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Carsharing Services in Emerging Economies

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Abstract

Although the level of motorisation in emerging economies is still low compared to developed countries, there is increasing private car ownership concentrated in megacities and metropolitan regions. Major cities, such as Beijing, Mexico City or São Paulo, have already reached saturation point with respect to volumes of individual motorised transport, resulting in a broad range of negative implications for urban liveability. Consequently, increasing private-car use and ownership pose a risk to the sustainable urban development of emerging economies and exacerbate the pressure on decision-makers to find innovative and demand-oriented alternatives to the ever-increasing motorisation of their populations.

Many nations in Europe and North America have adopted carsharing as part of an overall strategy to mitigate the impact of increasing private car ownership in densely populated urban areas. Professionally organised carsharing services separate the *use* of cars from their *ownership* and complement the existing network of public and non-motorised transport modes by offering on-demand, self-service, short-term and pay-per-use access to automobiles. As such, carsharing has the

potential to reform automobile usage and to significantly contribute to a shift of mobility patterns towards more efficient and sustainable transport modes – a change that appears to be a necessity to reduce air pollution, congestion and space consumption in the city-centres of emerging economies.

This report aims to evaluate the potential, as well as the necessary political support structure, for the implementation of carsharing services in emerging economies. Beginning with a basic introduction to the function and benefits of carsharing, as well as a review of its historical development, the paper identifies key success factors and best practice of mature carsharing markets. Since insufficient governmental support as well as a low level of public awareness are central challenges for the development of carsharing systems, the purpose of this document is to not only raise the publicity and understanding of carsharing in emerging economies, but also to provide best practice guidance for local authorities that aim to find suitable solutions to the negative impacts of increasing motorised individual transport.

1. Introduction

On the whole, you find wealth more in use than in ownership.

Aristotle, 350 BC

Cited by Eric Britton in the Speaking Notes of the Changzhi World Share/Transport Forum 2011

Demand, and with it production capacity, for automobiles has begun to shift from automobile saturated developed countries to emerging economies. Today, emerging economies are the key markets for the automotive sector and the sector is often a key industry in emerging economies. Countries such as Brazil, China, India, Mexico and Russia are significantly profiting from the growing automobile market, but at the same time this development poses serious problems in those countries.

Although the overall level of motorisation in emerging economies is often very low compared to developed

countries, increasing private car ownership is concentrated in metropolitan regions. Many densely-populated urban areas have already reached saturation point of motorised individual transport, resulting in a variety of negative impacts, including traffic congestion, scarcity of land and parking space, traffic accidents (incl. fatalities) as well as air pollution. If these trends continue, particularly air pollutant and greenhouse gas emissions will impair the quality of life in the affected cities and have other implications beyond the city limits. Figure 1 shows the annual passenger car production in Brazil, China, India, Mexico and Russia in 1999 and 2012.

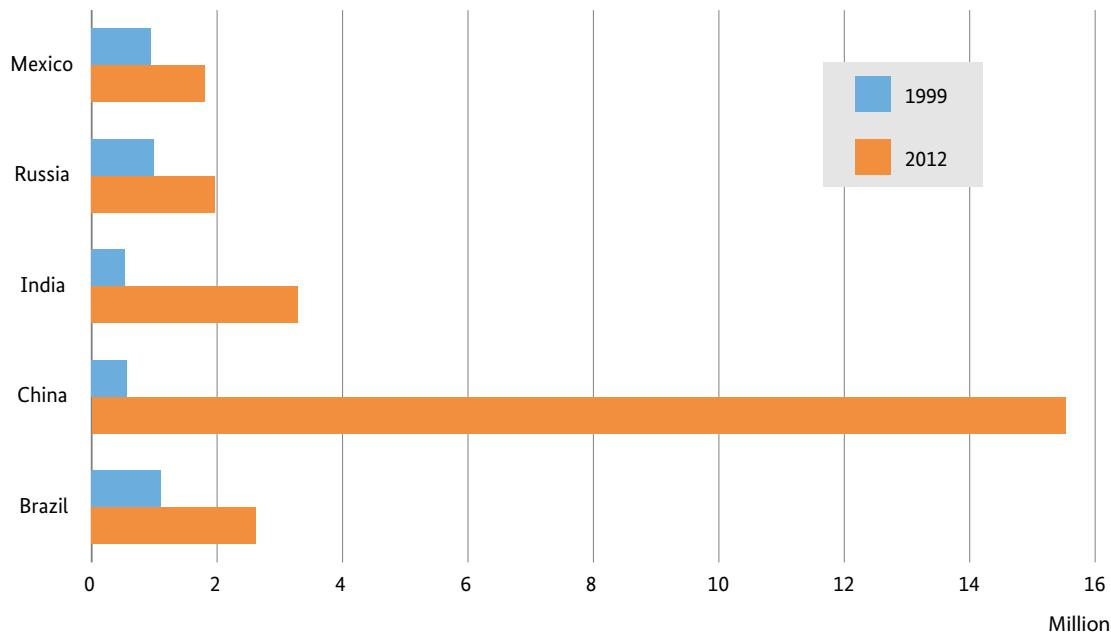


Figure 1: Annual production of passenger cars in emerging economies (1999 and 2012).
Source: Website International Organization of Motor Vehicle Manufacturers

Intensified by rapid urbanisation, energy consumption and greenhouse gas emissions related to individual transport are increasing rapidly in emerging economies. Considering the still-low motorisation level in these countries, the repercussions of unabated growth are daunting. Appropriate political instruments and transport planning strategies are urgently required to slow the growth in private car ownership as well as to mitigate the already existing negative impacts of motorised individual transport.

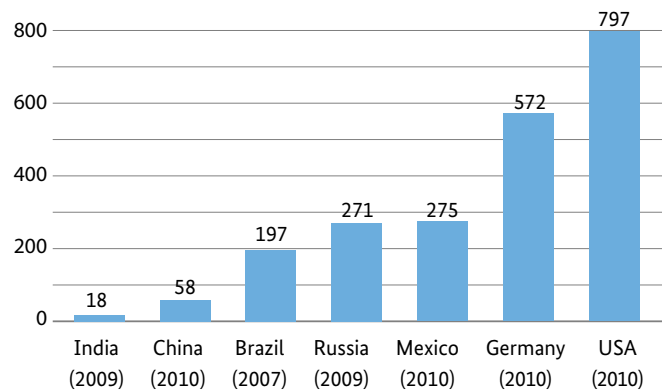


Figure 2: Motor vehicles (per 1 000 people) in major emerging economies, Germany and the USA.

Source: The World Bank World Development Indicators, <http://data.worldbank.org/indicator/IS.VEH.NVEH.P3>

Carsharing could serve as a new and innovative mobility solution to slow the mid- and long-term demand of private car ownership. Carsharing separates car use from car ownership, and can complement the existing network of public and non-motorised transport modes by offering access to cars in a similar manner to private car ownership (e.g. on demand, self-service, short-term and instant access). Because of this, carsharing has the potential to reform automobile usage and to significantly contribute to a shift of mobility patterns towards more sustainable public and non-motorised transport modes.

However, in contrast to European and North American countries, where carsharing is often considered a “complementary component” of public transport, carsharing activities in emerging economies are still in an exploratory stage. Availability and utilisation are low, and the impacts on urban transport and environment are barely quantifiable. For this reason, this report aims to raise the awareness and acceptance of this sustainable mobility service as well as to help local practitioners gain knowledge on its function, positive impacts and feasibility.

2. Introducing carsharing

Carsharing can be characterised as a mobility service in which a company maintains and provides access to a fleet of vehicles in an on-demand, self-service, pay-per-use and short-term basis to paying users. In general, members pay a single registration fee, a monthly membership fee and a usage fee according to time hired and/or distance driven. These fees include all incidental expenses (fuel, maintenance, insurance, etc.), thus carsharing provides the benefits of motorised individual mobility without the costs and responsibilities of owning a private vehicle. With its potential to fill gaps between public and individual transport, carsharing is mostly offered in densely populated urban areas with a well-established public transport system and a low level of car dependency (Cohen *et al.*, 2008).

Various carsharing organisational models are described, below: station-based (the most common), free-floating and peer-to-peer.

Station-based carsharing

Station-based carsharing involves hiring vehicles from designated stations. The cars can be reserved spontaneously or in advance via telephone, website or smartphone app. Most station-based carsharing companies offer round-trip usage, requiring the customers to pick up and return the vehicles to the same location. Station-based carsharing fleets usually consist of various types of vehicles (*e.g.* small compact cars, sedans or vans) to meet the needs of their users. The fee for station-based carsharing vehicles is calculated on a per hour, day or even week basis (Cohen *et al.*, 2008).

Figure 3 shows a carsharing station in Bremen (Germany) operated by the German carsharing company Cambio. Other examples of large-scale station-based carsharing services are Zipcar (USA, Canada, UK, Spain and Austria), Mobility (Switzerland) and Flinkster (Germany, Austria, Switzerland and the Netherlands).



Figure 3: Station-based carsharing “mobil.punkt” in Bremen, Germany.
© Michael Glotz-Richter, Bremen

Free-floating carsharing

Users of free-floating carsharing services can pick up and return their vehicles at any legal parking space within a designated area; they are thus liberated from the restriction of using designated carsharing stations. The connected problem of locating the cars is solved by on-board tracking systems and location services for users via service hotline, website or smart-phone app. As reservations are not required and only possible for a limited time (usually 15 to 30 minutes), free-floating carsharing offers flexibility, but limits the possibility of scheduling a trip in advance. Other significant differences to station-based carsharing services are minute-based pricing and less diverse carsharing fleets (most providers offer only one vehicle type). For this reason, free-floating carsharing is mainly suitable for providing spontaneous access for short trips within urban areas (Lytton and Poston 2012).

To date, free-floating carsharing systems have been introduced in Europe (Germany, Austria, Italy, UK and the Netherlands) and North America (USA and Canada), including services such as car2go (operated by Daimler and Europcar), DriveNow (operated by BMW and SIXT) and Multicity (operated by PSA Peugeot Citroën and DB Rent). Especially popular among younger, digital-native users, free-floating carsharing grew hugely since its inception in 2008: more than 700 000 people (equalling a market share of about 40%) are registered with free-floating carsharing services worldwide (Website car2go; Website DriveNow).

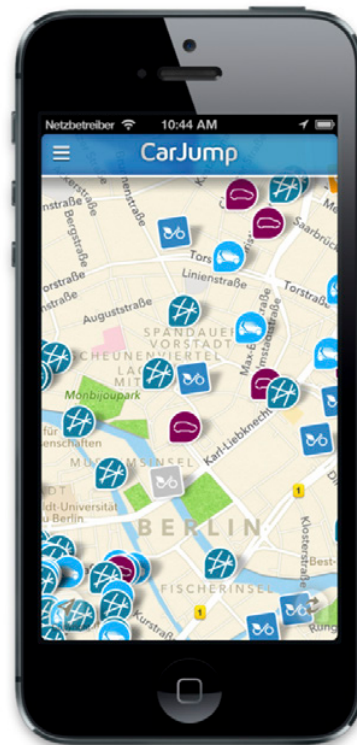


Figure 4: App-based localisation of free-floating carsharing vehicles. © CarJump, GHM Mobile Development GmbH

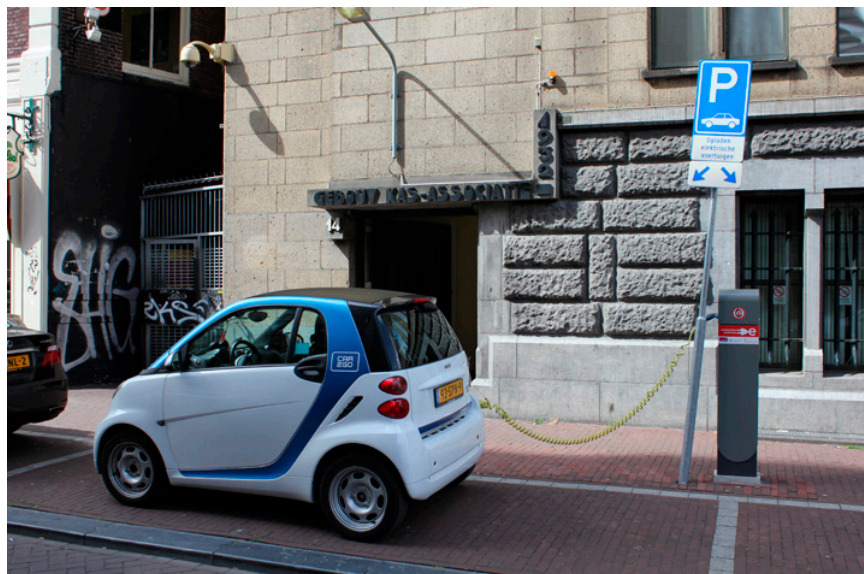


Figure 5: An electric vehicle of car2go in Amsterdam, Netherlands.
© Dominik Schmid, 2013.

Free-floating carsharing is one of the latest developments in the carsharing industry, so scientific research on it is limited in volume and sophistication, and opinions differ on whether it will contribute to a reduction of private car ownership in the same way as station-based systems. However, due to its minute-based pricing, free-floating

carsharing offers the potential to complement station-based concepts, especially for short distances and durations (> 1 h), where it can be cheaper. Figure 6 illustrates the average rental period of both free-floating and station-based carsharing according to a survey of 1 200 customers in Germany.

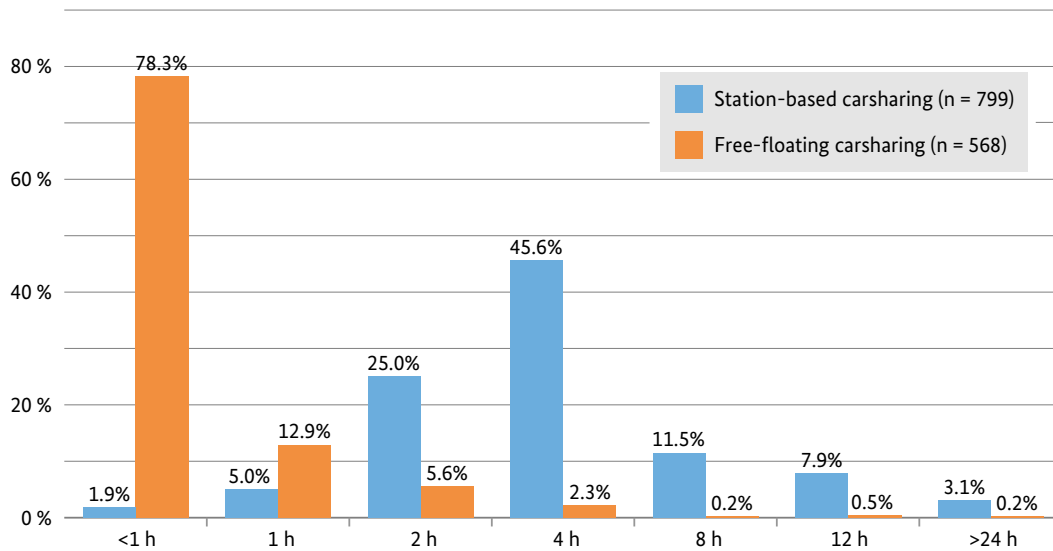


Figure 6: Average rental period of station-based and free-floating carsharing in Germany.
Source: Automotive Institute for Management 2012.

Peer-to-peer carsharing

The non-profit equivalent to professionally organised carsharing is known as peer-to-peer or private carsharing. It involves sharing a car owned either collectively or by one of the individual participants. In most cases, private carsharing users mutually conclude a contract to cover legal issues, such as insurance or liability. In contrast to professionally organised carsharing, private carsharing users must exchange the car keys in person. Peer-to-peer carsharing can be organised on a local level among acquaintances, in a neighbourhood, or at regional or national level using web services such as Tamyca and Autonetzer (Gossen and Scholl 2011).

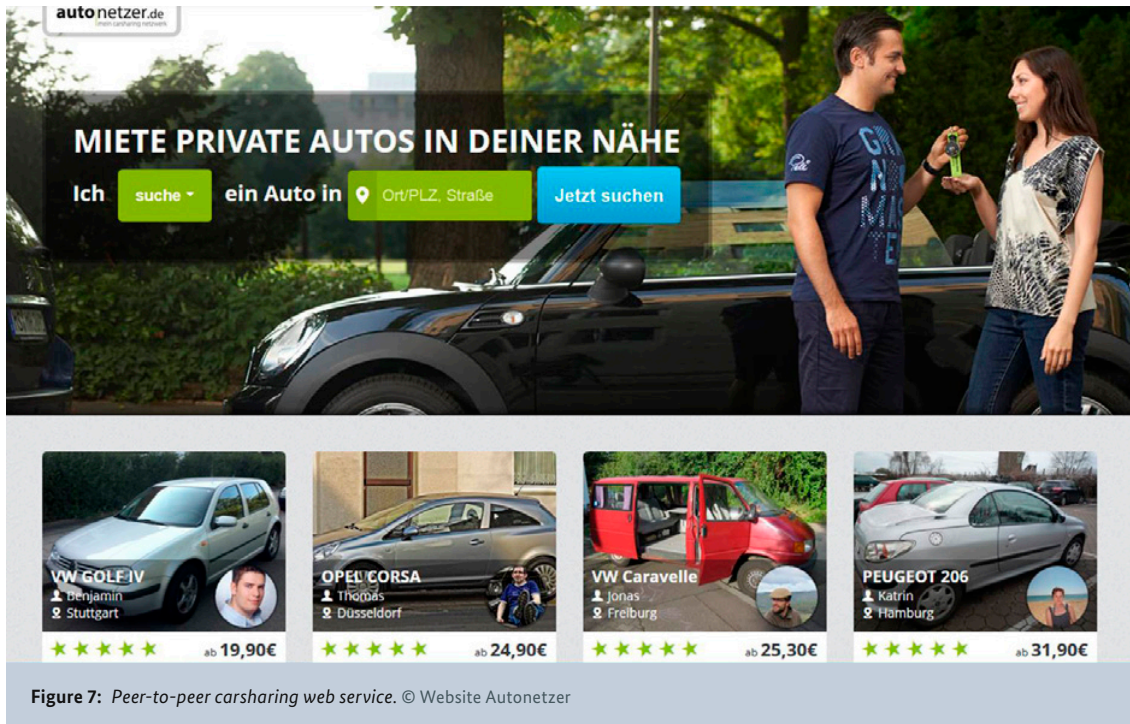


Figure 7: Peer-to-peer carsharing web service. © Website Autonetzer

2.1 Principles of carsharing usage

Although the specific business models of carsharing companies differ, they share common elements. The following describes the procedure of using a common station-based carsharing scheme:

■ Registration

After registering, customers receive an access device, in most cases a RFID smart card, which can be used to unlock and lock the vehicles. Depending on the company, members must pay a security deposit, a single registration fee and/or a monthly membership fee. Follow-up costs are limited to a fee, based on the time rented and/or distance driven, covering expenses such as fuel, insurance and maintenance.

■ Vehicle reservation and usage

After registering, members can reserve a vehicle at one of the stations via telephone, website or smart-phone app, either in advance (up to a year in advance) or spontaneously, contingent upon vehicle

availability. When picking up the vehicle, the user must check the vehicle's condition.

Most commonly, the ignition keys are stored inside the car, while entry to the cars is via an access card (see Figure 8). During the rental period, the cars may be parked anywhere legal (at the hirers expense), but a station-based carsharing vehicle must be returned to the station from which it was picked up. A fuel card inside the vehicle can be used to refuel at no additional charge and a service hotline can be contacted in case of an accident or problem.

■ Return of vehicle and payment

After use, the vehicle must be returned to the station and locked. Damage or other problems should be reported immediately. Most of the cars are equipped with an on-board unit which collects and transmits user data (e.g. time and distance travelled) to the carsharing operator. Payment is usually monthly, according to the actual usage of the cars.



Figure 8: RFID card access to a carsharing vehicle.
© Website Bundesverband CarSharing e.V.

2.2 Benefits and impacts of carsharing

Recent research and empirical studies indicate two different types of carsharing impact. While individual-related benefits increase the user acceptance of the mobility service, broader impacts, mainly caused by changes in the behaviour of carsharing users, can lead to improvements for urban transport and the environment. In this context, carsharing is often mentioned as a cost-saving mobility service, which enhances the mobility options of sustainable urban transport systems and supports a lifestyle that does not build on private car ownership.

2.2.1 Individual impacts

The impacts of carsharing systems include benefits to users, such as avoiding the need to purchase, park, insure and maintain a vehicle, and the associated costs, as well as the availability of a broad range of different vehicles.

The total cost of car ownership consists of variable costs (fuel, maintenance, etc.) as well as fixed costs (purchase price, insurance, etc.), which account for around 60% of the total costs, and are incurred regardless of how much a vehicle is used. Consequently, owners of private vehicles tend to travel predominantly by car. Using carsharing instead of a private vehicle shifts the cost ratio towards variable costs and with it changes the transport-related expenses from total costs of car ownership to total costs of mobility. In this way, carsharing users

avoid the fixed costs of owning a car and access vehicles on a pay-per-use basis, which provides the opportunity to save costs (Bundesverband CarSharing e.V. 2010).

Nevertheless, using a carsharing vehicle is not necessarily an inexpensive alternative to private car ownership. Measured by cost per vehicle kilometre travelled (EUR/VKT), owners of private vehicles with a high mileage pay less than owners of a vehicle with fewer VKT. Because high mileage decreases the costs per VKT, carsharing loses its price-competitiveness in case of frequent and extensive car usage. Although it is not easy to quantify an average break-even point of carsharing and car ownership (the point where carsharing is more expensive than car ownership), various studies estimate this to be around 10 000 km (Cohen *et al.*, 2008).

The aforementioned arguments also apply to corporate and public fleets. As a result of the steadily increasing business usage of carsharing vehicles, many carsharing companies are already offering specific schemes and tariffs to meet the mobility need of business customers.

2.2.2 Impacts on transport and environment

Although the results of research on carsharing's impacts on transport and the environment are not consistent, major studies agree in one aspect: carsharing has the potential to reduce car ownership and VKT by shifting its users towards public – and non-motorised transport modes – with accompanying improvements in traffic volume, parking, space consumption, local air pollutant and greenhouse gas emissions.

Dependency on private vehicles is mainly determined by the quality of alternatives, *e.g.* public- and non-motorised transport. Carsharing complements public- and non-motorised transport, allowing a broader range of inter- and multi-modal mobility patterns which would be impracticable without the flexibility of an automobile. Consequently, carsharing facilitates the usage of public and non-motorised transport modes, diversifies the personal choice of transport and therefore contributes to the reduction of private car ownership (Bundesverband CarSharing e.V. 2010).

In addition to its potential to reduce or prolong private car ownership, carsharing promotes a shift away from motorised individual transport. While owners of private

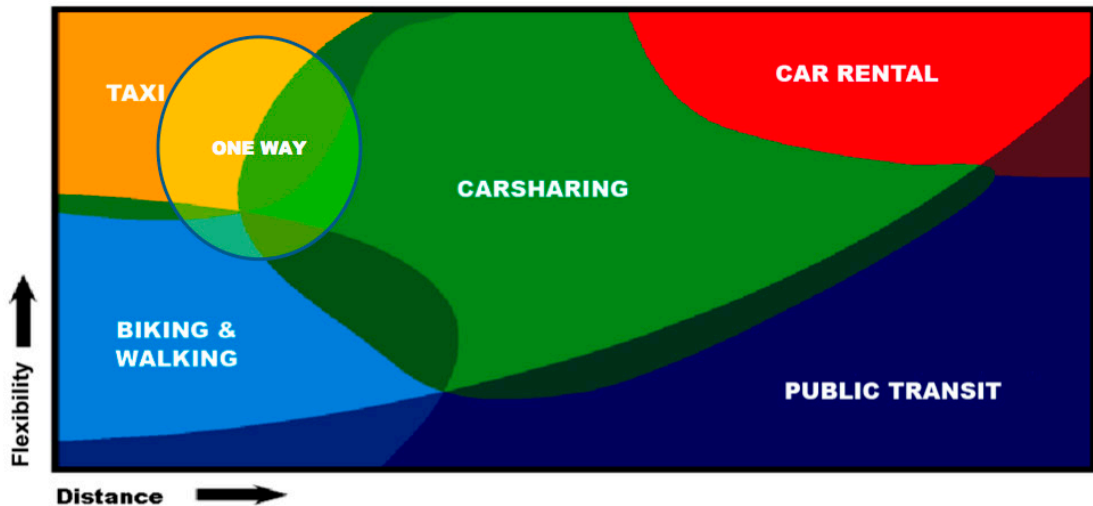


Figure 9: Carsharing – a complementary component of sustainable inter- and multi-modal urban transport.
 © Marco Viviani, CommunAuto

vehicles are often not fully aware of the total costs of car ownership, carsharing users are directly confronted with the total costs of mobility. Not being tied to the high fixed costs of a private vehicle enables carsharing users to rationalise their choice of transport by selecting the most efficient and cost-effective transport mode or combination of transport modes prior to every single trip. Thus, the transparent pay-per-use cost structure of carsharing schemes provides an incentive to reduce the overall level of VKT and to increase the usage of less expensive transport modes. As carsharing users tend to significantly shift their mobility patterns towards public and non-motorised transport, the carsharing not only supports a decrease in private car ownership,

congestion and space consumption, but also in transport related local air pollutants and greenhouse gas emissions (Martin and Shaheen 2010).

Despite its positive impact on the vehicle kilometres travelled by car, carsharing can also cause changes in mobility patterns away from public and non-motorised transport modes. Especially members who did not own a private vehicle before joining a carsharing scheme will increase their VKT. Nevertheless, carsharing can prevent or prolong the purchase of a private vehicle among this group of users, which in turn is a contribution to the overall development of a sustainable urban transport system (Martin and Shaheen 2011).

Table 1: Impacts of carsharing usage in Europe and North America

Impact	Europe	North America
Number of vehicles replaced per carsharing vehicle	4–10	6–23
Users which sold private vehicles after joining carsharing schemes	16–34%	11–23%
Participants who postponed or avoided a vehicle purchase due to carsharing	23–26%	12–68%
Vehicle kilometres reduced due to carsharing	28–45%	8–80%

Source: Cohen and Shaheen, 2006

3. Development of carsharing

The development of commercially organised carsharing systems can be classified into stages. The initial market entry in the late 1980s in Switzerland led to the worldwide diffusion of professional carsharing services, concentrated in Europe and North America. After a phase of substantial growth and technological progress, the carsharing market started to diversify and new business models emerged. Particularly the introduction of free-floating carsharing in 2008 raised the overall awareness of carsharing and led to a growth spurt for the whole industry.

Since its inception, carsharing has developed significantly, with carsharing companies, vehicles and membership growing at an exponential level. According to recent surveys, the total number of carsharing users worldwide increased more than five-fold in the last six years, reaching almost 1.8m in 2012. Recent projections of worldwide carsharing membership already exceed two million members across the globe in 2012. With a share of 90% of worldwide carsharing membership, Europe and North America are the predominant markets of carsharing activities (Cohen and Shaheen 2012). As carsharing

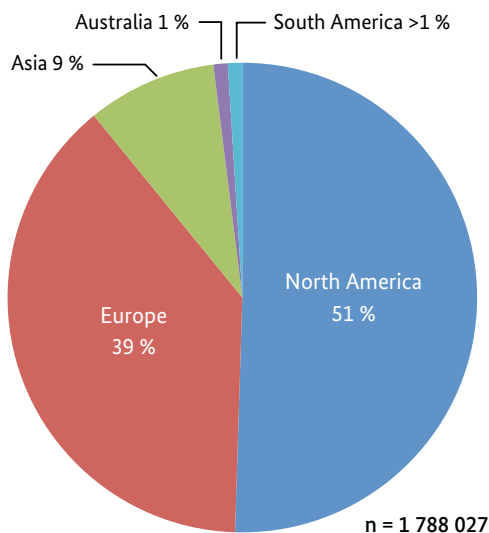


Figure 10: Percentage distribution of worldwide carsharing membership in 2012.

Source: Cohen and Shaheen, 2012

develops on a highly dynamic level, recent projections on worldwide carsharing membership already exceed two million members in 2014 (Website Navigant). That these numbers are possibly even rather conservative is shown by the press statement released in September 2014 by the German carsharing association: According to latest statistics, the number of registered carsharing users in Germany has now reached one million.^[1]

3.1 History of carsharing

Although initial attempts to establish carsharing in an organised way can be traced back to 1947, professional carsharing systems did not emerge until 1987 in Switzerland, when two companies, ATG (Auto Teilet Genossenschaft) and Sharecom Genossenschaft were founded. After a period of continuous growth, in 1997 the companies merged into the cooperative Mobility Genossenschaft, which is currently ranked among the largest carsharing companies worldwide. Together with the German carsharing provider StattAuto, founded in 1988, Mobility is recognised as one of the most influential carsharing companies and often credited as the pioneer of professional carsharing (Cohen and Shaheen 2006).

Based on its success in Germany and Switzerland, carsharing begun to popularise largely across Europe and spread in a short time to other countries such as the Netherlands, Belgium and the United Kingdom. With membership rates steadily growing in the double-digit percent range, carsharing was established as a professional mobility service and viable business venture.

Similar to the development of carsharing in Europe, North American carsharing was initiated by small scale projects (in Canada and the USA). The first professional North American carsharing company, Auto-Com, started its operations 1994 in Quebec, Canada. Implemented as a non-profit organisation, Auto-Com quickly changed to a for-profit business due to its commercial success. In 1998, the USA followed the Canadian carsharing movement with the introduction of CarSharing Portland. While CarSharing Portland operated on a smaller scale, Flexcar and Zipcar paved the way for the nationwide expansion of carsharing systems in 2000.

^[1] <http://www.carsharing.de/presse/pressemitteilungen/1-million-teilnehmer-im-deutschen-carsharing>

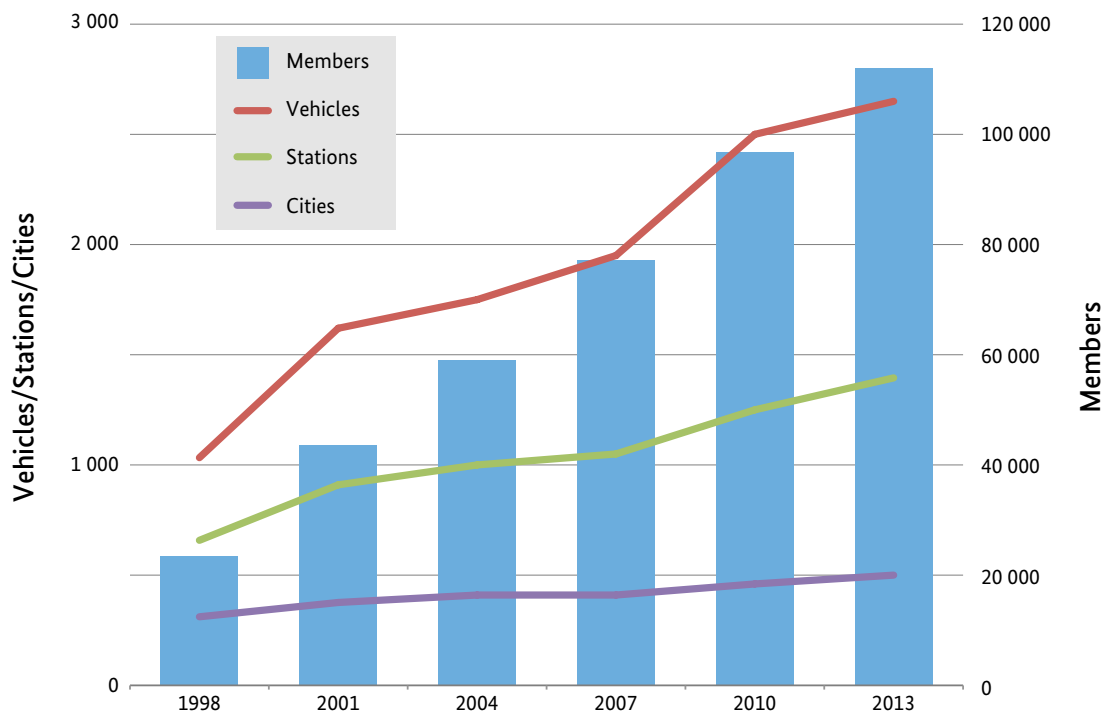


Figure 11: Development of the Swiss carsharing provider Mobility from 1998 to 2013.
Source: Website Mobility

Both companies coexisted as the largest competitors on the US market until merging 2007. Today, Zipcar is the world's largest carsharing company with more than 700 000 members in the USA, Canada, Spain and the United Kingdom (Chung *et al.*, 2009).

After the carsharing market was established in Europe and North America, the service started to develop in Asia from 1997 on. Asian carsharing activities primarily concentrated on Japan and Singapore, where well-developed public transport networks, a low level of car dependency and high costs of private car ownership provide a fruitful environment for the acceptance and development of carsharing services. In August 1997, NTUC Income Insurance, a life and general insurance company, established the first Singaporean carsharing company Car Club (previously known as Car Co-Op). Similar to the importance of Mobility in Europe, Car Club paved the way for other carsharing providers in Singapore, such as WhizzCar and Kahshare (Barth *et al.*, 2006). Smove, the latest Singaporean carsharing scheme, was introduced by the company Clean Mobility Singapore in 2012. The carsharing provider exclusively offers electric vehicles, which can be booked with an optional driver service (Website Smove).

In Japan, carsharing has been used as a test platform for alternative vehicle concepts, such as electric vehicles.

In 1998, Honda started the Japanese carsharing market by introducing the demonstration project ICVS (Intelligent Community Vehicle System), which offered four different types of low-speed electric vehicles as shuttles for the Twin Ring Motegi race track. Due to the success of the carsharing service, the Japanese Ministry of Construction (merged with the Ministry of Transportation in 2001) started to promote the carsharing concept by sponsoring the carsharing systems ITS Mobility System (1999 in Osaka), Tourist Electric Vehicle System (1999 in Kobe) and Eco-Park & Ride (2000 in Ebina). At the same time, the Japanese Association of Electronic Technology for Automobile Traffic and Driving (formed by the Japanese Ministry of Trade and Industry) substantially supported the introduction of the carsharing systems EV-Car Sharing (1999 in Inagi) and MM21 (2002 in Yokohama) (Barth *et al.*, 2006).

One of the latest Japanese carsharing systems was introduced by Toyota in 2012. The project Ha:mo ("Harmonious Mobility") provides ultra-compact electric cars as part of the co-modality app Ha:mo NAVI. Similar to the

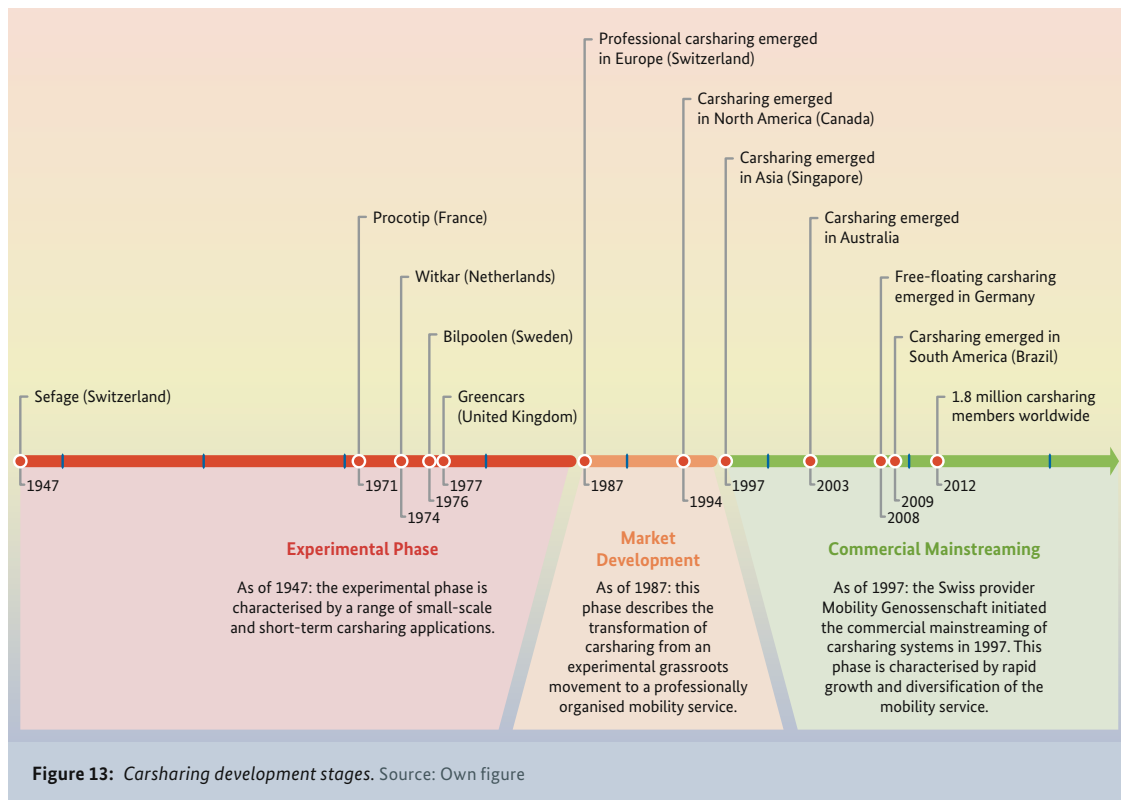
mobility app moovel^[2], this online tool allows customers to choose the most efficient and cost-effective transport mode or combination of transport modes to meet their mobility needs (Website Toyota).

More recently, professionally organised carsharing activities have started in Australia and Latin America. In 2003, Newton Carsharing introduced a service to Australia by providing a station-based system in the Sydney suburban area. The company, which launched the service with three cars and 12 members, changed its name to GoGet in 2004, and expanded to other Australian cities Melbourne and Brisbane. Altogether, more than 20 000 GoGet users have access to 800 vehicles (Website GoGet CarShare).



Figure 12: Ha:mo NAVI combines carsharing with public and non-motorised transport modes.
Source: Website Toyota

^[2] The inter- and multimodal mobility app moovel is offered by moovel GmbH, a subsidiary of Daimler AG. For more information see <http://www.moovel.com>.



Six years after the introduction of carsharing in Australia, the Brazilian carsharing provider Zazcar followed by offering the mobility service in South America as of 2009. Zazcar is a station-based system in São Paulo with about 2 000 members, 60 vehicles and 45 stations (Website Zazcar).

While the fundamental steps in the development of worldwide carsharing activities have been made with station-based systems, the implementation of free-floating carsharing was a watershed for the industry. Mainly provided by automobile manufacturers, such as BMW, Citroën and Daimler, free-floating carsharing has grown hugely since its introduction in 2008. The flexibility of a carsharing vehicle without the dependency on a designated station attracted new and previously unexploited user groups and led to quick diffusion throughout Europe and North America. Although conventional station-based systems still dominate the international carsharing market, free-floating carsharing had a lasting effect on the mobility service by introducing one-way trips, instant access and open-ended bookings (Le Vine 2012).

Figure 13 gives a brief overview of the different carsharing developmental stages.

3.2 Carsharing in Europe – A brief overview

Companies from Germany and Switzerland have played a key role for the overall development of carsharing by fostering its transition from a grassroots community movement to a commercial mobility service. Soon after the first professional providers established their schemes in the late 1980s, carsharing gained growing importance as an additional component of public transport. Based on an average annual membership growth of 20% since 2006, nearly 700 000 registered customers currently share more than 20 000 vehicles across Europe (Cohen and Shaheen 2012). With a share of more than 75% of all European members, the predominant carsharing markets are Germany, Switzerland, the United Kingdom and the Netherlands (Website Momo).

Both as a result of the successful diffusion of carsharing in Europe and in order to support the future development of the mobility service the inner-European project “More Options for Energy Efficient Mobility through Car-Sharing” (momo) was carried out between 2008 and 2011. Supported with funds from the European Union (EU), 13 organisations from eight European countries implemented the project. In the framework of the

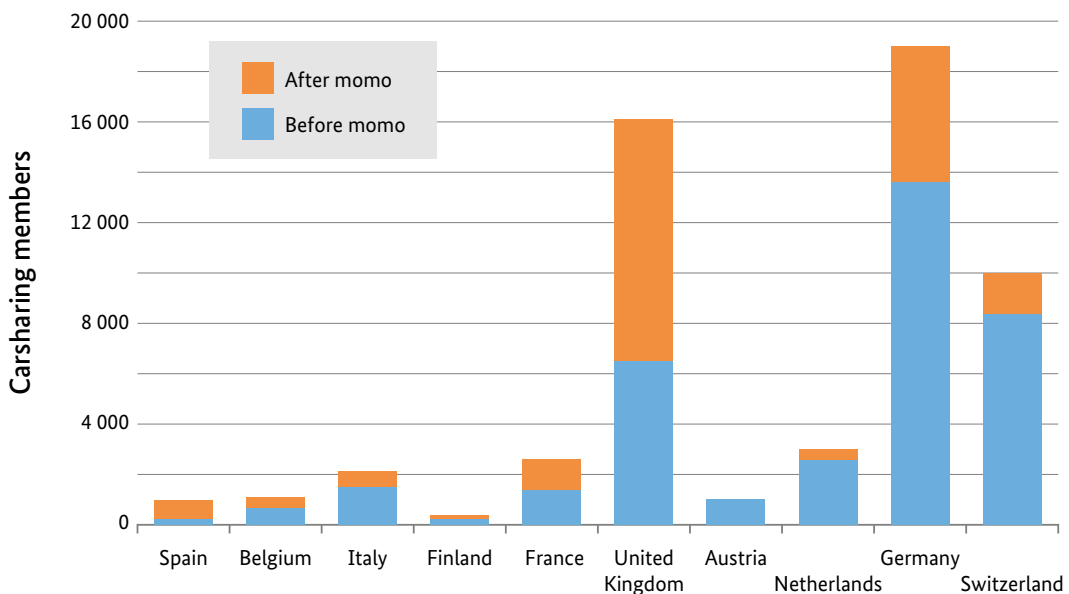


Figure 14: Carsharing membership in Europe before and after the EU-project momo. Source: Website momo

project, the International Association of Public Transport (UITP) cooperated with municipalities, research institutes and carsharing providers to achieve the following key objectives:

- Awareness-raising of carsharing;
- Service improvement of existing carsharing systems;
- Establishment of carsharing in unexploited areas;
- Enhancement of the energy efficiency of carsharing systems;
- Acquisition of new cooperation partners for carsharing providers.

Figure 14 shows a comparison between the carsharing membership of the participating countries before and after the implementation of momo. Most notably, the United Kingdom could more than double its carsharing members during the life span of the EU-project (Bundesverband CarSharing e.V. 2010).

After more than two decades of extensive carsharing development, the mobility service consolidated its importance as an alternative to private car ownership in various European metropolitan regions. Accompanied by an increasing body of scientific research, the successful development of carsharing did not only generate a higher business potential for the providers, it also put a stronger emphasis on its efficiency to contribute to sustainable urban transport systems.

3.3 Key success factors and good practice

The following section provides an insight into the key success factors based on long-standing carsharing activities in Europe.

3.3.1 Public transport integration

Carsharing is not conceived to be a first choice or mono-modal transport mode. Due to its function and pricing, carsharing members usually fulfil their daily transport needs using public and non-motorised transport; carsharing is mainly used to cover occasional demand for a private vehicle. In this way, carsharing closes the gap between public and individual transport, enhances the range of inter- and multi-modal mobility options and supports its users in adopting sustainable mobility behaviour. As such the integration of carsharing into a well-developed public transport network decreases the

dependency on private vehicles and raises the chances of success for carsharing services (Bundesverband CarSharing e.V. 2010).

Across Europe, a variety of carsharing providers recognise the importance of strong public transport systems as a factor affecting the likelihood of success of carsharing services. Consequently, companies, such as Flinkster in Germany or Mobility in Switzerland, have designed their systems in collaboration with public transport companies. According to the experience from existing partnerships between carsharing operators and public transport companies, the following section provides an overview of effective measures to generate benefits on both sides:

❖ *Inter- and multi-modal linkage*

In order to visibly integrate carsharing as a complementary part of public transport and to encourage inter- and multi-modal mobility, carsharing stations must be set up close to public transport stops and interchanges. Public transport companies can significantly support this development and the success of carsharing by providing access to demand-oriented parking spaces on their private property. Integrated information, for instance highlighting carsharing stations on public transport maps, helps customers to clearly identify carsharing as a complementary part of public transport and simplifies the rational selection between different transport modes (Bundesverband CarSharing e.V. 2010).

❖ *Combined ticketing and pricing*

Another possibility of intensifying the linkage between carsharing and public transport is the combination of user tariffs and tickets. In general, holders of a monthly or annual season tickets can pay an additional charge to gain access to carsharing services at a reduced rate. Combined ticketing schemes, often labelled “mobility packages”, help to cut the total costs of mobility and provide seamless usage of carsharing and public transport (Bundesverband CarSharing e.V. 2010).

❖ *Joint marketing*

Joint marketing campaigns raise the visibility and awareness of combined mobility services and help to

share expenses as well as potential customers. Especially small-scale and financially weak carsharing providers profit from the existing advertising channels of public transport companies (e.g. customer newspapers, e-mail newsletters and advertisements in buses, trains and stations) (Bundesverband Car-Sharing e.V. 2010).

Altogether, the active cooperation between carsharing and public transport companies generates significant potential for synergies that helps to attract new and to retain existing customers on both sides. Particularly car-sharing companies profit, by providing greater mobility

to their members and therefore by strengthening the actual role of the mobility service as an alternative to private car ownership.

3.3.2 Public carsharing support

As the positive impact of carsharing on traffic and environment is recognised across Europe, more and more local authorities are supporting the mobility service in order to address intensive car use and ownership in urban areas. Thus, carsharing is gaining importance as a transport demand management tool, which is used to

Good Practice: Flinkster

With Flinkster (previously known as DB Carsharing), the German railway company Deutsche Bahn AG launched its own carsharing scheme in 2001. As one of the leading station-based carsharing systems in Germany, Flinkster provides 2 800 cars in 140 German cities and towns for about 215 000 members. In addition to the conventional Flinkster fleet, Deutsche Bahn has launched the electric carsharing scheme e-Flinkster in 2010 (Deutsche Bahn 2013).

One of the key success factors of Flinkster is the direct linkage to the public transport network. Most of the carsharing stations are located near railway stations and airports in order to facilitate the connection of long- and short-distance transport as well as to enhance the inter- and multi-modal mobility options. Together with Call-a-Bike, Deutsche Bahn's national bikesharing scheme, Flinkster members can easily choose and switch between different sustainable transport modes.



Figure 15: Flinkster connects carsharing with public transport.
© Website e-GAP

Another success factor of Flinkster is the interoperability with other mobility services. Holders of a “BahnCard25 mobil plus”, an annual membership card for the mobility services from Deutsche Bahn, can use Flinkster, Call-a-Bike as well as public transport. In this way, one membership card provides access to a broad range of different transport modes, facilitating seamless sustainable mobility (Website Deutsche Bahn).

diversify the overall mix of transport options as well as to reduce private car ownership and VKT.



Figure 16: A carsharing station on public parking space in Bremen, Germany.
© Michael Glotz-Richter

The growth potential of carsharing systems largely depends on the availability of customer-oriented parking spaces which can be used to set up carsharing stations. Especially visible on-street parking spaces in areas with a high level of parking pressure can raise the awareness of the mobility service and significantly influence its success. Local authorities play a key role as they are able to provide access to high quality public parking spaces to carsharing companies (Cohen *et al.*, 2010). While the designation of carsharing stations is usually not regulated by national law, various European countries have granted local authorities the necessary legal authority to provide public space to carsharing companies (Bundesverband CarSharing e.V. 2010).

In Europe, governmental support for carsharing is not only limited to the provision of public parking space. Local authorities, such as Bremen, London or Paris, have adopted comprehensive development strategies by providing monetary as well as non-monetary incentives to support carsharing providers and to enhance the availability of carsharing services. Incentives range from funding and tax relief to awareness raising and road traffic privileges (for instance free parking or the exemption from congestion charges and city tolls) (Bundesverband CarSharing e.V. 2010).

The following good practice example gives a brief overview of Autolib', a Paris based carsharing scheme which receives strong support from the local government.

Good Practice: Autolib'

Based on a tender from the city government of Paris, the French carsharing provider Autolib' launched one of the world's first large-scale E-carsharing schemes in December 2011. As of October 2012, 37 000 members had registered with the company that currently offers 2 012 electric vehicles at 857 stations with 4 358 parking spaces and charging pillars. Autolib' plans to successively expand the system to 3 000 vehicles, 1 150 stations and 6 000 parking spaces with charging pillars across the city. The carsharing fleet consists of exclusively battery electric vehicles, so-called Bluecars, produced by Bolloré, a French investment and industrial holding group and the company behind the brand Autolib'. A major distinction to conventional station-based carsharing schemes is the

possibility to rent and return the electric vehicles at different stations. (Website Autolib' 1).

The rapid diffusion of Autolib' is mainly driven by the strong (proactive) support of the local government, which is committed to the development of carsharing due to the negative impacts of increasing private car ownership in Paris. Therefore, Autolib' received extensive financial support from the city government (EUR 35 million) as well as the city districts (up to EUR 50 000 per carsharing station). The local government additionally provides public parking spaces to set up carsharing stations – an essential requirement for the feasibility of large-scale carsharing schemes (Website Metropolitics).

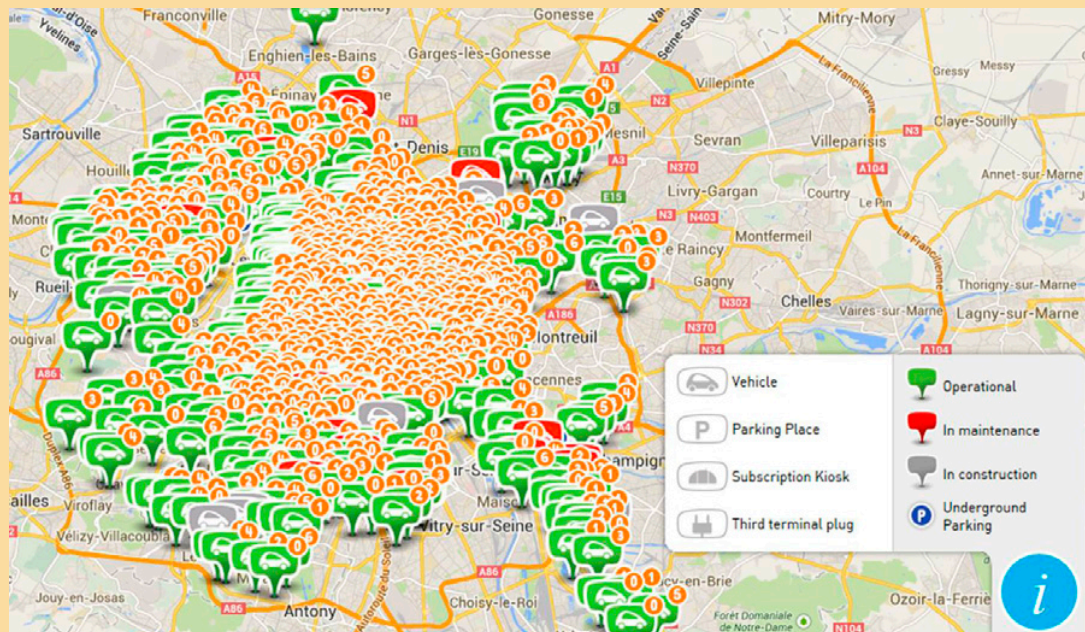


Figure 17: Autolib' station network in Paris, France. Source: Website SocieteAutolib' 2

4. Carsharing in emerging economies

While professional carsharing systems are available in various developed countries worldwide, carsharing activities in emerging economies are more limited. In most of these nations, the mobility service is still in a stage of experimentation, characterised by small-scale carsharing initiatives with low utilisation and a low level of impact on the urban transport system and the environment. The following section gives a brief overview of carsharing in emerging economies, the potential for its development as well as policy support options for local authorities to spur on the market.

4.1 Current situation

Currently, carsharing in emerging economies is a highly dynamic industry with numerous companies entering and exiting the market in a short period of time. While most efforts to establish carsharing in emerging economies have failed or remained small-scale, more stable and sophisticated carsharing activities have been established in the densely-populated megacities of Brazil, China, Mexico and India.

Brazil

The first Brazilian carsharing provider, Zazcar, started its service in 2009 in São Paulo. Members of Zazcar have



Figure 18: Zazcar carsharing station in São Paulo.
© Website Estado

access to more than 60 cars (ten different car models) at 45 stations throughout the city. According to Zazcar's CEO, Felipe Barroso, 2 000 people have applied for membership. Vehicle access is via RFID smart card, a comprehensive tariff structure for private and business customers as well as vehicle reservations via internet and telephone are features closely resembling conventional carsharing schemes from Europe and North America. In order to provide an additional incentive for users of the carsharing system, Zazcar cooperates with the car park operator Multipark. Based on this cooperation, Zazcar members receive a 30% discount at Multipark parking garages (Website Zazcar).

Due to the promising development of the carsharing service, the provider plans to expand the system to Rio de Janeiro and Curitiba. As a member of the US-based Carsharing Association (CSA)^[3], Zazcar is strongly committed to maximise the environmental and social relevance of carsharing services in Brazil. Furthermore, the provider is focused on improving the credibility, quality of service and the public awareness of carsharing and related sustainable transportation services.

China

In 2010, carsharing attracted substantial public interest during the World Expo in Shanghai. According to the exhibition's motto "Better City, Better Life", one of the selected good practices on sustainable urban development was the City of Bremen (Germany) and the carsharing provider Cambio. In the course of the exhibition, carsharing received extensive attention from the Chinese news agency Xinhua and the state owned TV Channel China Central Television (CCTV). The World Expo culminated in nationwide media coverage about station-based carsharing services (Glotz-Richter 2010).

Only a few months after the Expo, China Car Clubs (formerly known as EVnet) started its service in Hangzhou. The conventional station-based system offers more than 140 vehicles shared by about 6 000 members. The stations are mainly located in private parking garages and underground car parks. With the permission of the local

^[3] The CarSharing Association is a not-for-profit organisation based in the USA. CSA aims to promote the carsharing industry and the beneficial impacts of carsharing services. For more information see <http://www.carsharing.org>.

government, China Car Clubs wishes to set up additional carsharing stations on public on-street parking spaces (Figure 19). Considering that the awareness and diffusion of carsharing in China is still low, the commitment from the city government is a promising sign for the development of the provider as well as a positive example for other local authorities.

A second domestic carsharing provider, EduoAuto, emerged in the Chinese capital Beijing in May 2013. Based on cooperation agreements with car rental companies and Chinese car manufacturers, EduoAuto has grown quickly since its establishment and has expanded its station-based service to nine other Chinese cities (Changsha, Chengdu, Guangzhou, Nanjing, Qingdao, Shanghai, Tianjin, Wuhan and Xi'an). In total, the company provides about 400 cars at more than 100 stations. With smart-phone based vehicle access, stand-alone key management and a comprehensive user tariffs (e.g. for private, student or corporate users), EduoAuto is similar to sophisticated European and North American providers (Liu Wenjie, EduoAuto (Beijing) Technology Ltd. Co).



Figure 19: China Car Clubs carsharing station in Hangzhou.
© China Car Clubs



Figure 20: EduoAuto carsharing station in Beijing, China.
© Own figure

Mexico

The seed-funded carsharing company Carrot (the name is derived from the Spanish word for car – carro) is the largest carsharing service in Mexico. Based in Mexico City, Carrot established its system in April 2012 with only three cars, but has since expanded to 1 500 active members sharing 40 cars at 28 locations.

Carrot prioritises the integration of its system into the existing transport modes. For this reason, the stations are mainly located in densely populated mixed-use urban areas with convenient access to public and non-motorised transport modes. Although Carrot cooperates with the government owned Ecobici bikesharing scheme, there is no official cooperation with the Mexico City municipal government. Nevertheless, the local authorities recognise the environmental benefits of carsharing and endorse the activities of Carrot. Like Zazcar in Brazil, Carrot is a member of the carsharing association CSA. (Website Carsharing.US)

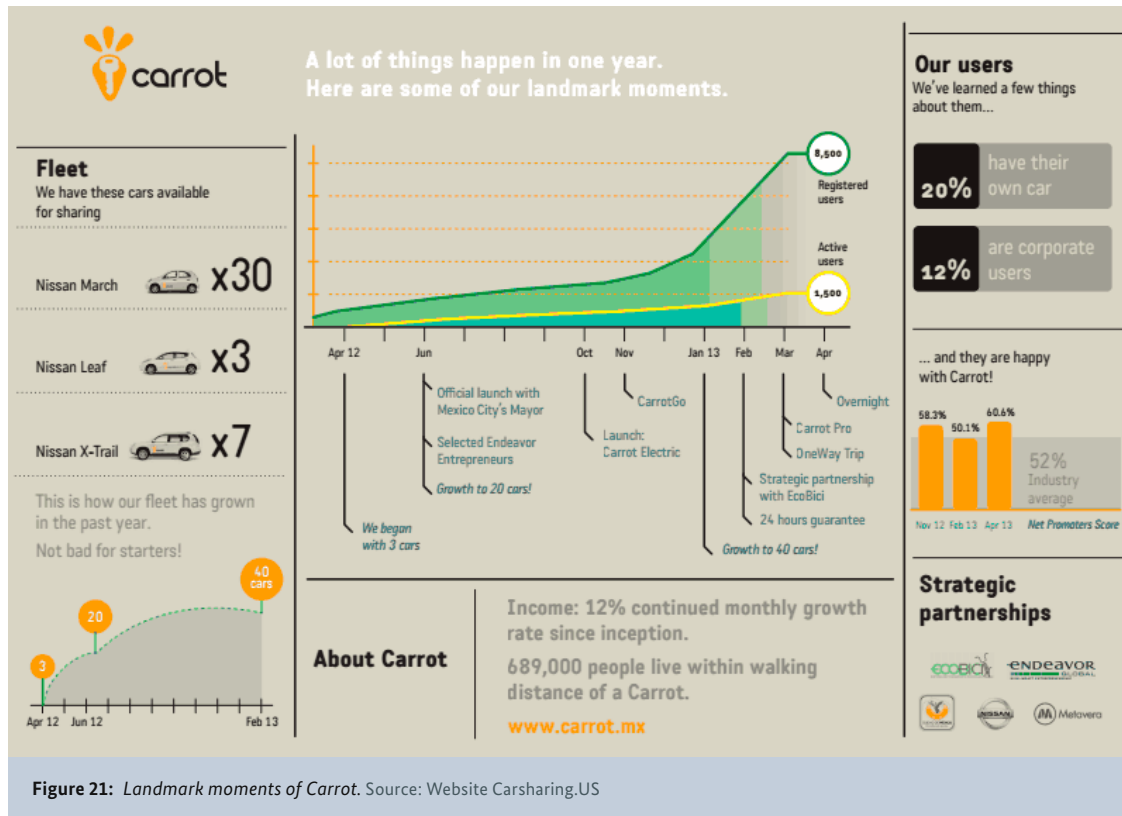


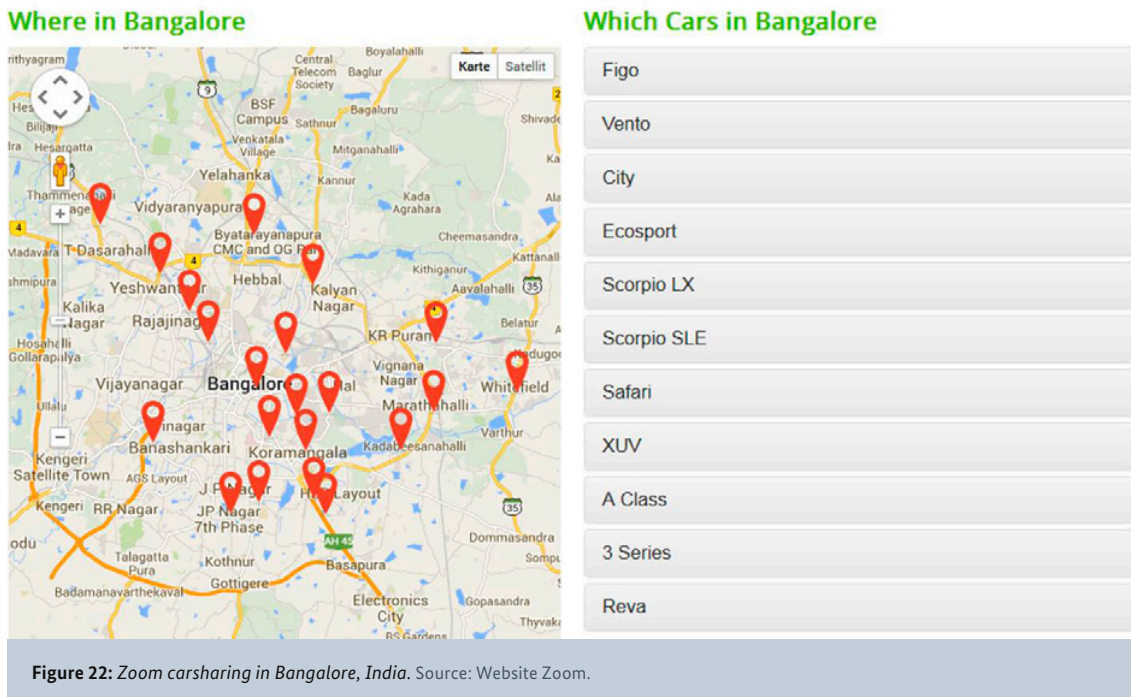
Figure 21: Landmark moments of Carrot. Source: Website Carsharing.US

India

The carsharing provider Zoom considers itself to be “India’s first membership-based self-drive car hire service”. In 2011, Zoom introduced a carsharing pilot project with ten vehicles in the third largest Indian city Bangalore. Due to the high level of interest and user acceptance, the provider could turn the pilot into a viable business, which now has 40 cars at five locations. Zoom offers state-of-the-art carsharing technology, for example vehicle access via smart phone, a fleet including premium car models (BMW Series 3) as well as electric

vehicles (Mahindra Reva E20). Based on the cooperation with Golden Gate Properties, an Indian property developer, Zoom provides carsharing stations mainly in residential apartment complexes. Additional cooperation, for instance with GM, Mahindra and BMW, allows the provider to access vehicles, maintenance, insurance, financing and logistical support. In the near future, Zoom intends to offer specific tariffs to students as well as to expand the system to Mumbai and Delhi (Website Harvard College).

Self Drive Cars In Bangalore



4.2 Carsharing's potential in emerging economies

Because the feasibility of carsharing strongly depends on city-specific demographics, mobility patterns and legal conditions, an in-depth investigation of the potential of carsharing in individual emerging economies exceeds the scope of this report. Nevertheless, it is possible to highlight certain beneficial conditions which are indicative of a fruitful environment for the implementation of carsharing services. The following section provides a brief overview of key indicators which can help to identify challenges and opportunities for carsharing in new markets.

Mobility Indicators

Carsharing has evolved to meet users' occasional need for motorised individual transport and to complement public and non-motorised transport instead of replacing

it. As the function and price structure of the mobility service are not aimed at frequent trips, such as daily commuting, carsharing cannot be considered as a primary or mono-modal transport mode. Consequently, carsharing largely depends on individuals commuting by non-car modes and using carsharing for non-commuting travel.

For this reason, carsharing is generally more attractive in areas characterised by overall low automobile dependency, a transportation mix with a high proportion of sustainable transport modes and for irregular and infrequent trips.

Policy Framework

As lessons learned in developed carsharing nations already indicate, the potential of carsharing systems often depends on specific policy support, such as the

provision of public parking space to establish carsharing stations. Due to a lack of successful carsharing schemes and demonstration projects which prove the viability and impacts of carsharing in emerging economies, political awareness and endorsement of carsharing in these countries is usually very low. Nevertheless, although carsharing-specific policies have not been introduced in emerging economies, carsharing-related policies often already exist.

In order to exploit its full potential, carsharing requires a strong public and non-motorised transport system as its “mobility backbone”. The more an emerging economy is committed to invest in the infrastructure of public and non-motorised transport modes, the more promising the environment for the implementation of carsharing systems will be.

Besides monetary encouragement of public and non-motorised transport modes, a range of non-monetary push-and-pull policies can contribute to the success of carsharing systems. Disincentives for private car use and ownership, for example congestion charging, high parking fees or limited vehicle licensing, not only support the governmental aim to strengthen public transport, but also raise the demand for alternatives to private car ownership, such as carsharing (Feng *et al.*, 2010).

Electro-mobility

In conjunction with the previously outlined policy framework, national development strategies on electro-mobility positively influence the success of carsharing services. Due to the negative consequences of increasing motorisation, electric vehicles are a hot topic amongst policy-makers and governmental officials in emerging economies. For this reason, led by China (“The China New Energy Vehicles Program”) and India (“National Electric Mobility Mission”), various emerging economies introduced their own strategies to accelerate the development of electro-mobility – often with ambitious targets.

Sophisticated European and North American e-carsharing schemes, for instance Autolib’ (Paris), car2go (San Diego, Amsterdam and Stuttgart) or Multicity (Berlin), demonstrate the feasibility and synergistic potential of electric vehicles and carsharing services. By offering electric cars without the requirement of ownership,

carsharing is a promising concept to facilitate affordable electro-mobility. Moreover, according to the average behaviour of carsharing customers (short distance trips in urban and suburban areas), most carsharing duty cycles are not negatively affected by the limited range and long charging time of electric vehicles (Knie *et al.*, 2012).

Although electric vehicles could increase the environmental benefits of carsharing, operators should meet the full range of customers’ mobility needs. For this reason, a combination of electric and conventional carsharing vehicles might be more appropriate than a fully electric fleet. In addition, e-carsharing represents a significant financial and operational burden for carsharing providers, which may require greater (possibly financial) support from the public sector.

Considering the aforementioned factors, officials in emerging economies could profit by supporting the implementation of e-carsharing systems. While e-carsharing is a promising approach to spur the diffusion of electric vehicles, it alone will not solve the transport related issues caused by intensive car use and ownership (*e.g.* congestion, parking).

Public awareness and acceptance

Correlating with the presently insufficient availability and governmental support, carsharing awareness in emerging economies is often still low. Taking China as an example, initial empirical studies unveil a significant lack of public awareness. In a survey carried out in 2006 in Beijing^[4], only about 10% of the respondents were aware of the carsharing concept. Consequently, in new markets such as Brazil, India, Mexico or China, education and promotion of carsharing and carsharing-related individual and social benefits are highly relevant to generate a broader public acceptance of carsharing systems.

However, the low acceptance of carsharing cannot be down to missing or insufficient awareness alone, but also to the availability of alternatives. Particularly taxi transport can be considered a competitor to (free-floating)

^[4] Martin, Elliot; Shaheen, Susan A. (2010a): *Demand for Carsharing Systems in Beijing, China: An Exploratory Study*. Transportation Sustainability Research Center (TSRC). Berkeley, USA.

carsharing, as it offers on-demand, short-term and pay-per-use access. While taxi services rarely exceed a share of 1% in European and North American cities, they are more popular in emerging economies' cities, mainly driven by inexpensive pricing and high availability. In megacities such as Brasilia, Mexico City or Beijing, taxis have modal shares of 5–10% (Martin *et al.*, 2011b). Nevertheless, the competitiveness of carsharing and taxi transport cannot be generalised, as it depends on specific use cases and individual mobility needs (especially in terms of the ratio of driving and parking).

4.3 Carsharing support options for local authorities

According to experience from successful carsharing markets, endorsement from government officials on a national as well as local level is crucial in creating a supportive climate for the development of carsharing services. Especially in emerging economies, where carsharing is still in an embryonic phase, proactive thinking and actions of the public sector could accelerate the establishment of more sophisticated carsharing systems.

Particularly at the local level, governmental authorities are able to find target-oriented options to provide effective support for carsharing services based on city-specific characteristics: carsharing can be introduced as not only a measure to improve to the quality of urban life, but also as an instrument to meet governmental targets on sustainable urban transport and electro-mobility. As the following section outlines, carsharing support options for local authorities can consist of monetary as well as non-monetary incentives.

4.3.1 Monetary incentives

As the establishment of a carsharing scheme requires significant financial investments, monetary support for both the initial and operational stage of such schemes is significant in reducing the risk in introducing such schemes, and will thus stimulate their introduction. Companies, especially initially, often depend on direct financing aid or tax relief until they reach a critical mass of customers.

Nevertheless, a more fundamental approach of monetary support could have a larger impact on the development of carsharing. Government-funded pilot projects can accelerate the diffusion of carsharing in emerging economies (Le Vine and Scott 2012). As the development of bikesharing in China, India and Mexico has demonstrated, pilot projects endorsed by the public sector are an effective way to raise the public as well as political awareness and to spur the diffusion of shared-use mobility. The implementation of Public Bicycle, a successful large-scale bikesharing system in the Chinese city Hangzhou, not only helped to gain experience in the field of sharing schemes, it also proved the viability of this service and encouraged other Chinese megacities to implement bikesharing (Martin *et al.*, 2011a). The funding of

Hangzhou Public Bicycle

The city of Hangzhou launched China's first bikesharing system in May 2008. Under the guidance of the local authorities, Hangzhou Public Bicycle offers 60 000 bikes at more than 2 000 stations in eight city districts. Due to the successful implementation and the positive impact on the transport sector, other cities followed and bikesharing spread quickly across China. Today, more than 19 Chinese cities offer bikesharing as a complementary non-motorised component of public transport (Martin *et al.*, 2011a).



Figure 23: Hangzhou Public Bicycle.

© Website ITDP China Bicycle Parking and Sharing Project.

large-scale carsharing pilot projects in emerging economies could possibly generate a similar spill-over.

When more sophisticated carsharing systems start to emerge in emerging economies, further (indirect) monetary incentives can be granted, through local authorities using the service to replace or supplement their own fleets, for example. The adoption of carsharing would not only help to increase the utilisation of the systems during business hours, it would also provide a degree of planning security to the providers by guaranteeing a source of monthly revenue. In addition, local authorities could cut their business travel expenses, improve their fleet management and encourage other companies to shift their mobility behaviour towards carsharing usage (Lytton and Poston 2012).

4.3.2 Non-monetary incentives

In order to grant public support to carsharing operators, financial aid is often less constructive than shaping a beneficial environment for the market development of carsharing based on non-monetary incentives. Especially on the local level, authorities are responsible for various externalities that enable and facilitate the establishment of the mobility service.

Non-monetary governmental support can be offered in terms of:

- Integrated Transport Planning;
- Parking Policies;
- Disincentives for Private Vehicles;
- Incentives for Carsharing Vehicles;
- Political and Public Awareness-raising.

Integrated transport planning

Experience from Europe and North America has shown that an integrated transport planning strategy with carsharing as the automobile component is one of the key success factors to spur the development and diffusion of carsharing services. Carsharing and public transport companies can generate synergies by enhancing the mobility of their customers, obviating the need for private vehicles and facilitating a rational choice of

the most efficient transport modes. Because the public transport sector is often strongly linked to governmental institutions, local authorities are able to encourage the cooperation between carsharing and public transport as well as to enforce the functional and technical connection of both modes.

Good practice

The Brussels public transport operator “Société des Transports Intercommunaux de Bruxelles” (STIB) and the carsharing company Cambio Brussels exemplify the synergy potential between public transport and carsharing. In order to enhance multi- and inter-modal transport in Brussels (Belgium), STIB supports the development of Cambio Brussels by facilitating the integration of carsharing in public transport stations. In addition, STIB includes carsharing in the public transport maps as well as in its commercial marketing and advertising strategy (Loose 2009).

More information on the cooperation between Cambio and STIB can be found at <https://www.stib-mivb.be/cambio.html?l=fr>.

Parking policies

One of the most effective non-monetary incentives can be granted by authorising carsharing stations on public space. The provision of highly visible public on-street parking facilities in key locations, such as dense mixed-use urban areas with convenient access to public and non-motorised transport, decreases the expenses for carsharing operators and improves the inter- and multi-modal transport integration of the mobility service. As a result, more potential customers can be attracted and larger impacts on urban transport and environment can be effected. Adequate parking policies should not only regulate the provision of public parking space, but also include enforcement mechanisms to prevent non-carsharing vehicles from parking on carsharing stations. This is particularly important in areas with high parking demand (Cohen *et al.*, 2008).



Figure 24: A carsharing station integrated in a residential parking area in Bremen.
© Michael Glotz-Richter, Bremen

Good practice

The City of Bremen (Germany) facilitates the installation of carsharing stations on public property by renting public parking spaces to local carsharing providers that meet specific criteria. In addition, the municipality introduced a unified design for the carsharing stations which increased their visibility and recognition value. Bremen was the first city worldwide to determine these and other carsharing support measures based on a comprehensive carsharing action plan (Glotz-Richter 2012).

The Action Plan “Carsharing for Bremen” can be downloaded at http://www.mobilpunkt-bremen.de/data/files/110/aktionplan_carsharing.pdf (only in German).

Disincentives for private vehicles

While parking is an essential non-monetary factor regarding carsharing support, the introduction of push-and-pull strategies is an additional option to accelerate the diffusion of the mobility service. Carsharing will be most likely successful in an environment with a high level of private vehicle disincentives and easy accessible alternative modes of transportation, thus, restriction and regulation of private vehicles, for example fuel-consumption-based vehicle fees and vehicle licensing limitations, are measures to decrease the appeal of private vehicles and to encourage the adoption of non-car lifestyles (Bundesverband CarSharing e.V. 2010).



Figure 25: Autolib' – Carsharing with electric vehicles in Paris, France.
© Dominik Schmid, 2013

Good practice

Due to persistent air pollution above European standards, the city of Paris (France) imposed a partial car ban in March 2014. While cars with even-numbered license plates were banned from the city centre, Autolib’s electric carsharing vehicles could be used without any restrictions. Moreover, the city granted free of charge access to the carsharing system, the bikesharing system and the public transport (Website New York Times).

More information on the Paris based carsharing provider Autolib’ is available at <http://www.autolib.eu/en>.

Incentives for carsharing vehicles

In addition to individual transport disincentives, local authorities can introduce privileges for carsharing users and companies. The exclusion from congestion charging and the provision of designated parking spaces for carsharing vehicles are examples of measures which improve the usability of carsharing in congested areas and which incentivise the adoption of the mobility service (Bundesverband CarSharing e.V. 2010). As already mentioned, the exclusion of carsharing from private vehicle disincentives can be a further possibility to provide privileges for its users.

Good practice

Based on the “Iniziativa Car Sharing” (ICS), Italy provides extensive support for carsharing services, including incentives for drivers of carsharing vehicles, such as free access to low emission zones and free parking in city centres (Bundesverband CarSharing e.V. 2010). So far, these measures apply only to station-based carsharing providers.

More information on the Italian Carsharing Initiative can be found at: <http://www.icscarsharing.it/main/english/ics-car-sharing-initiative>.

Table 2: Carsharing members, vehicles and stations in Italian cities supported by ICS (June 2014)

Cities	Members	Vehicles	Stations
Bologna	1 159	39	28
Brescia	120	6	5
Firenze	613	16	16
Genova/Savona	2 339	55	45
Milano	6 530	137	75
Padova	143	11	11
Palermo	857	43	31
Parma	372	10	10
Roma	3 313	115	78
Torino	2 420	121	76
Venezia	4 018	44	18
Total	21 884	597	393

Source: Website ICS – Iniziativa Car Sharing.

Political and public awareness-raising

As the political as well as public awareness of carsharing is often very low in emerging economies, awareness-raising is an essential component of non-monetary car-sharing support. Especially on a political level, relevant government ministries are able to provide comprehensive information to local authorities, in order to generate awareness of the function, impacts and benefits of car-sharing services. Based on this knowledge, local authorities can assess the local value of carsharing and promote the development of it in their transport planning departments as well as among the public. On a customer based level, governmental-supported marketing campaigns, media events, advertisement on public space and other measures with a high publicity potential can not only increase the public awareness, but also contribute to the general acceptance of carsharing schemes (Bundesverband CarSharing e.V. 2010).

Good practice

Together with the central transport coordination agency Transport for London (TfL), London's municipality introduced a Car Clubs Strategy to support local car clubs (the English term for carsharing companies) to reach market readiness. Based on workshops, public events and flyers, etc. the local authorities actively promote the concept of carsharing and its benefits for individual users, transport and environment (Bundesverband CarSharing e.V. 2010).

London's Car Clubs Strategy can be downloaded at <http://www.tfl.gov.uk/cdn/static/cms/documents/tfl-car-club-strategy.pdf>.



Figure 26: A Car Club parking space in London, UK. © Armin Wagner, 2014

5. Conclusion

Because various megacities and metropolitan regions in emerging economies have already reached their limit regarding the volume of individual transport, comprehensive demand-oriented mobility solutions are necessary to limit urban mass motorisation and to avert further damage. Carsharing, a mobility service that separates car use from ownership, has the potential to decrease the demand for private vehicles and to ease pressure on the transport system in major cities by complementing the existing public and non-motorised transport networks with on-demand, self-service, short-term and pay-per-use car access, potentially contributing to a shift of mobility behaviour towards more sustainable transport modes.

Despite the capability to contribute to a reduction of private car ownership and VKT, carsharing systems in emerging economies are still in an early phase. In contrast to various European and North American countries, where carsharing flourishes as an additional component of public transport, most efforts to establish carsharing in emerging economies have remained small-scale or failed shortly after their launch. That notwithstanding, some successful station-based schemes comparable to those in mature markets have been established in São Paulo, Mexico City, Hangzhou and Bangalore.

Local issues must be analysed in greater depth before making decisions on the potential of carsharing schemes.

However, based on the experience from countries with successful carsharing schemes, inadequate political conditions stand out as a major drawback for the expansion of new carsharing markets in emerging economies. In these countries, the political support for carsharing is still low and appropriate strategies to encourage the establishment of schemes are often non-existent. As the feasibility of carsharing depends on a wide range of factors under the control of governments, political awareness-raising is a central challenge carsharing providers face in emerging economies. Although restrictions and regulations of motorised individual transport (*e.g.* road pricing, driving bans and license limitations) are governmental measures to increase the demand of alternatives to private car ownership, more comprehensive and proactive support is necessary to stimulate the development of carsharing. Governmental initiated monetary and non-monetary incentives could help to jump-start the carsharing market in emerging economies as well as to improve the usability and number of customers of existing carsharing schemes. If eventually embraced by governmental planning, carsharing may not only develop more stably, it could also be implemented as a transport planning tool to decrease the high demand and the negative impact of private car ownership in urban areas – an essential step towards sustainable urban development in emerging economies.

6. A practitioner's contribution

What a city government can do – the example of the city of Bremen (Germany)

Written by Michael Glotz-Richter[]*

The Free Hanseatic City of Bremen (population 550 000) is a traditional harbour city in the North of Germany. The municipality is quite ambitious in the field of sustainable transport and quality of life. Bremen has received several awards for its transport strategies and pro-active integration of carsharing.

Carsharing started in Bremen in 1990 as a club with three cars and 28 users. The city currently has three operators (all station-based). The largest operator, cambio, has more than 9 000 customers (May 2014) and a fleet of about 200 cars at 60 stations in the city. All of the local providers operate as private market-based businesses.

The eight treasures for the successful implementation of carsharing – Eight fields of municipal support by the city of Bremen (Germany)

It is possible to identify eight concrete measures that the City of Bremen has undertaken in its efforts to fully

exploit the potential of carsharing within the city. These eight “treasures” are listed here and described below in more detail.

1. Embedding in an overall transport and urban development strategy;
2. On-street carsharing stations;
3. Integration into neighbourhood parking management;
4. Integration in new urban developments;
5. Integration with public transport;
6. Using carsharing to make fleet management more efficient;
7. Quality standards/certification;
8. Public relations and awareness raising.

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Figure 27: 2013 European Sustainable Energy Award.
© M. Glotz-Richter, Bremen



Figure 28: Guangzhou Award for Urban Innovation.
© M. Glotz-Richter, Bremen

6.1 Embedding carsharing in an overall transport and urban development strategy

Bremen is continually improving its public transport network and promoting cycling and it has a strategic objective of reducing the number of cars on its streets. Carsharing is not a stand-alone measure but is embedded into the city's urban development and transport strategies. Today, cycling accounts for more than 25% of all trips of Bremen's citizens, and the city has a goal of 30% by 2020. The city's goals and strategies are intended to allow as many people as possible to make their daily trips by the sustainable modes of walking, cycling and public transport. Carsharing in Bremen is seen as a supplement to the sustainable modes; only together they can be an alternative to the private car.



Figure 29: Quality of life and good conditions for business go together in Bremen; The historic city centre is pedestrianised and well connected by tram.
© M. Glotz-Richter, Bremen



Figure 30: Bremen's cycling culture is supported through a growing number of cycle streets.
© M. Glotz-Richter, Bremen

In addition to the other transport-related strategies, in which carsharing is embedded, Bremen adopted the world's first Carsharing Action Plan in September 2009. This clearly defined the interest of the municipality in carsharing and set a target for its development of at least 20 000 carsharers – equating to approximately 6 000 private cars removed from the streets – by 2020. This would quadruple the use of carsharing in Bremen as compared to 2008.

Currently, the City of Bremen undertakes a revision and update of its strategic transport concept ('Verkehrsentwicklungsplan' – see <http://www.bremen-bewegen.de>). The concept and process fulfils all requirements of a "Sustainable Mobility Plan" (SUMP) and the online tools of the participation process are a leading example of using modern technology for a broad involvement of citizens. The Internet Forum about the transport strategies (with an electronic map where citizens could put

on 'stickers' and other citizens could comment on these proposals) had 35 000 active visitors, 4 200 entries (proposals) and 9 500 written comments.

6.2 On-street carsharing stations

To make carsharing attractive, it is necessary to provide carsharing stations close to its customers. In the historic inner city areas with the highest demand and the biggest parking problems, the only option for carsharing stations is in public street space.

Since 2003, the City of Bremen has provided space for carsharing at mobility points (*mobil.punkt*). These stations are marked by a three metre tall pillar and are placed very visibly in public street space. They include reserved parking for the carsharing cars and bicycle racks. The *mobil.punkt* stations are either close to public transport stops or in the centre of residential neighbourhoods.

The provision of street space for accessible and visible carsharing stations at attractive locations close to the users is one of the key ingredients of successful carsharing implementation.



Figures 31, 32: Bremen: *mobil.punkt* carsharing stations – with pillar and bike racks.

© M. Glotz-Richter, Bremen

6.3 Integration into neighbourhood parking management

Carsharing is part of neighbourhood parking management in Bremen. Being aware that there is not enough street space to accommodate so many cars, Bremen decided that carsharing is a smart, cost-efficient measure to re-organise parking management.

Since 2013, a strategy has been in place to add a number of smaller carsharing stations (*mobil.punktchen*) in very small streets in order to relieve the parking situation there. The design includes extended kerbstone at intersections to reduce the problems of illegal parking. This approach eases the work of waste collectors and fire fighters, whose vehicles were often blocked by parked cars.



Figure 33: Small carsharing station in Bremen (mobil.punktchen).
© M. Glotz-Richter, Bremen

Mobil-Punktchen setzt Zeichen

Umgestaltung von Kreuzung in Seitenstraßen des Viertels dient der Rettungssicherheit

VON BETTINA GÖSSLER
Rund 8.600 Kunden nutzen in Bremen bereits die Möglichkeit des Car-Sharings. Die meisten von ihnen leben im Viertel und haben jetzt das erste „Mobilpunktchen“ der Stadt in ihrer unmittelbaren Nähe.

STREINROB Ein „Mobilpunktchen“ ist die kleinste Version einer Car-Sharing-Station. „An dieser Stelle sind zwei bis drei Wagen stationiert“, erklärte Kerstin Homrighausen, Geschäftsführerin des Anbieters „cambio“, vor der Einweihung des Standortes an der Ecke Schmidstraße/Hollerstraße. Ein solcher trage nicht nur zu einer „nachhaltigen Mobilität“ bei, wie Verkehrssenator Joachim Lohse (Grüne) sich ausdrückte, er habe ganz nebenbei auch andere Vorteile. Davon sprach „Viertelbürgermeister“ Robert Böcking. „Wir haben hier das Problem eines unendlich überparkten Quarters und hoffen, auf



Für Rettungswagen und Müllabfuhr ist es wichtig, die Kurvenbereiche passieren zu können. An der Ecke Schmidstraße/Hollerstraße ist das jetzt wieder möglich. Fotos: Schlie

Sharing-Angebotes zu bewegen, warf Lohse ein, bevor Böcking fortsetzte: „Die Rettungssituation im Viertel ist

Müllabfuhr. Das „Mobilpunktchen“ hat dahingehend einen positiven Nebeneffekt: Aufgrund der Umgestaltung von mehr Sicherheit. Im Viertel werden noch drei weitere „Mobil-Punktchen“ entstehen – an der Feldstraße/

Figure 34: Media coverage describes the improvement for waste collection vehicles due to carsharing.
© M. Glotz-Richter, Bremen

The Bremen carsharing operator cambio has reached a service level such that every carsharing car equates to removing eleven private cars from the streets. Thus the installation of an ever-growing network of carsharing stations both helps to make carsharing more attractive and also reduces the pressure on limited parking space.

Replacing private cars:

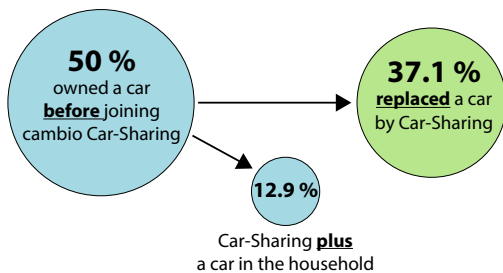


Figure 35: Impacts of carsharing in Bremen.
© M. Glotz-Richter, Bremen

6.4 Integration in new urban developments

Most new developments are still built with a great deal of car parking. For new housing or office developments in locations with good public transport and good cycling conditions, it makes sense to reduce the amount of parking and integrate carsharing.

As part of its building regulations, the City of Bremen revised its parking requirements for new developments. The regulations now require a higher standard for bicycle parking, while for car parking the developer has a choice of providing parking or offering mobility management options – including carsharing. It is thus possible to integrate carsharing to reduce the number of parking bays required. Fewer parking spaces mean lower construction costs for new urban developments, meaning more incentives can be offered for the use of walking, cycling and public transport – supplemented by carsharing.

This change in regulations helps to limit the car traffic often generated by new developments. It also offers benefits to the users: they don't have to pay for a parking space but they have access to a range of carsharing vehicles.



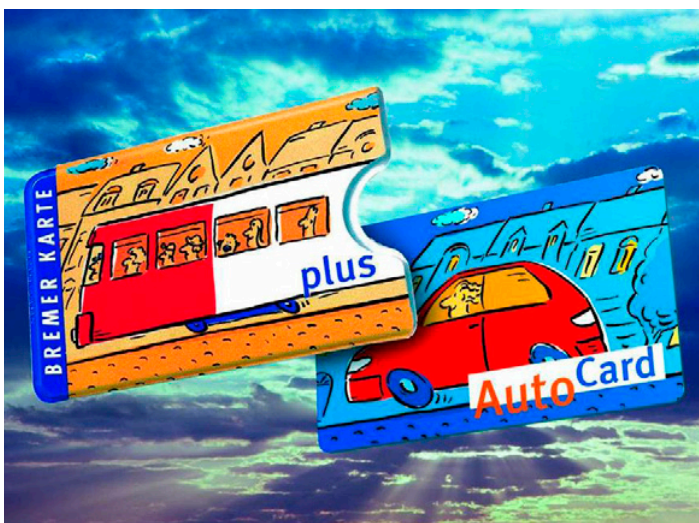
Figures 36, 37: Bremen: publicly accessible carsharing station on the estate of a new housing development (2002).
© M. Glotz-Richter, Bremen

6.5 Integration with public transport

There is synergy between the public transport and car-sharing. The public transport system covers most daily trips, but a car is still sometimes needed.

A core element of a new mobility culture is the promotion of public transport and cycling – supplemented by

carsharing – as an attractive alternative to car ownership. In Bremen, the collaboration between the public transport operator and the carsharing operator has a long history: the joint public transport season ticket with carsharing access – known as the *Bremer Karte plus AutoCard* – was implemented in June 1998.



Figures 38, 39: Promotion of the Bremer Karte plus AutoCard.
© M. Glotz-Richter, Bremen

The combination of a public transport season ticket with carsharing extends the service of public transport and creates a more solid ridership base for public transport and a less car-dependent lifestyle. There is combined promotional work and the carsharing stations are marked on the maps of the Bremen public transport operator.



Figure 40: Taxi transport integrated in a carsharing station in Bremen.
© M. Glotz-Richter, Bremen



Figure 41: Bremen's public transport map indicates carsharing stations.
© M. Glotz-Richter, Bremen

Taxis are also part of that strategy. The call centre for carsharing is operated by the taxi company over night. The rationale is easy to understand: those who do not own a car are more frequent taxi customers.

6.6 Using carsharing to make fleet management more efficient

The City of Bremen uses carsharing to improve the efficiency of its own fleet management. In 2003, the Senator for Environment and Construction started to reduce the department's fleet by using carsharing instead. Since then, the department has – except for a few specialised vehicles – moved completely from its own fleet to carsharing.

Ten years of experience show the advantages: more cars are at the city's disposal to meet peak demand more easily. In addition, the administration mainly uses cars during working hours while private demand is stronger in the evening and on weekends. The needs are complementary making the use of each car more efficient.

A major advantage for an administration or company is that the cars are managed by the carsharing operator. The fixed costs are low and the cost for each journey is completely transparent – an important ingredient for efficient cost management.



Figures 42, 43: 2003: New fleet management for the Bremen administration – today many companies use carsharing.
© M. Glotz-Richter, Bremen

The City of Bremen also offers workshops together with the Chamber of Commerce to show how companies (especially start-ups) can keep costs low while still maintaining the mobility of their workforce.

6.7 Quality standards or certification

Not every carsharing service is leading to similar impacts – especially on car ownership. A good carsharing system should be an alternative to owning a private car. Thus, it must be able to allow not only urban but also regional trips. Family-friendliness is another important aspect.

The City of Bremen requires certain standards to be fulfilled by a carsharing operator if the operator wants to use public street space for stations. Bremen initiated a certification for carsharing providers under the official German “Blue Angel” eco-label. The main requirements for Blue Angel certification are:

- High service quality (24-hour reservation, 24-hour pickup and 24-hour car return);
- A tariff structure based on time and mileage (i.e. no free kilometres);
- A tariff structure that encourages short-time use;
- Low emission and low noise vehicles;
- Regular care and maintenance of vehicles.



Figure 44: The official German “Blue Angel” eco-label.
The full set of requirements can be found in English at <http://www.blauer-engel.de/en/index.php>.

In Bremen, operators must also present results of annual user surveys about the replacement of private cars. Only when a carsharing operator can demonstrate (through before and after customer surveys on car ownership) how many cars really are replaced, the privilege of street space is provided.

6.8 Public relations and awareness raising

As the general public is still generally not aware of car-sharing, awareness raising is an absolute “must” if a municipality wants to get carsharing started. The city has options such as:

- Mentioning carsharing in regular media reports (e.g. when discussing the issue in political committees);
- Using billboards (especially near to public transport stops and stations);

■ Running campaigns.

The City of Bremen has carried out a number of such activities. Currently, a comic person called Udo (a German man’s name, but also an acronym for *Use it. Do not own it!*) shows that he has a better life when using carsharing instead of owning a car – as he has more time, more money and more choices.

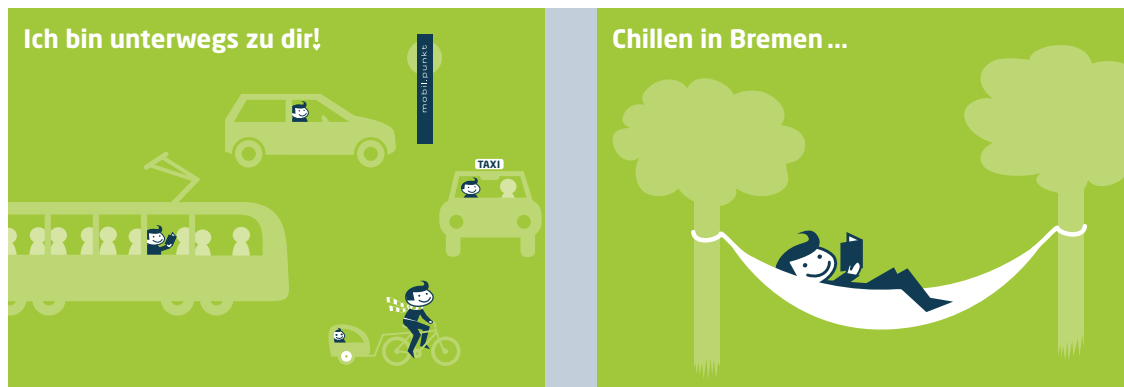


Figure 45: Udo (an acronym for “Use it do not own it”) in Bremen: using all modes of transport and having more time (as he does not need to take care of a car).

© M. Glotz-Richter, Bremen

A tram operated in Bremen during the 2010 world exposition in Shanghai saying in German and Chinese: always the right vehicle (ranging from the bicycle to various carsharing cars to bus and tram).

Figure 46: Reference to the EXPO2010 in Shanghai: Carsharing promotion on a tram: “always the right vehicle” indicating that public transport, cycling and carsharing belong together.

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Figure 47: Carsharing T-shirt – Bremen promotes carsharing at the 2010 EXPO in Shanghai.
© M. Glotz-Richter, Bremen

But the most beloved promotional activity is still a post-card asking simply: “Would you buy a cow for a glass of milk?”



Figure 48: Promotional postcard: Would you buy a cow for a glass of milk?
© M. Glotz-Richter, Bremen

6.9 Conclusion

Carsharing has huge potential to improve quality of life and traffic conditions in cities. The City of Bremen has been successfully integrating carsharing in its strategies for more than a decade, and is an example for many other cities in Germany, in Europe and abroad.

Every of the “Eight Treasures” of the strategic integration into urban policy making reinforce each other and jointly they develop a high level of synergy.



Figure 49: Michael Glotz-Richter at the EU-China Exhibition on Urban Development 2013 in Beijing, China.
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