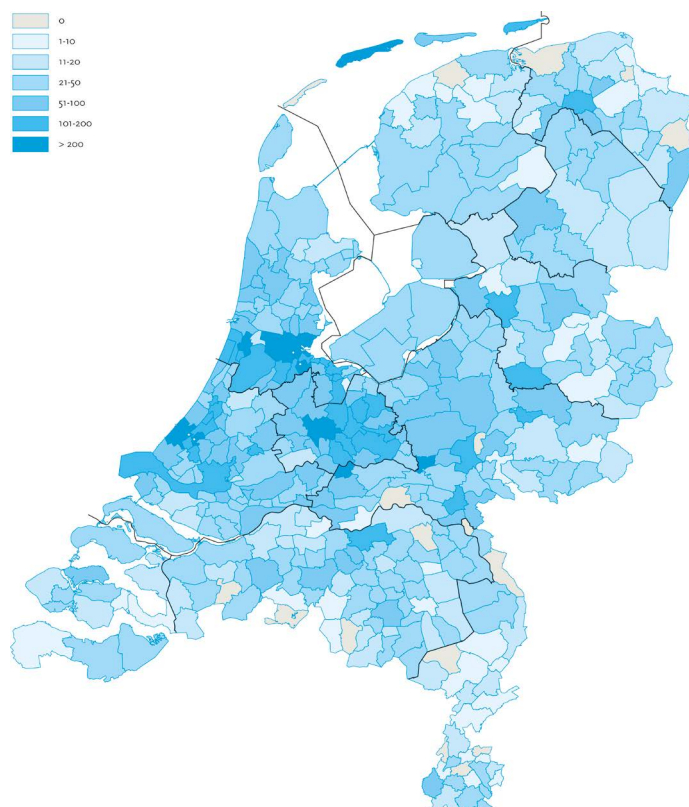
1. company or lease cars can be shared by employees for business use;
2. cars shared with other employers;
3. employees rent their lease car to other private individuals via peer-to-peer platforms;
4. employers have one or more pool cars for business trips. Sometimes employees rent a pool car for private use in the evenings and weekends.

Figure 2.2 Top 10 municipalities for shared cars (number of shared cars per 100,000 inhabitants). Source: CROW/KpVV (2015).



About 96% of Dutch municipalities have some form of carsharing scheme (376 of the 393 municipalities), which means that shared cars are available in almost all municipalities. Figure 2.3 shows the numbers of shared cars per 100,000 inhabitants per municipality.

Figure 2.3 Number of shared cars per 100,000 inhabitants. Source: CROW/KpVV (2015).



3

The carsharing market and user profiles

Just a small proportion of people in the Netherlands make use of one or more types of carsharing services: about 1% of the population aged 18 or above. Most of these people are young, well educated urbanites. More than half of them rent via an organisation, about a fifth rent from private individuals (via an organisation) and more than a quarter do both. Carsharers use cars mainly to visit friends and family, for shopping and to transport heavy objects.

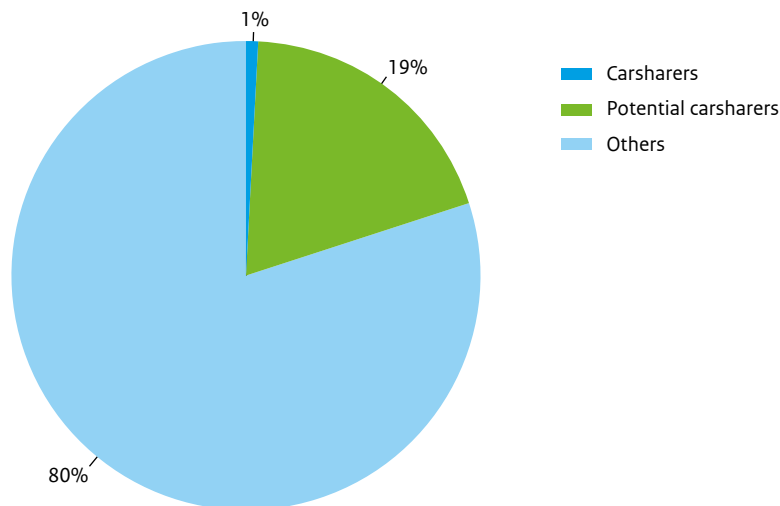
3.1 The size of the carsharing market in the Netherlands

In the previous chapter we saw that the supply of shared cars has increased in recent years. But how much are these cars used? How many people use them, and what types of carsharing services do they use?

A survey by TNS NIPO (*Monitor autodelen 2014*) shows that about 1% of the Dutch population aged 18 and over make use of one or more types of carsharing scheme (TNS NIPO, 2014). This amounts to about 90,000 carsharers in the Netherlands, who account for 0.02% of all car trips made in the Netherlands.

Although the current size of the carsharing market is still limited, almost 20% of the population indicate that they are open to using one or more types of carsharing scheme (Figure 3.1). Most of these people consider renting a shared car via an organisation (13%), followed by renting a car from a private individual (7%) and hiring out their own car via an organisation (4%) (TNS NIPO, 2014).

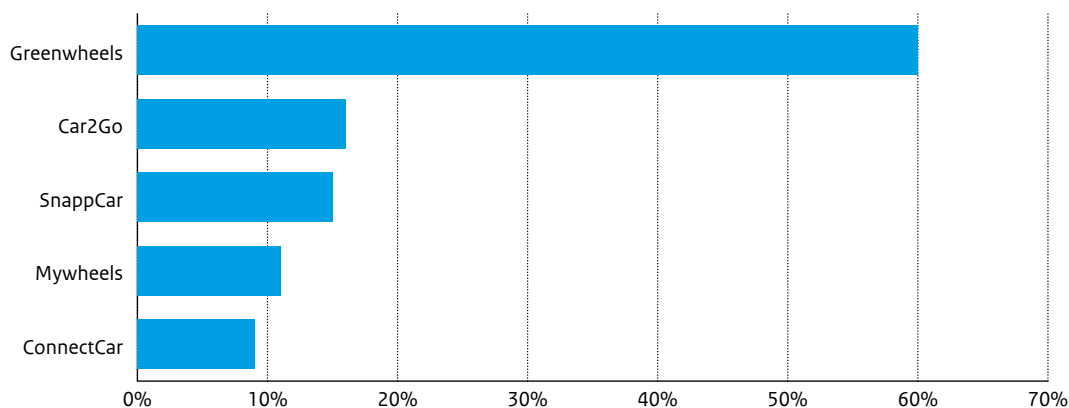
Figure 3.1 Carsharing propensity among the Dutch population. Source: TNS NIPO (2014).



Types of carsharing

The study also provides information about the various types of carsharing schemes that people use. Almost 60% of carsharers use shared cars owned by an organisation (such as Greenwheels) and about 20% rent cars via a peer-to-peer platform (TNS NIPO, 2014). Greenwheels has the greatest share of the market at around 60%. Despite the large number of shared cars on offer via the peer-to-peer market, only 15% of carsharers use SnappCar (Figure 3.2).

Figure 3.2 Proportion of carsharers by operator. Source: TNS NIPO (2014).



3.2 Profile of carsharers

Carsharers: young, well educated urbanites

Three-quarters of carsharers are between 30 and 60 years old. Compared with the total population (over 18 and in possession of a driving licence), the 30–40 age group and, to a slightly lesser extent, the 40–50 age group make relatively high use of carsharing services (Figure 3.3). Nevertheless, the 18–30 age group is also an important user group, which reflects the findings from other Western countries (see, for example, Efthymiou et al., 2013).

If, besides age, household composition is also taken into account, carsharing is particularly popular among young singles (18–40 age group) and households with young children. Another important user group is two-person households (couples without children) in the 50–65 age group.

If a distinction is made by income and educational level, then the users of carsharing services are found mainly in the higher socio-economic classes. In particular, people who rent via an organisation often have a high socio-economic status⁵ (Figure 3.3): two-thirds of carsharers have at least a bachelor's or higher university degree, and most have an above average to very high income. There is a discrepancy between these findings and the findings in the existing literature: according to most studies, carsharing is the preserve of the low to middle income groups (Costain et al., 2012; Douma & Guag, 2009), although many do have a relatively high level of education (Efthymiou et al., 2013).

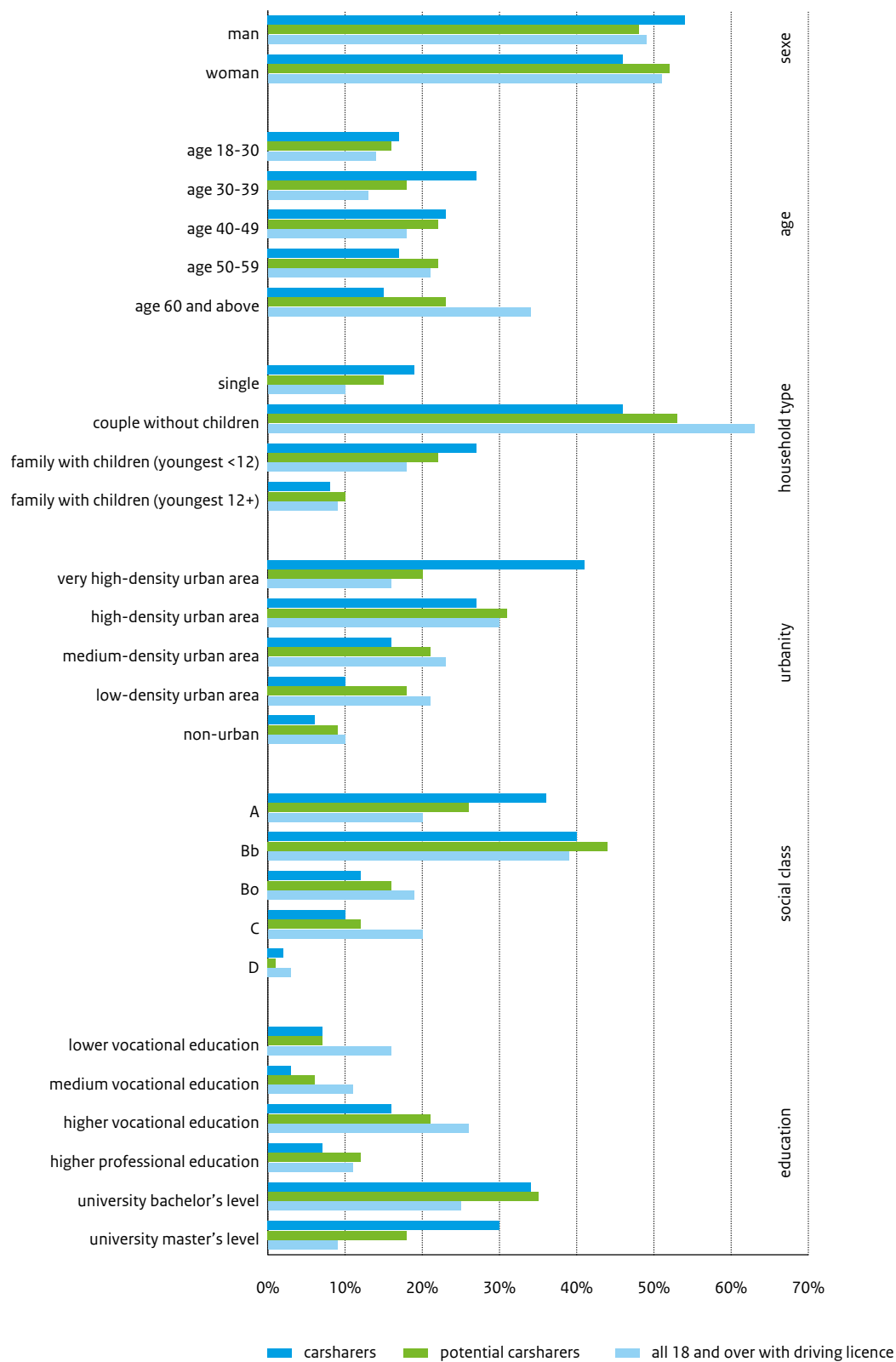
Carsharers are overrepresented in the very high-density urban areas: more than 40% of carsharers come from these areas, whereas just 15% of the total population (over 18 and in possession of a driving licence) live in these areas (Figure 3.3). Carsharers are underrepresented in rural areas (non-urban areas). The finding that carsharing is primarily an urban phenomenon is consistent with the findings of previous studies of carsharing in other European and North American countries (Costain et al., 2012; Cervero, 2003; Shaheen & Rodier, 2005; Burkhardt & Millard-Ball, 2005).

Potential carsharers: not so young and less urban

The group of potential carsharers (people who intend to start carsharing in the next few years) have a profile that is more or less in middle ground between existing carsharers and the general public (Figure 3.3). An interesting aspect is that women are more likely to consider carsharing than men (in contrast to the actual users). The vast majority of people who are considering carsharing are also residents of high-density urban areas (in contrast to the actual users, who mostly live in very high-density urban areas).

⁵ The distinction between social classes is based on a classification commonly used in marketing studies in the Netherlands, in which the population is divided into five segments (also called 'income groups'; Kotler et al., 2013). The A segment is the wealthiest and includes directors of large companies, top civil servants and members of the liberal professions (about 10% of the population). The Bb segment is the upper middle class and includes directors of smaller companies, the upper segment of professional and tradespeople, higher level civil servants and senior managers (about 10% of the population). The Bo segment is the lower middle class and includes civil servants in middle level positions and the middle segment of professional and tradespeople (more than a fifth of the population). The C segment is the less well-off and includes small shopkeepers and traders, lower level office personnel and skilled workers (about 40% of the population). The D segment is the least well-off and includes unskilled workers (about 15% of the population).

Figure 3.3 Carsharers and potential carsharers by demographic and social characteristics. Source: TNS NIPO (2014); adapted by KiM.

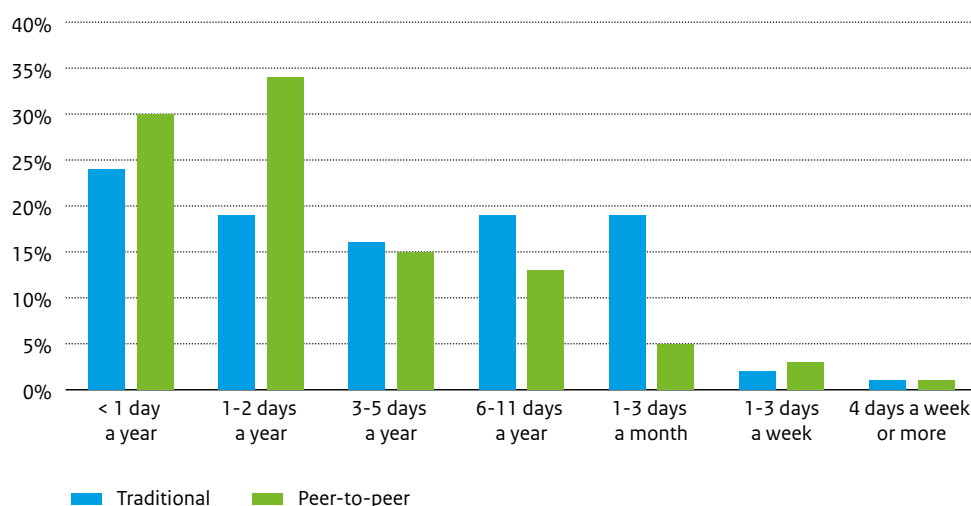


3.3 Traditional and peer-to-peer carsharers

More than half of all carsharers rent cars via an organisation (such as Greenwheels or Car2Go). One in five carsharers rent cars from private individuals (via an intermediary organisation like Snappcar) and more than a quarter rent via organisations and from individuals.

Very few people use carsharing services to meet their daily travel needs. Most people make incidental use of these services. Roughly half of the carsharers who rent cars via organisations say that they do so on average less than three times a year. Of the carsharers who rent from private individuals, almost two-thirds say they do so less than three times a year. Together these account for 0.02% of all car trips in the Netherlands. People rent cars from organisations more often than from private individuals. Only a small minority rent a shared car each week (Figure 3.4)

Figure 3.4 Frequency of use of carsharing services. Source: TNS NIPO (2014); adapted by KiM.



Carsharers that rent cars via an organisation (e.g. Greenwheels) are on average older than carsharers who rent from individuals (Figure 3.5). A quarter of peer-to-peer renters are younger than 30, compared with just over a tenth of traditional carsharers. In both relative and absolute terms, most carsharers are adults between the ages of 30 and 40. Carsharing is also popular among those in their forties, although this age group mainly prefers the traditional type of carsharing.

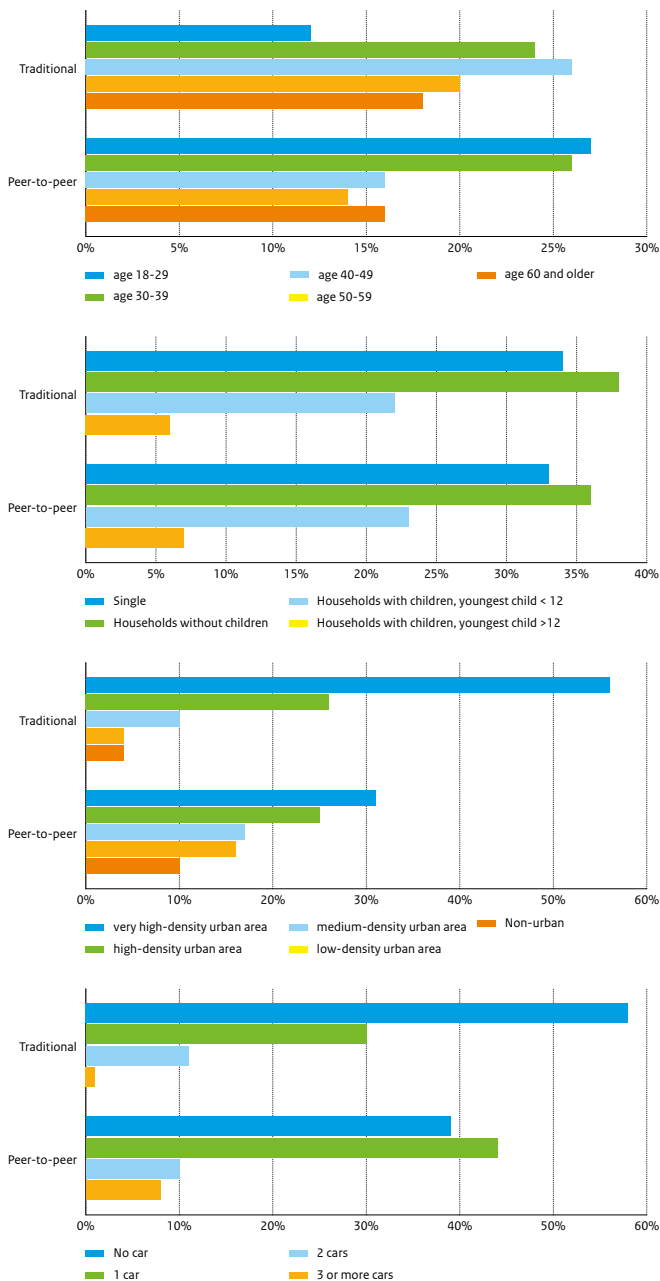
If, besides age, household composition is also taken into account, peer-to-peer carsharing is particularly popular among young singles (35 years and younger) and households with young children (Figure 3.5). Another important user group is two-person households (couples without children) in the 50–65 age group. Traditional carsharing is used by more or less the same groups, along with singles older than 40. Men are somewhat overrepresented among the traditional carsharers, whereas women are overrepresented among peer-to-peer carsharers.

An analysis of the income and educational level of carsharers shows that on average the users of traditional types of carsharing services more frequently come from the highest socio-economic class than peer-to-peer carsharers: almost 40% of traditional carsharers have a gross annual household income of 50,000 euros or more, as opposed to 15% of peer-to-peer carsharers (among whom the group with a low income is proportionately larger). A breakdown by educational level gives a similar pattern. Almost two-thirds of traditional carsharers have completed a bachelor's or higher degree course as opposed to almost 50% of peer-to-peer users (a larger proportion of whom have a lower and secondary level vocational education).

The vast majority of people who use carsharing services via an organisation (more than 80%) live in high-density to very high-density urban areas (Figure 3.5). Most car renters also live in very high-density urban areas, but car renters are found more frequently in the less urbanised areas than traditional carsharers.

Almost half of all carsharers do not own their own cars. Almost 60% of people who rent cars via an organisation do not have their own cars, but among people who rent from a private individual this figure is about 40% (Figure 3.5) More than a third of carsharers own one car. Carsharers who have two or more cars make up just a small minority of all carsharers.

Figure 3.5 Carsharers by age, household composition, residential environment and car ownership. Source: TNS NIPO (2014); adapted by KiM.



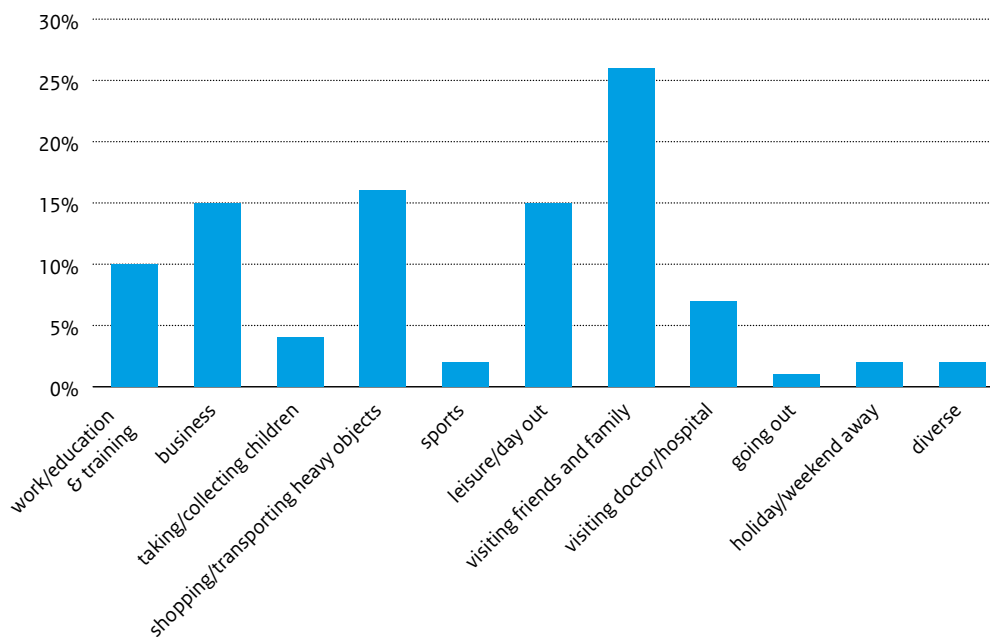
3.4 Trip characteristics

Trip purposes

TNS NIPO asked respondents to its survey to state the purpose, the destination and the distance travelled for the last two trips they made using a shared car. No distinction was made between the type of carsharing service (rented via an organisation or from a private individual).

The most frequently mentioned reason for using a shared car is to visit friends or family (Figure 3.6), which accounts for more than a quarter of all trips. Other frequently mentioned reasons are shopping and/or transporting heavy objects (e.g. visiting a home furnishings shopping mall), recreational trips (a day out) and business trips; each of these reasons accounts for about 15% of the trips. Travelling to and from work or training course accounts for a tenth of all shared car trips.

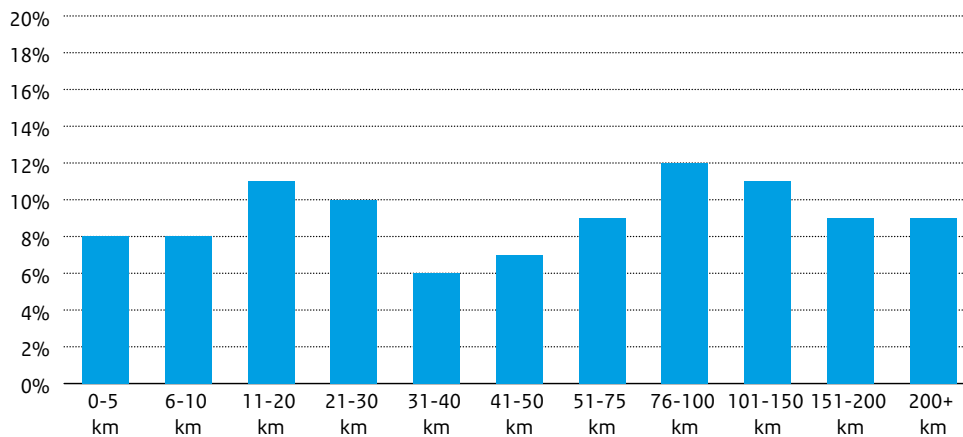
Figure 3.6 Carsharing trip purposes. Source: TNS NIPO (2014); adapted by KiM.



Distances

Most carsharing trips are for medium to long distances: almost three-quarters of the trips are over 20 kilometres and half are more than 50 kilometres (Figure 3.7). About one in ten trips are over distances of no more than 5 kilometres. Most trips longer than 20 kilometres are made to visit friends or family or for recreational purposes and day trips.

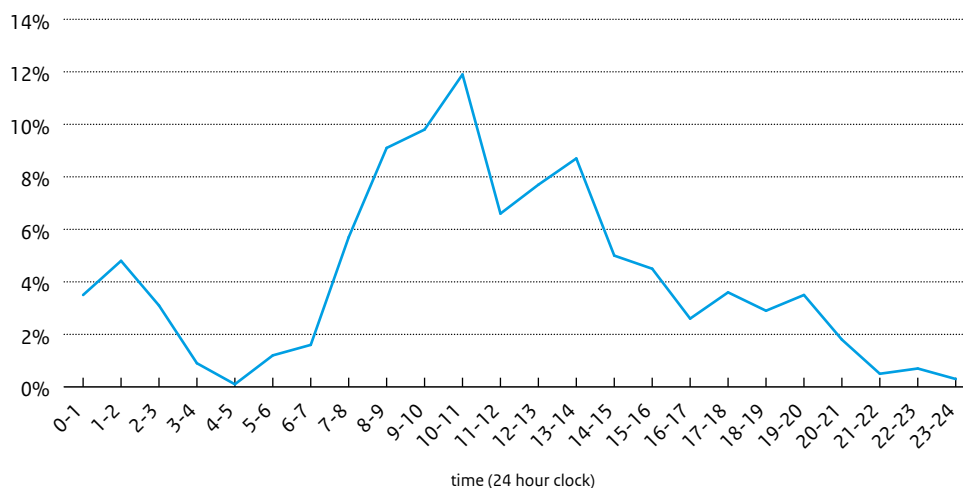
Figure 3.7 Breakdown of carsharing trips by distance travelled. Source: TNS NIPO (2014); adapted by KiM.



Time of travel

From the information on the last two trips it is estimated that 40% of carsharing trips are made during the weekend. About 10% of all trips take place during the morning rush hour (between 8 and 9 a.m.), but the busiest time is a little later in the morning (between 10 and 11 a.m.) (Figure 3.8). An interesting finding is that a relatively high proportion of carsharing trips are made during the night (but given the limited numbers, care should be taken about drawing any conclusions from this observation).

Figure 3.8 Distribution of departure times of carsharing trips. Source: TNS NIPO (2014); adapted by KiM.



4

Motives, experiences and preferences

People choose a carsharing option for their trips mainly for financial reasons. Convenience is also a motive, but environmental and sustainability considerations are of minor importance. Being able to pick up a car that is available nearby in the neighbourhood and easy to use is considered to be an advantage. The fact that an organisation arranges everything (assistance following breakdowns, fines, cleaning, etc.) is also a plus point. Stated preference research shows that carsharers want low running costs and a short walking distance to the car.

4.1 Motives for carsharing

In the literature three factors are mentioned that can stimulate carsharing:

- *Saving money.* Money is a key motive. The evaluation study 'Carsharing in the Netherlands' (*Gedeeld autogebruik in Nederland*) revealed that the cost of running a car is an important reason for people to rent or share cars. Meijkamp (2000) also comes to the conclusion that people who have a clear idea of the real (fixed and variable) costs of running a car are more inclined to start carsharing. In principle, the lower costs of carsharing make it accessible to lower income groups. Recent research shows that carsharers find it financially advantageous to use carsharing services (Ettema & De Gier, 2015). Environmental considerations generally play little part in the decision. Neither do users have the idea they are part of a specific social group with the same lifestyle and/or shared goals (Lindloff et al., 2014).
- *Convenience,* such as not having to find a free parking place (Theunissen & Meijkamp, 1997). Conversely, the inconvenience of alternative means of transport is also mentioned in the literature as a reason for carsharing. Some carsharers think that public transport takes too long and/or is too expensive (Mesken & Veenema, 2000b).
- *Enjoyment,* particularly the carsharing experience itself. People are responsive to attractive styling, design and status. At first sight there would not appear to be much 'enjoyment' to be gained from carsharing. The design of 'traditional' shared cars (Greenwheels, Connektcar) is not particularly appealing (they are standard models, sometimes in bright or gaudy colours). Moreover, these cars cannot be said to have much status; it is clear to everyone that they are hire cars and the driver is not the owner. The situation is different for peer-to-peer carsharing: the carsharer can choose from a cross-section of the Dutch national car fleet, including more expensive and attractively designed models that exude status. Some people exploit this and promote 'hedonistic' products with slogans like 'Be James Bond for the day' (Moeller & Wittkowski, 2010).

The carsharers and potential carsharers that took part in the Amsterdam focus group sessions were asked what motivated them to start carsharing and how heavily those reasons weighed in their decision-making. A distinction was made between the motives of carsharers (people who have made use of carsharing services during the past year) and those of potential carsharers (people who expected to make use of a carsharing service over the coming year).

Motives of carsharers

The carsharers came up with a wide range of reasons for carsharing. Some have to do with the convenience of carsharing and others with not having a car or no longer owning a car:

- relaxed;
- easy;
- go anywhere;
- availability;
- parking place;
- driving an electric car;
- no private running costs;
- no fuss / Periodic inspection;
- not owning a car;
- ideological;
- safety late at night;
- relatively cheap;
- faster than public transport.

For one reason or another most carsharers in this group do not have or no longer have their own car. Some became unemployed and lost their lease car, or their car had simply come to the end of its useful life. Others found their car to be too expensive in relation to how often they used it. A few participants used carsharing services as an alternative to owning a second car; they share their own car with their partner and use a carsharing service when their own car is not available (in use by their partner).

Most carsharers clearly have a number of reasons for using carsharing services. Once people have taken the plunge and start using a carsharing service, they find that the vehicles are readily available, it removes a lot of the bother of car ownership (cost, parking in the city) and that it is cheaper than owning your own car.

‘Carsharing has turned out to much better than I thought. I really like it. It’s so easy. Using the app and unlocking and starting the car is never any trouble. And being able to leave the car anywhere you want is just so convenient.’

Motives of potential carsharers

The reasons why potential carsharers consider taking up carsharing are varied:

- a desire to be less dependent on public transport;
- a handy ‘second car’ (for car owners);
- helping to build an ideal society in which 80% of cars on the road are shared cars;
- an alternative when their own car comes to the end of its useful life.

Interestingly, environmental and sustainability considerations have little or no influence on the thinking of potential carsharers. The costs of owning and running a car and the convenience of carsharing carry greater weight.

The barriers to carsharing are largely situational. For potential carsharers who currently have their own car, carsharing only comes into the picture when they sell or scrap their own car (e.g. when it can no longer be repaired). Some barriers are to do with how the carsharing schemes work: for example, being tied to fixed times is felt to be a restriction of personal freedom.

Topic of conversation / social environment

Carsharing is a topic of conversation among friends and work colleagues. Carsharers tend to promote the benefits of carsharing and the subject also comes up occasionally in conversations between potential carsharers and their friends and work colleagues. Shared cars have become a standard part of the Amsterdam street scene and almost everyone knows someone who uses them.

‘I’ve taken a few people for a test drive to show them how easy and practical it is and how fast an electric car can go.’

‘It’s a fun topic of conversation at dinner parties. A friend of mine and her partner had two cars, but moved in together and now have just one parking permit. She’s now also planning to carshare because of what I’ve told her about it.’

The participants in the focus group sessions saw many positive sides to carsharing: it comes across as unselfish, it is innovative, something for early adopters, it leads to fewer cars on the street, and carsharers receive positive comments about it. But the participants thought it was going too far to say that if you carshare, or are thinking of doing so, it says a lot about who you are.

Cost comparison

Although costs are mentioned as a motive for carsharing, in practice people do not seem to take the trouble to make a proper analysis of the cost differential between running their own car and using a carsharing service. Just a few carsharers said they had compared the cost of carsharing with renting a ‘normal hire car’ or had calculated how many kilometres they would have to drive a car to financially justify owning it.

Personal circumstances prove to have a major influence on the perceived usefulness of a cost comparison. Some potential carsharers said they would only consider switching to carsharing when their car needs to be replaced, which is when they would compare the costs. They also said the relevance of making a cost comparison depends on what car they currently own.

4.2 The perceived advantages and disadvantages of carsharing

The focus groups also discussed the advantages and disadvantages perceived by potential and actual carsharers. The discussions were based on traditional carsharing (via an organisation) because this was the most common experience among the participants. The advantages and disadvantages of peer-to-peer carsharing (via private individuals) received less attention.

The perceived advantages and disadvantages of carsharing

Carsharers and potential carsharers alike consider the main benefit to be the peace of mind it gives them (Table 4.1): the availability of cars in the neighbourhood, the convenience of carsharing and an organisation that takes of everything if the car breaks down or you get a traffic fine, etc. These are concrete advantages for carsharers and anticipated advantages among potential carsharers.

Table 4.1 The perceived advantages of carsharing

Carsharers	Potential carsharers
<ul style="list-style-type: none"> • number of cars • in the neighbourhood • peace of mind / on demand • availability • neutrality, anonymous • rapid reservation • filling up without money • electric cars: no filling up • positive comments from other people • per hour instead of per day (hire cars) • ‘planning’ (compelled) • always a parking place • system: public transport smart card 	<ul style="list-style-type: none"> • organisation to fall back on: take care of everything in the event of unforeseen circumstances • knowing where you stand, security • convenience • reliable car • availability • what you see is what you get • firm agreements • clean and tidy cars • reward (Car2Go) • insurance / roadside assistance and recovery service • good for your image (Car2Go) • in the neighbourhood

The perceived disadvantages of carsharing

The disadvantages experienced by carsharers relate to price and the constraints of fixed time limits. They also mentioned ‘incidents’, such as times that there was no car available or the tank was empty, or when the car did not start. Potential carsharers foresee other disadvantages as well, such as the restricted range of Car2Go, the limited availability of Greenwheels and disadvantages that reduce convenience, such as limited availability, having to return the car to the same parking bay, online reservation and the use of cards (Table 4.2).

Table 4.2 The perceived disadvantages of carsharing

Carsharers	Potential carsharers
<ul style="list-style-type: none">• expensive option• fixed-period reservation• stress of returning the car on time• subscription/membership costs• car does not start• no time to get to know different model• ugly logo• delivery failure• no car• empty tank• interior not clean• car not suited to activity	<ul style="list-style-type: none">• relatively expensive• fixed period• inconvenience of online reservation and use of card• Greenwheels only available in the big cities• range of Car2Go• must be a subscriber/member• ‘station based’ scheme sometimes a problem

The focus group discussions suggest that the Amsterdam carsharers consider convenience to be a key benefit of their carsharing experiences. Other advantages they mentioned were having a parking place, lower costs compared with owning a car and vehicle availability. At the same time, major disadvantages were not having access to a car when needed, the relatively high costs and the stress of having to return the car on time. For potential carsharers, the major benefits are the perceived reliability, the availability of vehicles rented via organisations and the convenience (everything arranged for you, cars in the neighbourhood). On the other hand, the expected cost and having to register with the scheme are major stumbling blocks.

Findings from the literature

Disadvantages of carsharing mentioned in the literature are mainly the costs (Theunissen & Meijkamp, 1997) and not having a car available outside the house (Theunissen & Meijkamp, 1997; Mesken & Veenema, 2000b). Having to walk long distances to the car is perceived to be a negative point (Lindloff et al., 2014:230).

Another important disadvantage of carsharing mentioned in the literature is that it is more difficult to express one’s identity and status with the car than with an owned car (Frenken, 2013). Cars are felt to be more than just a means of transport. They are ‘positional goods’ that express the owner’s status or social standing. Given that many cars are parked on the street and are visible to other people, they have for a long time been used as a way of showing how well off you are.

Carsharing via an organisation (such as Greenwheels) offers limited opportunity to express personal identity, because the vehicles on offer are from a limited number of models of a single make and in one colour (the small Peugeot 107 city car, the larger Peugeot 207 Estate and the Volkswagen Caddy minivan, all in red). Some firms do have a more varied range. It has also been pointed out that renting or hiring a product can in fact raise one’s social status. Some products, such as designer handbags, quickly go out of fashion and renting such products is a way of keeping up with the latest trends at a reasonable cost. (Moeller & Wittkowski, 2010). People can also express their identity via other types of consumer goods than cars, smartphones being a good example (Frenken, 2013).

The perceived advantages and disadvantages of peer-to-peer carsharing

The focus group sessions concentrated mainly on the advantages and disadvantages of traditional carsharing (via an organisation). Less attention was given to peer-to-peer carsharing, because the participants had had little or no experience with this form of carsharing. Nevertheless, enough is known about the advantages and disadvantages of peer-to-peer carsharing from the results of surveys conducted in the United States and Germany.

Residents of San Francisco and Oakland (California) know more about traditional carsharing than the possibilities for peer-to-peer carsharing. In both cities, residents say that convenience and availability (vehicles available from various locations throughout the city) are the most important advantages of peer-to-peer schemes, followed by economic aspects (cheap compared with owning a car or traditional carsharing). Many respondents were less enthusiastic about sharing their own car, though. About half of all respondents were concerned about who would be liable if there was an accident and had little faith in potential renters (Ballús-Armet et al., 2014).

Similar results were obtained from a study in Portland (Oregon), where users of peer-to-peer schemes were asked about their reasons for joining these schemes. Important motives were that membership was free (and so they had nothing to lose), that they thought peer-to-peer carsharing was a worthwhile idea, and that owning their own car and traditional carsharing were both too expensive (Dill et al., 2014).

In Germany, the 'traditional' DriveNow, owned by BMW, Mini and car hire firm Sixt, was compared with tamyca, a peer-to-peer platform. Saving money was the most important reason for using both of these carsharing schemes. But there were also differences. DriveNow was valued in particular for its convenience, because it provides easy and quick access to a car. The tamyca peer-to-peer scheme was considered to be more sustainable. German consumers think this form of carsharing is better for the environment (Balck & Cracau, 2015).

4.3 Preferences for carsharing schemes

To supplement the study on the motives for and experiences of carsharing, research was conducted into the preferences of Dutch drivers, based on the different aspects of carsharing. In cooperation with Eindhoven University of Technology, a stated preference study was carried out and analysed using discrete choice models. A detailed description of the method and results is given in Dieten (2015). From the existing literature and focus group sessions (see also sections 4.1 and 4.2) it was concluded that at least the following seven features play a part in people's decisions on whether or not to use a carsharing scheme:

- cost (price per kilometre or per hour);
- maximum walking distance to the car (5, 10 or 15 minutes);
- whether or not reservation is necessary;
- station based or free-floating;
- reserved parking spaces for carsharers or not;
- personal contact prior to use or not;
- electric or fossil fuel car.

Different combinations of these features, in the form of fictitious carsharing schemes, were presented as options in a questionnaire to a large group of respondents (n = 525). The results show the respondents' preferences and indicate their likelihood of selecting specific types of carsharing schemes (with a given set of features) for specific types of trips (trip purpose).

The main results are summarised in Table 4.4. This shows that five of the seven features listed above significantly increase the likelihood of participating in a carsharing scheme.

Table 4.4 Preferred features of carsharing schemes. Source: Dieten (2015).

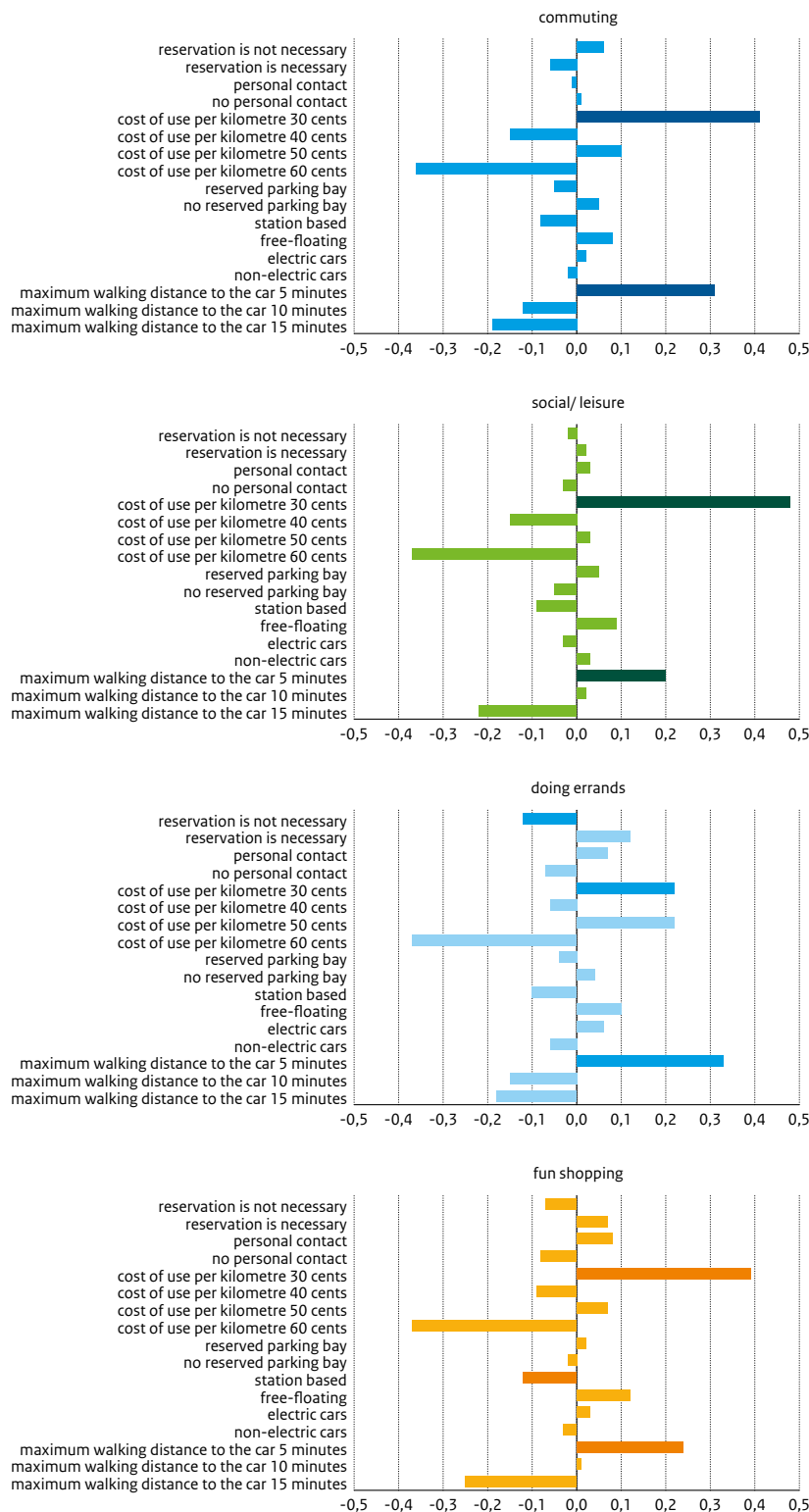
1. Low cost: 0.3 euros per kilometre
2. Short walking distance (no more than 5 minutes) to the car
3. Free floating (no requirement to return the car to the same place)
4. Reserved parking bay
5. Electric car

The lowest possible cost of use and a short walking distance to the pick-up point are preferred for all types of carsharing schemes, irrespective of other features and trip purpose (shopping, recreational shopping, social and recreational trips, and work-related trips). Although of less importance and not shown in Figure 4.1, there seems to be a preference, depending on the model of car chosen, for a one-way carsharing scheme in which the car can be left at a different location after use. In other words, people prefer not having to return the car to a fixed drop-off point. In addition, a reserved parking bay is an important consideration and electric cars are preferred for shopping and commuting trips.

Less important features are having to reserve the car beforehand (the results indicate that this is only significant for shopping trips) and personal contact. These features have little or no influence on the propensity of Dutch drivers to use carsharing schemes.

In short, cost (in particular, the lowest possible cost of use) and convenience (in particular, a short walking distance, no fixed drop-off point and a reserved parking bay) are the most important features for the Dutch when considering using a carsharing scheme.

Figure 4.1 Carsharing preferences by trip purpose.⁶ Source: Dieten (2015).



⁶ The coloured bars are the coefficients estimated using a multinomial logit model (see Dieten, 2015). The darker coloured bars indicate a significant coefficient (95% confidence interval).

5

Success factors for carsharing

An important success factor for carsharing is support from the local authority, such as providing parking permits for shared cars and indirectly by discouraging car ownership and the use of private cars. A large and diverse vehicle offer is also important. The relatively large number of shared cars in Amsterdam, for example, not only improves the accessibility of carsharing services but also increases the familiarity of the concept (the cars are in effect mobile advertising hoardings). A third success factor is convenience. A free-floating system in which the car does not have to be returned to the same place offers greater flexibility and freedom than a station based scheme. A fourth success factor is linkage with public transport. For example, in Switzerland there are special carsharing bays at railway stations and public transport stops. A final success factor is how the carsharing schemes are promoted, for example through target-group marketing.

5.1 Cases in the Netherlands and elsewhere

The success of carsharing schemes is determined not just by what users want, such as low costs and convenience, but also to different degrees by a whole range of contextual factors (such as the composition of the population) and the institutional context in which the schemes operate (for example the availability or not of subsidies and cooperation with public transport companies). Based on experiences with carsharing schemes in recent years in various cities in Europe and North America, we can identify a number of such success and failure factors which can provide inspiration for the further development of carsharing in the Netherlands. In this chapter we examine the success and failure factors for carsharing schemes in Germany, Switzerland and Canada. But first we look at the experiences with carsharing in Amsterdam since it was first introduced.

5.2 Carsharing in the Netherlands: Amsterdam

The first form of carsharing to appear in Amsterdam was the Witkar ('white car'), which was introduced in 1968. The idea, conceived by the Luud Schimmelpennink (a city councillor and ex-member of the Dutch Provo counterculture movement from 1965 to 1967), was for a fleet of small pay-as-you-go electric cars similar to golf buggies. By spring 1969 there were to be 'at least 500' in operation, but this target was never achieved. In the end there were 35 Witkar vehicles and five charging stations.

In 2009, Schimmelpennink presented plans to reintroduce the Witkar, but so far nothing has come of them. Nevertheless, other operators of 'traditional' carsharing services are active, including Greenwheels, Connectcar, Diks, Drive and Wheels4All. The carsharing scheme that attracted considerable media interest on its launch in Amsterdam in 2011 was Car2Go: 300 electric Smart cars available for use within the city by subscribers. The cars can make use of the existing charging infrastructure. The introduction of Car2Go is part of an experiment by Amsterdam City Council in which operators with electric cars can make a total of 750 of these cars available in the city (a maximum of 350 per operator).

The success of carsharing in Amsterdam is due in part to the large number of vehicles available and the variety of cars on offer. Several hundred cars are available in the city, which means that there is always a car available within walking distance – in sharp contrast to the few dozen Witkar vehicles that were available in the 1970s. Moreover, the relatively large number of shared cars increases the visibility of carsharing (the cars double up as mobile advertising hoardings). This would suggest that a certain critical mass is needed for success. A pilot project in Nijmegen also shows that carsharing can be stimulated by providing an attractive pool of cars (under the motto ‘supply creates its own demand’). When additional cars were added to the existing pool it led to a considerable growth in the number of subscribers (Martens, 2009).

A second success factor is support from the local authority. The Witkar did not get the active support from Amsterdam City Council that the current carsharing schemes enjoy. Car2Go has been offered parking permits that are valid across the whole city, whereas the Witkar received little political support. The lack of support for the Witkar meant that the project failed to scale up sufficiently to make it viable: ‘Neither the City Council nor any organizations of national government – or any European institutions for that matter – made a serious effort to understand the concept and to extend it beyond the first small demonstration project’ (Britton, 2014: 12).

A final success factor is the ease of access to shared cars nowadays. The failure of the Witkar project has been ascribed to the long charging times of the electric vehicles and the fact that some charging points were regularly overfull while others remained empty (Schuessler, 2012). Reserving a car was also a difficult process. Reserving shared cars was still quite a complicated process during the 2000s, but today apps give real-time information on the cars so that users can immediately see where they are and what condition they are in. No complicated procedures are needed before departure. The cars can be unlocked with a smart card and the cost is calculated and charged automatically. Car2Go’s free-floating service offers greater convenience than station based services, as users can leave the car wherever they want.

5.3 Carsharing in Germany: Berlin and Bremen

The ‘carsharing capital’ of Germany is Berlin. In recent years carsharing has rapidly grown in popularity in this city. At the beginning of 2015 there were ten carshare operators active in the city, six of which use the station based system (start and finish at the same place) and the other four are free-floating services (no fixed pick-up and drop-off points).

The station based carshare operators (Flinkster, Greenwheels, Cambio, HertzOnDemand, Stadtmobiel and CiteeCar) have a combined fleet of more than 630 cars and an estimated 10,000 customers. The free-floating carsharing services introduced in Berlin since 2011 (in order of introduction, DriveNow, Car2Go, MultiCity and SPotCar) have many times that number: at the beginning of 2015 they had a combined total of more than 2,500 cars and more than 200,000 customers (Senatsverwaltung Berlin, 2015). In 2014, each day on average 12,000 trips were made with shared cars in Berlin and each car was used an average of four times per day (Senatsverwaltung Berlin, 2014). Although the use of carsharing services is increasing rapidly, the number of trips made by shared car as a proportion of all trips is still small.⁷

What has led to such rapid growth in the provision and use of shared cars in such a short time? First, a certain critical mass of cars would appear to have been exceeded, leading to strong growth in the use of carsharing services. Cars are now widely available and users can choose from a range of different models, which has increased the visibility of the carsharing concept and reduced the walking distance to the nearest car to a minimum. Ease of use is also mentioned as a success factor. Parking costs are detected via GPS systems and automatically debited each month. It is all taken care of for the user, who is not

⁷ To illustrate, in Berlin 32% of all trips are made by car, 26% by public transport, 29% by foot and 13% by bicycle (2008 figures). There are indications that car use has been declining in recent years while cycling has considerably increased (Senatsverwaltung Berlin, 2014).

immediately aware of the costs involved. In fact, the costs of using free-floating carsharing services are higher than station based services. These higher costs apparently do not outweigh the advantages of the flexibility and convenience of free-floating schemes (Senatsverwaltung Berlin, 2015).

Curiously enough, while the city of Berlin is open to new mobility solutions and new carsharing services, it does not provide any incentives to encourage such schemes (such as subsidised parking places and permission to use bus lanes). There is, however, an increasing sense of urgency for a policy to regulate the use of parking places by carsharing services, to coordinate and link carsharing services with public transport, and to stimulate the use of electric vehicles, for example by installing more charging places and points. (Senatsverwaltung Berlin, 2014).

Another German city where carsharing is becoming a success is Bremen (Glotz-Richter, 2015). Among the operators active in Bremen is Cambio, which has a fleet of more than 200 cars and over 10,000 customers. Cambio claims that its customer research shows that carsharing in Bremen has led to a fall in the number of private cars in the city by 2,200 (Glotz-Richter, 2015). Based on initial information, the city council has drawn up a carsharing action plan in which it sets a target of having at least 20,000 carsharers by 2020, and a concomitant reduction in the number of private cars of at least 6,000. The success factors the council intends to create are additional space for shared cars (for example by creating dedicated parking bays in new residential developments and redevelopments), coordinating and linking carsharing with public transport (such as multimodal ticketing and payment systems) and provision of information and marketing (Glotz-Richter, 2015).

5.4 Carsharing in Switzerland

Carsharing in Switzerland dates back to 1948, when residents of a housing cooperative in Zurich decided to share a number of cars. Following this and a few other local initiatives, in 1987 two cooperatives were established to share cars on a larger scale. In 1997 these organisations merged under the name Mobility (see www.mobility.ch). This carsharing scheme now virtually has a monopoly position in Switzerland and has more than 11,000 members (out of a total population of about 8 million). The scheme has 2,700 cars in nine categories (from small city cars to cabriolets and delivery vans).

Cars are available from 1,400 locations in 500 municipalities across the country, both in the cities and in rural areas. Besides station based cars (which have to be returned to the same place), a free-floating system has been recently introduced in which cars are not restricted to fixed locations and can be dropped off elsewhere. This free-floating variant is currently only on offer in Basle (under the name 'catch-a-car').

Mobility works closely with Swiss Federal Railways. Parking bays are provided at railway stations and public transport stops so bus and train passengers can use shared cars to continue their trip. This linkage between public transport and the carsharing scheme seems to be one of the reasons for Mobility's success.

Over the years the company has made ambitious agreements on the provision and use of their cars not only with Swiss Federal Railways but also with local authorities. It has also made bilateral agreements with various companies on reduced tariffs and the use of specially reserved fleet cars (for specific industrial estates or office parks). These extensive local arrangements and agreements with a range of actors makes it difficult for other carsharing services to compete with Mobility, which has virtually no competitors. The success of Mobility is also partly responsible for the very limited market for peer-to-peer carsharing in Switzerland.

Another important reason for the success of Mobility is the company structure: a cooperative in which private individuals can also participate – anyone can become an 'owner' of a piece of the company by making a one-time payment (e.g. CHF 1,000). Users who are members of the cooperative (as 46% are) enjoy special privileges, such as no subscription costs and a special rate for the use of the cars. Of course,

it is also possible to register as a member and rent cars at the standard subscription rate and variable user costs (as do 54% of all users). Because Mobility is a cooperative it is seen as being more in touch with the public and can justifiably call itself a social enterprise.

When considering how Mobility operates it should be remembered that the Swiss population is wealthy and so owning a car is still the default situation for many people (on average the Swiss spend 10% of their income on mobility, and 90% of all households own one or more cars). The indications that a growing number of people aim to live a 'car-free life' can be seen as both an opportunity and a threat. This applies in particular to young adults living in urban areas. Carsharing presents an alternative to owning a car, but if young adults also put off getting a driving licence, or give up on the idea altogether, carsharing will of course also not be an option. In response to this, Mobility is now offering driving lessons to young people in the hope they will become future customers.

5.5 Carsharing in Canada: Toronto and Vancouver

Several different carsharing services operate in Canada. One of the oldest schemes is Modo (since 1997), with more than 250 locations, 300 cars and about 10,000 members. In addition, AutoShare has been operating in Toronto since 1998 and has 220 cars and over 10,000 users. Another relatively large player, which has been operating in Canada and the US since 2000, is Zipcar. This company operates 10,000 vehicles across the whole of North America, 350 of which are in use in Toronto. Car2Go is active in various Canadian cities, including Vancouver, with 700 cars and 40,000 members. The most recent entrant onto the carsharing market is Student Carshare, which has been operating since 2014 from 36 university campuses across Canada.

Like Mobility (Switzerland), Modo operates as a cooperative and members can buy a share of the business. In recent years the cooperative aspect of 'sharing' and the associated sustainability ideal has been displaced by the entry of new market players. Zipcar and Car2Go, for example, are more interested in providing convenience and savings. In the words of Kevin McLaughlin, director of AutoShare in Toronto: 'It took us years to figure out that the green part is not the reason people were joining. People were joining because carsharing was convenient and saved them money' (in: Pachner, 2010).

Vancouver has recently been dubbed the carsharing capital of North America (Jackson, 2014): the high density of locations and people and the high costs of car ownership are the main explanations for the success of carsharing in Vancouver, according to Car2Go, Modo and Zipcar. Over the past few years these companies have experienced rapid growth in Vancouver.

The composition of the population, the local geography and a high quality public transport system that can complement carsharing all seem to be critical conditions for successful carsharing services as operated in Vancouver. Success can also be achieved by targeting specific groups, as Zipcar has shown with its marketing aimed at young hipsters (offering alternative 'cool' cars and having a presence at social events the target group attends in large numbers).

Policy also contributes to the success of carsharing in Vancouver. The city council discourages private car ownership by setting high parking charges, while reserving special parking bays for carsharing vehicles, which makes parking much easier. Carsharing is also an explicit element of the city's mobility policy.

5.6 Success factors summarised

The first success factor, which can be found in all the cases, is support from the local authority. For example, Amsterdam facilitated the Car2Go initiative by offering the company parking permits that are valid across the whole city. The electric cars can make use of the existing charging infrastructure. In Vancouver, the city council's policies make an indirect contribution to the success of the carsharing services because the high parking charges discourage private car ownership.

The second success factor is the number and variety of cars on offer, often combined with high building densities so that large numbers of people are within a short distance of a shared car. In Amsterdam the relatively large number of shared cars not only improves the accessibility of carsharing services but also increases the familiarity of the concept (the cars are in effect mobile advertising hoardings). A critical mass has now also been reached in Berlin: cars are widely available and users can choose from a range of different models, which has increased the visibility of the carsharing concept and cut the walking distance to the nearest car to a minimum. The Swiss case shows that a large number of cars does not have to be limited to high-density urban areas: carsharing services are available throughout the whole country, not only in the cities but also in rural areas.

The third success factor is convenience. In Amsterdam, for example, digital aids (such as smartphone apps) make it easy for users to find a suitable car. This is the case in other cities as well. Moreover, in Berlin parking costs are detected via PGS systems and automatically debited each month. Convenience also depends heavily on whether the carsharing service operates a station based system or a free-floating system in which the car does not have to be returned to the same place; the latter offers greater flexibility and freedom.

The fourth success factor is coordination and linkage with public transport. In Switzerland the federal public transport operator works closely with the carsharing scheme and designated parking bays have been provided at various railway stations and public transport stops.

The final success factor is the way the carsharing services market and promote themselves. The Swiss carsharing scheme Mobility, for example, is run as a cooperative which private individuals can also buy in to. This allows the company to promote itself as a social enterprise, which by implication is more in touch with the public. Another technique is marketing to specific target groups, as shown by Zipcar in Canada with its marketing geared to young hipsters.

The key lessons from the cases are summarised in the table below.

Success factors	
Support from politicians and government officials	<ul style="list-style-type: none"> • support from politicians and government officials (urgency) • providing and administering parking permits • providing charging infrastructure for electric vehicles • ensuring linkage with public transport • providing public information on carsharing and marketing activities • high parking charges
Scale and diversity of vehicle offer	<ul style="list-style-type: none"> • number and variety of vehicles on offer • urban design (high building densities), although the Swiss case shows that carsharing can also be profitable in rural areas (to supplement or replace public transport).
Convenience and flexibility	<ul style="list-style-type: none"> • easier access to the carsharing service • easy processing of user and parking charges • availability of a free-floating system
Linkage with public transport	<ul style="list-style-type: none"> • presence of high quality public transport systems to complement carsharing services
Marketing and promotion	<ul style="list-style-type: none"> • promotion as a social enterprise (cooperative) • targeting specific user groups • visibility in the street

6

Impacts of carsharing⁸

Carsharing has impacts on car ownership, car use, the environment, use of public space and economic welfare. Dutch carsharers now possess at least 30% fewer cars than before they started carsharing. Carsharers travel by car about 20% less kilometres than before they started carsharing. This reduced level of car ownership and car use results in an 8–13% reduction in CO₂ emissions per person per year. Shared cars also lay claim to less space because they need fewer parking places, saving about 120,000 m². The benefits to society are slightly positive.

6.1 Determination of impacts

One of the goals of this study is to estimate the possible impacts of carsharing on car ownership, mobility, sustainability and economic welfare. In this chapter we make an estimate of the changes in mobility as a result of carsharing. To do this the TNS NIPO market research agency carried out a questionnaire survey among 363 carsharers from a representative panel. The questionnaire was a supplement to the TNO NIPO carsharing survey (*Monitor autodelen*) of 853 respondents held in mid-2014 (see also Chapter 1).

To obtain an impression of the changes in mobility, the respondents were asked about their current car ownership and use and their car ownership and use before they started carsharing. They were also asked what their car ownership and use would have been if they had not started carsharing. In planning and economics research this is called the baseline alternative. At first sight, one would expect that the impact of carsharing on the car ownership of a respondent who owned one car before and after starting carsharing would be zero. However, it is perfectly possible that because that person started carsharing they decided not to buy a second car. In that case, carsharing has had a real effect on car ownership, even though it may not be immediately obvious. In view of this, Shaheen (2012) drew a distinction between observed and unobserved effects. Both are included in this study. The survey did not only ask about car use, because carsharing will meet part of people's mobility needs that were previously met by other modes such as bus, train or a borrowed private car. Information about this was also collected.

To find out what impacts carsharing has on mobility and environmental quality, we compared the situation before carsharing with a hypothetical baseline alternative. Ideally, the difference between the two is the impact of carsharing. However, other factors also affect travel behaviour. Major changes in people's personal lives, such as moving in together, divorce, a new job and having a baby, are often reasons to reconsider ingrained mobility choices (see, for example, Verhoeven et al., 2005; Prillwitz et al., 2006; Oakil et al., 2014). To isolate the effect of carsharing as much as possible, the respondents who said they had been through a life-changing event during their carsharing period were initially excluded

⁸ This chapter was prepared in cooperation with PBL Netherlands Environmental Assessment Agency and is based in part on the ideas of Nijland et al. (2015), who describe the effects of carsharing on mobility and CO₂ emissions.

from the analysis. The disadvantage of this approach is that it reduced the number of respondents to 165. However, we do state what the conclusions would have been if this group had been included in the analyses.

Changes in travel behaviour will have consequences for the resulting emissions. To determine the changes in emissions, the actual emissions of the various modes of transport, such as private cars, shared cars, train, bus, etc., have to be calculated. There are three accepted methods for calculating these CO₂ emissions:

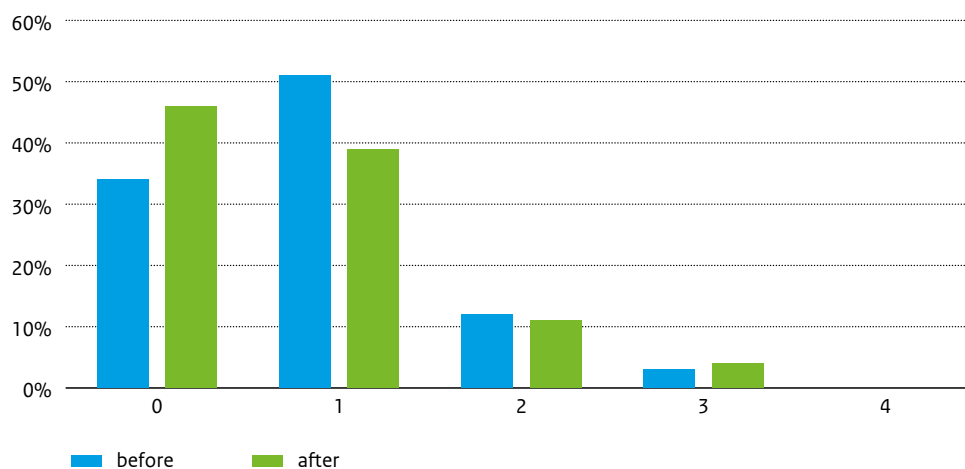
- The tank-to-wheel method (TTW), in which only the emissions from the exhaust pipe are measured. The advantage of this method is the ready availability of good coefficients for various modes of transport. This method does not allocate any emissions to electric trains, because these are emitted from the power station and not from the train.
- The wheel-to-wheel method (WTW), which also includes emissions produced during the manufacture of the fuel (petrol/diesel or electricity). This method includes CO₂ emissions from train kilometres travelled.
- Life cycle analysis (LCA), which takes into account the emissions from the construction and dismantling of the car (or other form of transport).

In this report we use the WTW approach to compare the travelled kilometres (Otten et al., 2014), after which we use the LCA approach to calculate the effects of changing car ownership.

6.2 Impact on car ownership

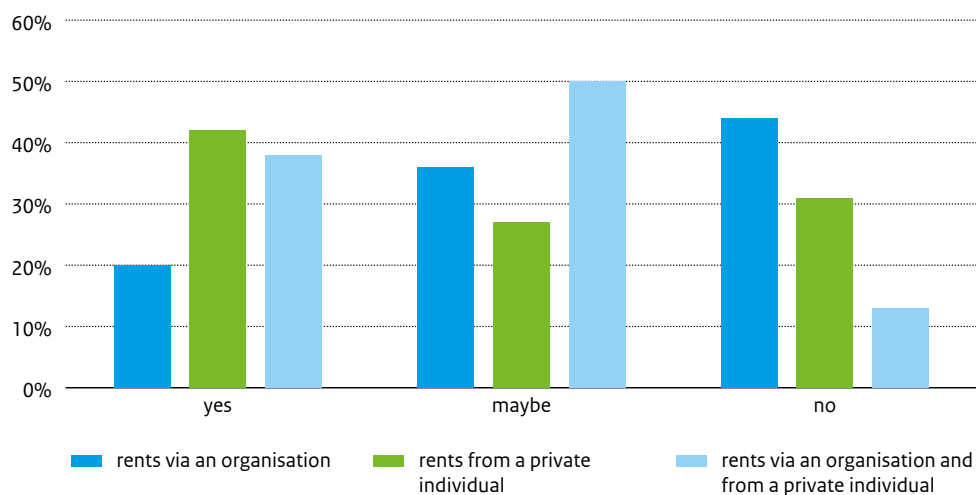
Since respondents started carsharing, their level of car ownership fell from an average of 0.85 cars per household to 0.72 cars per household (Figure 6.1). This decline was caused mainly by a reduction in car ownership among the traditional carsharers.

Figure 6.1 Distribution of (observed) number of cars per household before and after starting carsharing. Source: Nijland et al. (2015).



A large proportion of carsharing is an alternative to car ownership, according to 20% of the carsharers who rent via an organisation and 40% of the carsharers who rent from private individuals (Figure 6.2). A striking finding is that those who rent from a private individual see carsharing as a ‘replacement’ for their own car more than those who rent from an organisation. Moreover, 37% of those people who owned a car said they would have bought an extra car if they had not taken up carsharing instead. For them the shared car appears to have the same function as a second car. Of the people who did not have a car beforehand, 8% would have bought a car if they had not started carsharing. If we also include the unobserved effects, car ownership among the respondents fell from 1.08 per household in the baseline alternative to 0.72 per household now, a reduction of 0.36 cars per household.

Figure 6.2 Answers to the question: ‘Would you buy a car if you had not started carsharing?’ Source: TNS NIPO (2014); adapted by KiM.



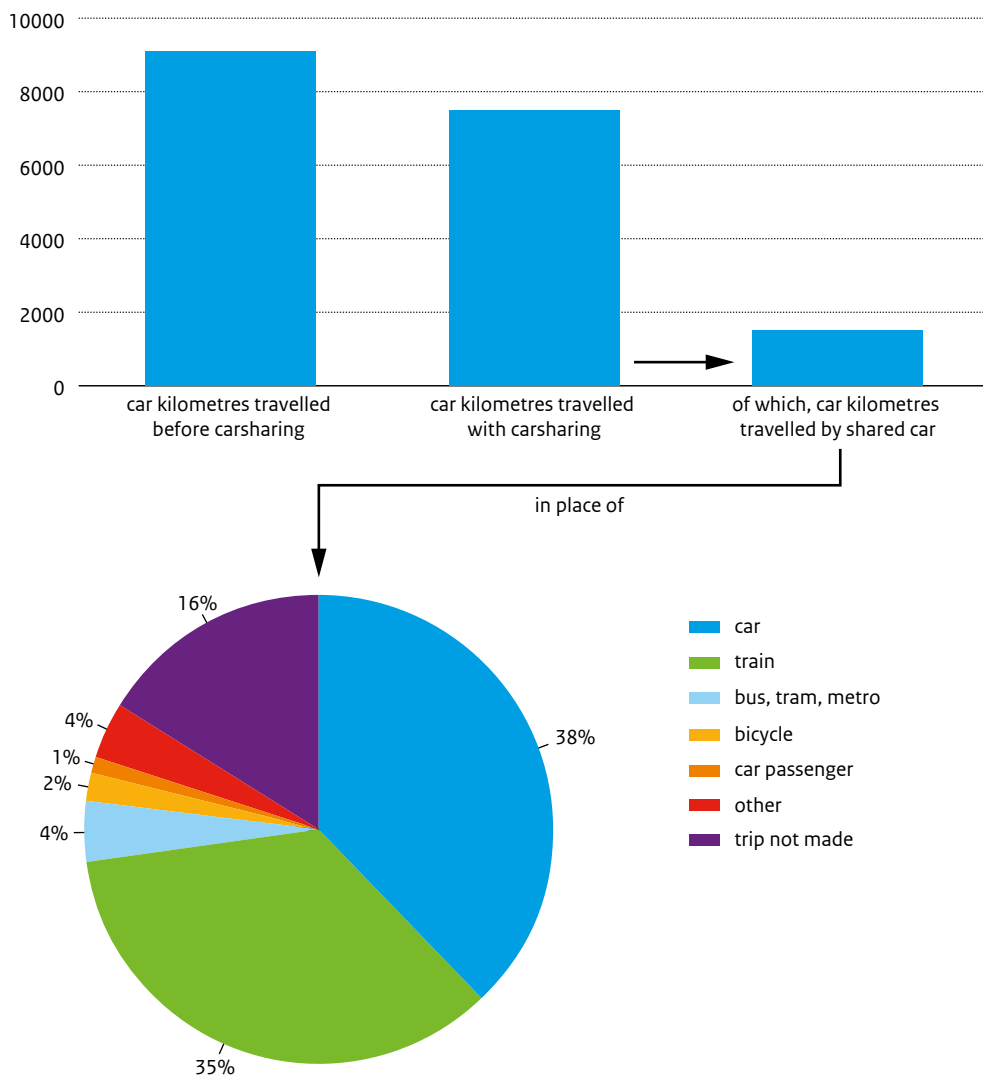
Previous research for the ‘Carsharing in the Netherlands’ evaluation programme in the mid-1990s showed that car ownership among carsharers fell from 47% to 20% (Meijkamp & Theunissen, 1997). More recent European research shows that families that use carsharing services on average own fewer cars than families that do not. These households decided either to sell or dispose of their own cars or not buy a car after all. Depending on the study and the country in question, 16% to 40% of carsharers sell or dispose of at least one car (Momo, 2009).

Carsharing in Amsterdam was evaluated in 2006 (Eerdmans et al., 2006; Nanninga & Eerdmans, 2006), when there were three commercial carsharing companies active in the city, with 464 cars and about 4,000 subscribers in total. The study revealed that, compared with the situation in Germany and Switzerland, the cars were not used very intensively. Nevertheless, positive effects were found. Carsharing led to a considerable reduction in car ownership among the carsharers. Each shared car replaced 3.14 privately owned cars. In 2009, another study was done of carsharing in Amsterdam (De Jong & Jakobs, 2009). In that year there were five carsharing organisations active in the city, including Greenwheels and ConnectCar. The conclusion of this study was again that the level of car ownership had declined. Before taking up carsharing, 37% of the households owned one or more cars and during the period of carsharing this fell to 16%.

6.3 Impacts on car use and on the use of other transport modes

Before they started carsharing, carsharers drove on average about 9,100 km per year. Now they drive considerably less, on average about 7,500 km per year. That is 1,600 km less per year, with a 95% confidence interval of 350–2,900 km per year.⁹ This reduction is mainly due to the people who sold their cars driving much less than before. Of these 7,500 km, 1,500 were travelled in a shared car. Those trips used to be made using a different form of transport or not at all (Figure 6.3). Carsharing has a clear impact on use of the private car: almost 40% of carsharers say they make less use of their own car, a borrowed car or a rented car. A further 40% of carsharing is an alternative to using public transport. Moreover, 16% of the kilometres driven in shared cars would never have been made if the drivers had not been able to use a carsharing service (Nijland et al., 2015). In other words, 16% of carsharing kilometres do not replace trips made by another form of transport, but are in fact additional mobility.

Figure 6.3 Kilometres driven by carsharers before and after starting carsharing and breakdown of trips made previously by another transport mode. Source: Nijland et al. (2015).



⁹ The confidence interval is large because the net sample size is small.

Previous studies also found that carsharing leads to a reduction in car use. Shaheen et al. (2012) observed a fall in the number of kilometres driven of about 40% and a fall in car ownership of about 25%. Earlier, Meijkamp (2000) surveyed 3,000 Dutch respondents. The results of his questionnaire showed that carsharers drove two-thirds fewer kilometres than when they owned their own car, down from 13,380 to 4,730 per year. Most of this reduction could be attributed to people who used to own a car but switched to carsharing.

The reason for the drop in the number of kilometres driven, according to many researchers, is that people take a more critical look at their own mobility needs or desires. There is no car outside the house and in many cases the shared car has to be reserved in advance. As this requires a certain amount of planning, habitual behaviour patterns can more easily be broken (Meijkamp & Arts, 1997). People can decide to use a shared car, but in the first instance they tend to consider alternatives, such as cycling for shorter distances. It has also been observed that over time carsharers tend to make less use of shared cars. The users, it is said, not only get an increasingly accurate picture of the costs, but in time also learn to appreciate the advantages of other modes of transport. This is called the 'learning curve of carsharing' (Momo, 2009).

In the previously mentioned study in Amsterdam, De Jong and Jakobs (2009) came to the conclusion that carsharing leads to a reduction in the number of kilometres driven. Almost 80% of carsharers drove less in shared cars than in their own car, 7% drove more and 14% drove the same distance.

The results of the 'Carsharing in the Netherlands' evaluation programme back this up. Members and subscribers of carsharing schemes made less use of the car. This reduction in car use was found across all types of carsharing. Four types of carsharing schemes were evaluated in the first round and another four in the second round. In all cases, car use declined (by 43% in the first group and by 15% in the second group). People made more frequent use of the bicycle (+5% and +10%), the train (+7% and +16%) and urban public transport (+5% and +12%).

A similar picture emerged from a qualitative study in Bath, England (Chatterjee et al., 2013). In-depth interviews with users of carsharing services revealed that the respondents made more use of public transport, walked more, shopped online more often (including fewer trips to the supermarket) and some no longer travel at all. Their car use declined over the long term (Chatterjee et al., 2013).

In general, the picture that emerges from the international literature is that carsharing has a positive impact (reduction) on car ownership and the number of car kilometres travelled (Shaheen et al., 2012; Baptista et al., 2014). However, the results of these studies differ considerably (the reduction in the number of car kilometres travelled varied from 3% to 67%) and they cannot easily be compared because they were carried out in different cities and countries and under different conditions.

Although we may conclude that carsharing has a positive impact on car use, the effects could be counterproductive in the long run. Innovations may turn out differently than intended or anticipated. In Berlin, for example, there are signs that free-floating carsharing services are replacing walking, cycling and use of public transport (Harder, 2014). The study also indicated that shared cars are almost as inefficient and take up almost as much space as privately owned cars. The shared cars are driven for 62 minutes each day and so they take up a parking place for almost 23 hours of the day. Private cars are used for 30 to 45 minutes each day in the city.

6.4 Environmental impacts

Carsharing has a positive impact on the environment. It reduces the number of car kilometres travelled, which means fewer exhaust emissions, including CO₂, NO_x and PM₁₀.

Calculations by Nijland et al. (2015) show that carsharers drive on average 1,600 fewer kilometres per year than they did before they started carsharing (see section 6.3). That delivers a reduction of 250 kg CO₂, with a 95% confidence interval of 50–450 kg. However, some of the kilometres now travelled by shared cars used to be made by more environmentally friendly modes of transport (public transport, bicycle) or not made at all. Because carsharers now use a car instead of another form of transport, they contribute to an additional 160 kg of CO₂ emissions, with a 95% confidence interval of 90–230 kg.¹⁰ Taking into account both the number of car kilometres travelled and the shift in transport mode, the reduced car use by carsharers leads to an annual reduction in CO₂ emissions of 90 kg.

However, car ownership also involves CO₂ emissions. The manufacture and dismantling of a car requires the use of raw materials and energy. If these are also taken into account, the reduced car ownership among carsharers leads to a reduction in CO₂ emissions of 85–175 kg per household per year.¹¹

Table 6.3 summarises the effects of the changes in car ownership and car use on CO₂ emissions and shows that on average carsharing reduces the CO₂ emissions caused by each respondent by 175–265 kg. This is equivalent to a reduction in emissions associated with car ownership and use of about 8–13% (Nijland et al., 2015). The reduction in combustion emissions of PM₁₀ and NO_x from car use is about 13%.

Table 6.3 Changes in CO₂ emissions per person per year resulting from changes in car ownership and use. Source: Nijland et al. (2015).

	kg CO ₂
Change in car kilometres travelled	-250
Change in transport mode	+160
Change in car ownership	-85 to -175
Total	-175 to -265

Many other studies have also found that carsharing has positive environmental impacts. Momo (2009) reviewed six studies in various European countries (Switzerland, Germany, Belgium, Italy and Great Britain) and compared the CO₂ emissions of shared cars with those of private cars. In general, emissions from the shared cars were 20% lower than from private cars. Other, foreign studies produced similar results (Prettenthaler et al., 1999). This can be partly explained by the fact that carsharing organisations often choose light and fuel-efficient cars which have a lower environmental impact (Meijkamp, 2000). The cars are also on average newer than most private cars, so they are equipped with the latest technologies to reduce fuel consumption and emissions (Mono, 2009).¹²

The results obtained by Nijland et al. (2015) are based on analyses of the group of carsharers who had experienced no life-changing events in their personal lives since they started carsharing. This is because such events tend to lead people to reconsider their travel behaviour. It is then often not entirely clear whether or not a change in mobility can be attributed to the switch to carsharing or to a change in

¹⁰ These figures are based on measured emissions corrected for passenger load factor.

¹¹ This is based on the assumption that during the service life of a car 10–20% of the CO₂ emissions are from the manufacture and dismantling stages (see, for example, Samaras et al., 2008; Gbeghaje-Das, 2013). It is assumed that a car has a service life of 15 years and clocks up a total of 250,000 km, and that an average of ten people use a shared car.

¹² If the shared car is used primarily as an alternative to a second car, the effect will be more limited (small cars, but possibly on average older).

personal circumstances. If the group of carsharers who did experience a life-changing event had been included in the analysis, the effects on car ownership and use would have been somewhat larger. Average car ownership per household would not have fallen by 0.36, but by 0.40, and car use would not have fallen by over 1,600 km per year, but by almost 1,800 km per year. These figures should be treated with caution because the sample is based on a limited number of respondents and it is by no means certain that the respondents drive less because they started carsharing rather than for other reasons. On the other hand, all the differences in car ownership and use between the before and after situations are statistically significant. This is at least a very strong indication that the differences can be attributed to carsharing.

Caution is also required because the numbers of kilometres the respondents drove in the past were estimated by them, even the figures for the most recent years. Their memories may not be reliable. Moreover, they may have a psychological bias towards the idea that they drive less now than they used to, which would mean that the results of this study overestimate the effects of carsharing.

Many respondents said they would have bought an extra car if they had not taken up carsharing. In the absence of any reliable comparative data, no additional kilometres have been attributed to these additional cars that were not bought. Nevertheless, it is conceivable that if someone had an extra car on the driveway instead of a shared car a few streets away, they would have used their own car more often. In this respect, the figures presented here are more likely to be underestimates rather than overestimates of the effects (Nijland et al., 2015).

6.5 Impacts on the use of space

Carsharing saves space because fewer parking places are needed (Meijkamp, 2000). According to Mono (2009), shared cars replace four to eight private cars, releasing 36–84 m² of space. According to calculations by Nijland et al. (2015), car ownership among carsharing households has fallen by 0.36 cars per household. Assuming 90,000 carsharers and an average household size of 2.12 people (Statistics Netherlands), there are 41,000 carsharing households. These households therefore own almost 15,000 fewer cars (41,000 * 0.36) than they did before they started carsharing. As a parking place takes up about 8 m², the reduction in the number of cars by 15,000 works out to be a saving of 120,000 m² of space, an area the size of 24 football pitches.

6.6 Social cost-effectiveness

Little is known about the social cost-effectiveness of carsharing. CE et al. (2014) made a largely qualitative analysis of the nature of the costs and benefits and their size (relatively large or small). CE et al. (2014) divide these costs and benefits into three categories:¹³

1. Costs/benefits to the *users*: these include the costs of using a shared car, if applicable the avoided costs (= benefits) of a privately owned car (petrol, taxes), the additional costs of using other forms of transport than shared cars when someone no longer owns their own car, the convenience or loss of convenience of a private car, etc.
2. Costs/benefits to the *government*: these include the costs of government information campaigns promoting carsharing, loss of tax revenues (excise duty, car and motorcycle tax) due to fewer privately owned vehicles, etc.
3. Costs/benefits to the *rest of society*: these include benefits in the form of avoided pollution and CO₂ emissions and the resulting health benefits, the benefits of fewer or shorter traffic queues, reduced need for parking spaces, etc.

¹³ Not all these costs have been monetarised. For example, the loss of convenience when someone no longer has their own car cannot be given a monetary value.

The social costs are the sum of these three categories of costs and benefits.

CE et al. (2014) came to the conclusion that the social cost-effectiveness of carsharing is about zero – depending on the context it is either just cost-effective or just not cost-effective to society, and the net costs and benefits are generally limited.

Divided between the three categories listed above, the outcome is as follows:

1. Users: have net benefits (by definition)
2. Government: has net costs
3. Rest of society: have net benefits +

4. Social costs: net benefits or net costs, but limited.

It is important to note that the researchers *assumed* that the users have net benefits, reasoning that otherwise they would not make use of carsharing services. By definition, these people use carsharing services voluntarily (no coercion).

The net benefits to the users, depending on the type of carsharer, are the sum of various different costs and benefits. A particularly influential factor is whether or not the carsharer used to own a car. For the first group of users, the shared car is a second car or substitute for a second car; for the second group of users the shared car is an addition to the available alternative transport modes (especially public transport and bicycle).

Among the benefits to the first group of users (who used to own a car) are the avoided costs of owning a car, but they lose the convenience of having their own car. The second group of users (who did not own a car) enjoy the benefits of the convenience afforded by carsharing, so the argument goes, but they face costs they did not have before, such as a loss of health or fitness due to less use of the bicycle (replaced by use of shared cars).

7

Conclusions and future outlook

What trends can be seen in carsharing and how widespread is carsharing now in the Netherlands? Who uses carsharing services and for what purposes, and what are their motives for doing so? What are the impacts of carsharing on car ownership, mobility, the use of space and economic welfare, and how are these trends expected to develop in future? What lessons can we learn from examples of carsharing schemes in other countries? These were the main questions this report sought to answer. Based on quantitative and qualitative research, we have answered these questions.

7.1 Use of carsharing services

90,000 carsharers and 14,000 shared cars in the Netherlands

The number of shared cars in the Netherlands has increased rapidly over the past few years, especially in the peer-to-peer segment. In the Netherlands there are currently more than 14,000 shared cars available for use by private individuals, 15% of which are 'traditional' rental cars and 77% are 'peer-to-peer' cars. About 1% of the Dutch population aged 18 and over has used one or more types of carsharing service. This amounts to about 90,000 carsharers in the Netherlands, who account for 0.02% of all car trips made in the Netherlands. The number of carsharers is therefore still small and consists mostly of a group of early adopters in urban areas, often young and single or in a family with young children, well educated, carless and with an active social life. Shared cars are used mainly for visiting friends and family, and most people use them only occasionally. Most carsharing trips are medium to long distance and made in the weekend. About 10% of all trips are made during the morning rush hour (between 8 and 9 a.m.).

Lower levels of car ownership, fewer car kilometres travelled, reduced CO₂ emissions, reduced use of space by cars

Ownership of cars among carsharers is about 30% less than before they started carsharing. Shared cars are used mainly as an alternative to a second or third car. Carsharers drive about 80% of the total distance they did before they started carsharing, with those who sold or disposed of their cars cutting back the most on the distance they drive. Shared cars are used for trips that used to be made mainly by train, a privately owned car or a borrowed or rented car. Because carsharing leads to a reduction in car ownership, it reduces the associated CO₂ emissions in the Netherlands by an average of 8–13%. It also reduces the amount of parking space by an estimated 120,000 m², about the area of 24 football pitches. The social cost-effectiveness of carsharing is more or less zero: depending on the context, it is either just about cost-effective or just fails to be cost-effective to society.

Success factors for carsharing

The foreign carsharing schemes that were studied and the stated preference research indicate that six factors have an influence on carsharing. First, there needs to be a clear local parking policy that favours carsharing, such as parking permits for shared cars and high parking charges for private cars. Second, the number and variety of shared cars on offer is important, in combination with a high building density to ensure that many people have access to a shared car within a short distance. Carsharers place great store on a short walking distance to pick up a car and the availability of a car close by in their neighbourhood is seen as an advantage. A third point is the convenience and flexibility of the service. It must be accessible and not too expensive, arrangements for payment must be straightforward and the carsharing company or organisation should take care of everything else (such as breakdowns, fines, cleaning, etc.). A free-floating system in which the car does not have to be returned to the same place offers greater flexibility and freedom than a station based scheme. A fourth factor that can encourage more widespread use of carsharing services is coordination and linkage with public transport, such as dedicated carsharing parking bays at railway stations and public transport stops. A fifth factor is marketing to specific target groups (such as young people or hipsters). Finally, carsharing schemes may be better received if they are set up as social enterprises or cooperatives so that the users feel they have a stake in the organisation.

7.2 Future outlook: the potential of carsharing

The obvious question is whether or not carsharing will continue to grow, and if so, how it will develop in future.

What do we know about the market potential?

From the perspective of innovation studies, Frenken (2013) says that carsharing has potential, although it will never entirely replace the privately owned car. He argues that carsharing has a number of favourable aspects that will promote the further uptake of the phenomenon, saying that within a single generation it could grow into a fully established mobility regime in its own right. Frenken sees just one potential obstacle, that shared cars do not give the user quite the same status and identity that privately owned cars do. However, he makes no statement about the future size of the carsharing market (Frenken, 2013). Based on the results of the TNS NIPO carsharing survey, Ettema and De Gier (2015) conclude that almost 20% of the adult Dutch population are open to the idea of carsharing (see also Chapter 3). A third of these potential carsharers are already looking into the possibilities.

The potential for carsharing has also been investigated in other countries. A 2004 study of the potential for carsharing in Germany (Nobis, 2006) concluded that, taking into account various objective (possession of driving licence) and subjective (attitude to cars) criteria, there was a market potential of 1.5 to 2 million people (in German towns and cities with more than 20,000 inhabitants). Given that most towns and cities do not yet have a carsharing scheme, this potential can only be realised in the long term. In the mid-term the expected number of users is between 1.1 and 1.4 million. Another German study gives a more optimistic picture. Wilke and Bongardt (2007) developed two carsharing scenarios for 2020 and presented them to a group of respondents. Based on the interest expressed by the respondents, they estimated a maximum of 6.4 million consumers in 2020. In 2015, 1.5% of German driving licence holders used one form of carsharing or another and about a million drivers were registered with 150 carshare operators (Bundesverband CarSharing, 2015).

The Austrian carsharing market has also been studied. The researchers first looked at the potential on the basis of rational arguments, such as saving money. This showed that from a financial point of view carsharing was only interesting to households that drive fewer than 15,000 kilometres per year in their own car. This limits the group of potential users to 69% of households. However, besides rational arguments there are also more diffuse, subjective reasons for carsharing, such as the car always being available like an 'obedient servant'. In traditional carsharing arrangements, rental has to be paid even when the car is standing idle. This reduces the attractiveness of such schemes, leaving a target group of

22%. Status and prestige also need to be taken into consideration. Private cars are often chosen to express the owner's lifestyle, but as shared cars cannot fulfil this role, the potential market is reduced to 9% of Austrian households (Prettenhaler & Steiniger, 1999).

Potential in the Netherlands

The literature and various empirical studies show that the Netherlands is not leading the way in the sharing economy. About 8% of Dutch households participate in the sharing economy, which accounts for less than 0.01% of Dutch GDP. The Dutch appear to be more attached to their possessions than other Europeans. Ownership is therefore still the norm. Cars are popular things to share (like tools and homes), but the Dutch share fewer cars than other Europeans (ING Economisch Bureau, 2015)

The disparity between attitude and behaviour

The fact that estimates of market shares often turn out to be wrong is to a large extent due to the disparity between people's attitudes and their behaviour. The literature indicates that the realistic potential for carsharing is significantly lower than the theoretical potential (Prettenhaler & Steiniger, 1999; Wilke et al., 2007). Attitude and behaviour are disconnected by various internal and external barriers (Kollmuss & Agyeman, 2002).

First, there are various internal factors, including a lack of information. Some people feel they know too little about carsharing to take the plunge (costs, insurance, practicalities, etc.). They may also have too little time to explore the ins and outs of carsharing in more depth. Others, who have a positive attitude to environmental issues, do not translate this into a choice for carsharing because they suspect that it makes little contribution to meeting environmental goals (does it make a positive impact on the environment?). Perhaps the most important barrier is that people tend to be fixed in their habits – it just seems natural to use the car for daily travel needs. As long as they have a car outside the house, most people will not give a thought to taking an alternative form of transport. Convenience and flexibility are the main reasons for using the car. The other side of the coin is the inconvenience, such as finding a suitable parking space.

Second, institutional factors can also throw up barriers. Drivers may be genuinely interested in carsharing, but if the necessary infrastructure is not in place (the local authority has not created enough 'autodate' carsharing parking bays) or if there are too few shared cars, they cannot take the step.

Finally, social and cultural factors have an important influence. People listen to what their friends, family and acquaintances say. If their social circle is largely negative towards carsharing (for example, because shared cars have a low status) they are unlikely to take it up. The dominant culture also reinforces the disparity between attitude and behaviour. Private property is still the norm in the Western world.

Theoretical estimate of market potential

In 2015, 20% of the Dutch population over 18 and with a driving licence indicated they were open to the idea of traditional or peer-to-peer carsharing (TNS NIPO survey). This would mean that the number of potential carsharers (all other things being equal) would amount to almost 2 million. Given the disparity between attitude and behaviour, however, we can assume that just some of these people will actually switch to carsharing. In the light of this, the aim of having 100,000 shared cars available in 2018 (Green Deal on carsharing) would also seem to be too optimistic, as it amounts to an almost sevenfold increase in the shared car fleet within three years. Another ambitious target in the Green Deal on carsharing is that by 2025 10% of the Dutch national car fleet (800,000 vehicles) will be shared cars.

The 'realistic' potential for carsharing is lower than the theoretical potential (Wilke et al., 2007; Prettenhaler & Steiniger, 1999). If 10% of the Dutch population over 18 with a driving licence start to make use of carsharing services to a greater or lesser extent (which is half of the theoretical potential identified from the TNS NIPO survey), based on the results of the PBL research (Nijland et al., 2015) and assuming that the observed behaviour of the respondents in the sample can also be applied to about 10% of drivers, this would mean that in time there would be a maximum of about 800,000 users. However, we do not know how the growth curve will develop. If we assume that carsharers on average

drive 1,600 fewer kilometres per year, as indicated by the research results (again, based on the assumption stated above), this would amount to a total maximum reduction of 1.3 billion kilometres. This is a reduction of about 0.5–1% of the estimated number of car kilometres travelled in 2020 (KiM, 2015).

In their publication, Nijland et al. (2015) give an indication of the future potential of carsharing in the Netherlands. Scaling up the shared car fleet to 100,000 in 2020¹⁴ would mean a sevenfold increase in the current number of shared cars. If the number of people per shared car remains the same, about 10% of drivers would then be using carsharing schemes. This in turn amounts to a reduction in CO₂ emission of 0.2–0.3 megatonnes. However, this calculation is based on the outcome of a very small sample (n = 165) and assumes that the observed behaviour of the respondents in the sample can be applied to the 10% of drivers in 2020. About half of this reduction can be counted towards the target set in the Energy Agreement for Sustainable Growth (Nijland et al., 2015).¹⁵ But there is a catch. The Energy Agreement is based on cars with on average low emissions. The growth in carsharing is mainly to be found in the peer-to-peer segment, which contains a range of very different cars with probably a wide range of different emissions.

When estimating the potential for carsharing, a number of points should be taken into consideration:

1. Most of the cited literature on the market potential of carsharing refers to traditional carsharing services. While peer-to-peer schemes have only been available for a short time, the number of cars has grown considerably in recent years, and not only in the four main Dutch cities. However, it is still a relatively unknown concept in the Netherlands and the trend in the use of such schemes could develop differently from that of the traditional carsharing concept.
2. Carsharing is not distributed evenly across the country. At the moment, carsharing is concentrated mainly in urban areas, and these areas are probably where the greatest potential for carsharing is to be found. The expected trend towards further urbanisation could therefore enhance the potential for growth in the use of carsharing services.
3. The estimate is subject to many uncertainties, such as:
 - transport policy, particularly recognition of the urgent need to support carsharing in local and national policy, for example through the provision of dedicated parking bays and linkage with public transport services;
 - technological developments, such as the emergence and development of automated cars;
 - the development of other concepts such as ride-sharing (carpooling, paid-for trips, UberPoP, etc.);
 - the marketing strategies of car hire companies, car manufacturers and mobility services providers such as NS (Dutch Railways) and Mobility Mixx;
 - the disparity between attitude and behaviour.

Incentives for carsharing

There are many ways to increase the popularity of carsharing and the lessons and success factors from the cases described in Chapter 5 provide pointers for increasing the modal share of carsharing in the mobility system. The challenge is to promote the positive aspects of carsharing.

Much of this has to do with public interest aspects (improved liveability, reduced CO₂ emissions, reduced use of space by cars). The growth of carsharing also depends to a degree on local and national policies. Local policies such as parking policies that favour shared cars can complement a national policy of increasing the cost of car ownership and reducing the cost of car use.

¹⁴ The Energy Agreement for Sustainable Growth includes a target for 2020 of 100,000 shared cars with low average emissions. The Green Deal on carsharing brought this target forward to 2018.

¹⁵ In the Energy Agreement the transport sector is allocated a reduction target for 2020 of 1.3–1.7 megatonnes CO₂. Only TTW emissions count towards this target. Emissions from the production of fuels or from the manufacture and dismantling of vehicles are not included.

The literature contains various recommendations for reducing the disparity between attitude and behaviour:

- image and awareness-raising campaigns that emphasise the positive aspects (Leismann et al., 2012; Leismann et al., 2013) to make the public more familiar with the idea of carsharing;
- tailoring services to specific target groups;
- greater convenience (new technological developments);
- new investments by carsharing organisations (traditional carsharing) (Wilke et al., 2007).

These recommendations closely match the success factors identified in the case studies. The fact that the 2015 Green Deal on carsharing addresses these factors is a positive sign. It is important to realise that while providing expertise and information is a good start, this will not be enough on its own to change people's behaviour.

Finally, we raise an aspect that tends to be ignored when looking at ways to stimulate carsharing: the 'framing' of carsharing as either the temporary possession of a car or as an experience. Research suggests that owning luxury goods contributes more to someone's happiness than the temporary use of these goods (Gilovich et al., 2014; see section 2.2). However, this may be different if the use of luxury goods, such as cars, is not framed as temporary possession but as an experience. People value experiences, such as travel and holidays, more than possessions. The experience frame could therefore be used to stimulate carsharing. For example, renting a car from an organisation (e.g. Car2Go in Amsterdam) may be the first opportunity for the customer to experience what it is like to drive an electric car. Alternatively, SnappCar offer an extensive range of cars for hire, giving the customer an opportunity to drive their dream car, such as top of the range BMW or other luxury model, or the experience of driving a vintage car. The use of carsharing services can be further encouraged if the experience is enhanced by sharing it with passengers (such as partner and children) and when visiting friends and family. This is a particularly relevant point because shared cars are mainly used for visits to friends and family (see Figure 3.6, Reasons for carsharing trips) and much less for business trips.

Suggestions for further research

It is important to keep track of the provision and use of carsharing services in the Netherlands. Further research could focus on the following topics:

1. Monitoring carsharing in the Netherlands, either by continuing with the TNS NIPO carsharing survey or by including carsharing as one of the modes of transport in the Dutch Travel Survey (OviN) conducted by Statistics Netherlands.
2. International comparisons of the development and popularity of carsharing in cities to inform explanatory analyses.
3. New market parties and initiatives and their significance for carsharing: for example, how are car rental companies and car manufacturers going to respond to the trends in carsharing?
4. Identifying developments that could influence carsharing services, such as the emergence of electric cars and automated cars.
5. Determining the effects of the various measures announced in the Green Deal on carsharing, such as bundling knowledge, promotion and events, identifying opportunities and constraints, information campaigns, etc.

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Appendix 1: List of interviewees

Germany

Jan-Niklas Willing and Hermann Blümel: Senatsverwaltung für Stadtentwicklung und Umwelt te Berlin, Grundsatzfragen der Verkehrspolitik (Senate Department for Urban Development and Environmental Protection Berlin, transport policy section)

Switzerland

Alain Bruegger: Mobilitätsakademie / Académie de la Mobilité, Bern.

Canada

Ren Thomas: Ontario Growth Secretariat, Ministry of Municipal Affairs and Housing, Toronto, Canada.
Alan Woodland, director of the Carsharing Association (see <http://carsharing.org>).

Netherlands

Monica Bentvelzen and Annemiek van der Horst: NS Zakelijk

Colophon

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