

Eco-efficiency of car-sharing at risk?

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Abstract

Until now, car-sharing is a mobility service with positive ecological effects (especially regarding CO₂). But ongoing system transformations in numerous German car-sharing organisations could jeopardize these positive effects on a medium term.

The system transforming of car-sharing is, at the same time, the precondition and the result of the aspired diffusion of car-sharing on the transport market. Many car-sharing providers who started as civic self-help projects turn to profit oriented business corporations. New car-sharing companies as Shelldrive or the DB CarSharing interpret their services as an offer for a flexible short-term car hire. This change results from the activities of mainly commercially oriented providers to canvass new customers. The intention is to reach customers from outside the initial car-sharing milieus. The original service was an ecological innovation and the majority of customers still adheres to this origin. But if this strategy proves to be successful, it is possible that not only new customers can be acquired but that the general use and, consequently, the eco-balance of car-sharing could change.

In this respect, intermediate results from a current research project on the future of car-sharing in Germany are presented. Based on systematic reflections on the ecological effects of car-sharing, the results of theoretical and empiric examinations of the change on the supply- and demand-side show that it will be necessary to give the current research

perspective another direction and to amend the image of car-sharing.

Introduction

17 years after its invention in Berlin, car-sharing has established in the German transport market. In 2004, the leading German consumer magazine "Test" tested different providers (Stiftung Warentest 2004) and the German association of public transport providers (VDV) gave its members the explicit recommendation to cooperate with car-sharing organisations (CSO). Car-sharing is also mentioned in sustainable mobility concepts (Federal Government 2002: 196). The reasons are its positive ecological effects, especially the reduction of number of vehicles and kilometres travelled.

In the beginning of the 1990s there were critics that car-sharing could give access to car use to those who could not afford their own car. Hence, it was argued that it could become a "gateway" for buying a car (Wohltmann 1992). These concerns were successfully refuted through various empirical studies (e.g. Baum/Pesch 1994). On the contrary, car-sharing seems to make many people get rid of their car or at least their plans of buying one. The fact that car-sharing was adopted as an additional car option by a small number of users, was considered as negligible. As a consequence, car-sharing is generally currently esteemed as an eco-efficient mobility service (e.g. Weizsäcker/A. B. Lovins/L. H. Lovins 1995: 164-165).

Until today, about 80 different car-sharing providers have ca. 76 000 customers. Scientific market and potential analyse (Baum/Pesch 1994, Loose/Mohr/Nobis 2004) have found that the potential is much higher and in the range of

several million customers. Therefore, the essential question of the providers as well as mobility research about car-sharing is how to achieve a (better) exploitation of potentials.

Background of a diffusion of car-sharing is a transformation initiated in the mid 1990s by progressive providers. This transformation can be summarized by the statement "getting away from the eco-image" (Byzio/Heine/Mautz: 2002: 204-205). In the beginnings the service was provided not by companies but associations that are de facto ecologically oriented "self-help projects". Since the mid 90s, these non-profit organisations have started to transform themselves into profit-orientated companies and offer car-sharing as professional mobility services. However, there was still an environmental objective: It was assumed that the diffusion of the service will result in a diffusion of different mobility patterns characterized by less car-use. If car-sharing made people to change their mobility behaviour the eco-balance of car-sharing would be improved. Hence, the main efforts aimed at reaching new user groups. Thereby, the success story of the car-sharing development in Switzerland is still a shining example.

But why is the development of the market progressing only slowly? Car-sharing studies typically list reasons that can be summarized with the keywords "lack of professionalisation" and "lack of centralization" (e.g. Knie/Koch/Lübke 2002, Frick/Knie/Reindl 2000, Franke 2001). The analysis focus on quality of services (e.g. access barriers, inflexible utilisation, complicated tariff systems, impracticable and time-consuming handling) and on the provision of the service (representation, marketing). Furthermore, the fragmented structure of providers is criticized: Most organisations only offer services in one city or region. Hence, the heterogeneity of supply was held responsible for the slow diffusion, because of different-sized providers, legal form and economical efficiency. Recently, the focus of critique has shifted to the lack of technological and organisational innovations like instant access, open-end-reservation and one-way-rides (BCS 2001, Franke 2001).

The car-sharing concept of the German Railway Company (Die Bahn – DB), launched in 2003, intends to avoid these deficits (Knie/Koch/Lübke 2002: 98). But also other providers have been working on the improvement of the system. The common target is to offer a flexible system that can be used "without thinking" (Franke 2001). Consequently, it is intended to reach the standard of a private car. In this context, the planned introduction of new technologies will likely push quality, utilisation and handling (Wilke 2002a: 10-11). It is assumed, that the centralisation of the provider structure is a precondition for a professionalisation and standardisation of the service. The most prominent examples for such a strategy are the DB as well as Cambio that both have developed a franchising-concept open to regional providers. In contrast to that, Shelldrive expands its activities to more and more cities.

In this context, it is necessary to deal again with the question about the future of car-sharing in Germany. This must be done not only in the face of market prospects but also with regard to the ecological effects. New technologies and services correspond to new user groups. But such a development does not necessarily lead to a change of mobility patterns of these new customers. By offering the standard of a

private car, the opposite effect could happen: behaviour of car-sharing users changes towards conventional forms of using a car. Consequently, the ecological effects of car-sharing could be abolished. Generally speaking, car-sharing would not be longer eco-efficient per se. Only if certain conditions are fulfilled it will keep its status as "sustainable" transport mode.

This paper discusses the above described questions in more detail. It is based on preliminary results of the research project "The Future of Car-Sharing in Germany", [1] supported by the German Federal Ministry for Education and Research. The initial hypothesis of the project is that the transformation of the car-sharing system is at the same time precondition and consequence of the diffusion, but that the ecological effects of car-sharing are going to change through the system transformation. A first report [3] gives evidence for the plausibility of this hypothesis. The article will show that preliminary results of the project, started in 2003 [2], support the starting hypothesis. First, the potential ecological effects of car-sharing are discussed. This is explained at the example of a study conducted in Switzerland. Afterwards, the transformation process and the future prospects are outlined. Thereby, considerations about the perspectives of car-sharing services are developed in a contrasting presentation of the ideal types of "current" and "new" car-sharing services. Finally, conclusions are drawn regarding the hypothesis of the project.

Ecological Impacts of Car-Sharing

The ecological effects (reduction of pollution, noise, greenhouse gas emissions as well as land use) of car-sharing are of a comparative nature, i.e. it is necessary to compare the situation with car-sharing and a reference situation without car-sharing. From a perspective of environmental economists, it can be differentiated between eco-efficiency impacts and eco-sufficiency impacts. Furthermore, there are impacts due to a possible additive demand [4]:

Eco-efficiency aims at increasing the resource productivity and at reducing the environmental burden by improving technology or organisation. This can also involve the substitution by functionally equivalent goods and services. Eco-sufficiency, in contrast, stands for reducing resource use and environmental burden by reducing the demand for goods and services (Scherhorn/Reisch/Schrödl 1997, Frick/Diez/Reindl 1998). Finally, additive demand refers to the opposite effect of additional demand.

In the following paragraphs these terms are used to discuss possible ecological impacts of car-sharing. It focuses on a reduction of CO₂-emissions through alternative patterns of using a car [5]. According to this, the potential positive ecological impacts of car-sharing can have three reasons: a reduction of the number of vehicles (fleet-size), a decrease in the total number of kilometres travelled (passenger transport capacity) and changes in size and energy consumption of cars.

ECO-EFFICIENCY IMPACTS

A central ecological impact of car-sharing is the reduction of the numbers of vehicles. This is a consequence of a bundling effect. Bundling means that by car-sharing vehicles are

more intensively used than private cars. Generally speaking, a more intensive utilisation means that cars are used more often and parking periods are reduced (Schrader 2001: 92).

Further eco-efficiency impacts of car-sharing originate from the relatively new car-sharing fleet. Therefore vehicles used are normally more environmentally sound than the average private car. Further efficiency impacts can be achieved by using vehicles with environmental sound technology like lower energy consumption or equipment for alternative fuels.

ECO-SUFFICIENCY IMPACTS

The reduction of demand, which means that people travel less compared to previous patterns of using a private car, is considered as the main ecological impact of car-sharing (e.g. Meijkamp 2000: 197-198). The facts that car-sharing provides transparency of costs as well as that a renouncement of car-use results in a direct reduction of costs possibly make people to bring about a different travel behaviour than car-owners (Schrader 2001: 98-99). Car-sharing confronts the user with the total costs and not only the fuel costs. This "sufficiency effect" is empirically well proved (Schrader 2001: 252).

Additionally, it can be assumed that the non-monetary transaction costs (e.g. reservation call, checking the car, filling in the logbook etc.) and the related "disciplining effect" (Harms 2003: 116-177) also play a considerable role (see below). Moreover, during user's car-sharing membership, an overall reduction of the kilometres travelled by car-sharing vehicles is to be noticed (Muheim & Partner 1998: 100-101, Wuppertal Institut 2004: 60-61); this behaviour is usually considered as a "learning effect" (Holm, n.y.). The reduction of the kilometres travelled by car contributes to a decrease in the number of cars as well as to a reduced use of fuel and emissions.

A further sufficiency effect results from another feature of the price system. As small cars are cheaper than large ones, most car-sharing users have the tendency to choose smaller vehicles than they would have bought. While people normally buy a car that can be used for a variety of purposes, and thus usually buy bigger cars (e.g. a car must suite for a holiday trip), car-sharing makes it possible to rent the appropriate car according to each particular occasion (Wuppertal Institut 2004: 60-61).

A last aspect leading to the reduction of resource use is, that car-sharing vehicles often (GWI) have less luxurious equipment than private cars. However, comfort is becoming more and more important for the car-sharing customer, e.g. more and more car-sharing cars are air-conditioned.

Generally speaking, being a car-sharing customer can result in a reduction of car use. However, in a comparison with and without car-sharing three aspects have to be considered: (1) kilometres travelled with public transport, (2) kilometres travelled in other cars and (3) kilometres driven by service vehicles (e.g. home delivery).

EFFECTS DUE TO ADDITIVE DEMAND

So far, the ecological benefits of car-sharing have been described. Even though car-sharing can also lead to additional demand for "auto mobility" and thus to a negative environmental impact. Firstly, there are mainly two types of users

that generate additive demand: Customers, who previously did not travel by car, and customers, who still own a car. These people do not reduce car-use but enhance their access to cars.

Secondly, changes in the car-sharing tariff system can minimise the above described effects of the price transparency. While up to now, a transparent kilometre- and time-based cost-charging was a basic feature of car-sharing, the Deutsche Bahn and some business offers of other providers are representing simplified and "cleared out" prices. They are more similar to conventional car-rent-providers by decoupling costs from the effectively travelled kilometres. E.g. DB CarSharing offers 25 free kilometres per hour (250 per day) so that only time and fuel costs are charged [6].

Thirdly, car-sharing can bring about an up-sizing of vehicles. Indeed, this depends on the previously used cars on the demand side and the composition of the car-sharing fleet. Even if there is no empirical data about the former cars of customers, there is an evident tendency for upgrading the vehicle fleets in terms of comfort and range of supplied models. Even if small cars are still dominating, providers more and more integrate upper middle class cars, upper class vehicles and people carriers into the fleet. The car-sharing providers mainly justify this with a specific demand of business customers. However, these cars are available for private customers as well.

So far, only the additive demand inside the transport sector was discussed. But if car-sharing really leads to a modal shift, people can save transport expenditures. This again could principally lead to increasing consumption and increasing energy use in other sectors. But until now, this hypothesis is not proved empirically.

This short and simplified overview about possible ecological effects shows the necessity of a differentiated environmental assessment. This will be the main task in the final step of the research project "The Future of car-Sharing in Germany".

BALANCING ECOLOGICAL EFFECTS: AN EXAMPLE

So far, there are no final results from the current research project. These will be available by the end of 2005. However, starting point of a framework for eco-balancing can be the approach of a study conducted in Switzerland.

Results from Switzerland

The Swiss study of the transport consulting Muheim & Partner regarding Swiss car-sharing provides a differentiated balance of mobility pattern of car-sharing customers before and after using the services (Muheim & Partner 1998). The study is based on interviews with 511 active customers of the Swiss car-sharing provider Mobility.

The authors distinguished four customer categories:

- customers being motorised for the first time with car-sharing (26,7%);
- customers having abandoned their car before starting car-sharing (42,4%);
- customers having abandoned their car simultaneously to or after the accession (11,3%);
- customers using car-sharing as "second car" (19,6%) [7].

To balance the effects of the different groups, the comparison takes into account the means of transport and the kilometres travelled per person. As a result, the following effects appear:

In the overall balance, the total number of travelled kilometres slightly decreases. Taking all groups into account, the share of the auto-kilometres (all forms of motorised individual transport including car-sharing) decline, whereas the shares of the environmental transport means increase. As expected, the raise of the auto shares is observed in the group “motorised for the first time with car-sharing” and in the group “using car-sharing as second car”. Nevertheless, these increases are more than compensated by the decrease of car kilometres shares in the other groups.

These findings are considered as typical for car-sharing. However, a closer look at the figures in the eco-balance for the Swiss provider “Mobility” (Mertens 2000: 31-33) leads to some preliminary, comparative conclusions about car use before and after access to a car-sharing scheme:

First, customers that owned a car “before car-sharing” already used cars below average at that time. This leads to the assumption of an comparatively low importance of cars in everyday-life organisation.

Second, an aspect known from other studies (e.g. Baum/Pesch 1994: 115-116) should be considered: Even people who do not own a car, de facto use cars. If they are not car-sharing customers, they rent or borrow cars.

Third, customers do not only use car-sharing but continue using “other cars”, such as cars from friends and relatives or from conventional car-rental companies. Furthermore, the use of “other cars” lies significantly above the one of car-sharing.

Especially the last point leads to the hypothesis that car-sharing as well as the use of “other cars” is mainly relevant for special purposes and not for everyday-life mobility. This hypothesis is supported by the fact that persons using car-sharing as a second car travel 5 100 kilometres per year on average. In comparison to the Swiss average kilometre performance for second cars of 8 727 kilometre (in 1999, Bundesamt für Raumentwicklung, Bundesamt für Statistik 2001) this is significantly less. Such a low level makes an overall additional demand for “auto-mobility” through car-sharing not likely.

Methodological Critique

Apart from these conclusions and hypothesis, it is possible to learn from some shortcomings of Muheims eco-balance. This is mainly related to the assumptions regarding the comparison “before” and “with” car-sharing.

As said before, people who do not own a car use cars e.g. from friends. Although they are travelling a relatively low yearly amount of kilometres, it is a critical point: Defining this user category as “motorised for the first-time with car-sharing” does not correspond to the realities and is hence misleading.

Even more problematic is the group of customers that sold their car “before” car-sharing. The time-span in which these people sold their car is not defined. This was not considered in the survey (vgl. Muheim & Partner 1998: 89). The decision to sell their private car may have been taken a short time ago or even years ago. The critique is that in a

longer lasting period, people have become used to an everyday-life without private car. Thus, it must be assumed that people had a low demand for car travelling. Consequently, the reduction of kilometres travelled cannot be assigned to car-sharing but must have been independently from that. It is not accurate to compare the behaviour “with car-sharing” to the yearly travelled kilometres with the former private car. Instead, the comparison must always take into account behaviour that occurred straight before using the service.

The consequences of these deliberations can be outlined at the example of the Swiss eco-balancing. Car-sharing customers, who sold their car before becoming a customer, are with 42,4% the largest group within the random sample; their contribution to the car kilometre reduction sums up to 72%. Based on the above-presented considerations, it can be assumed that at least for a part of these people, the car use “before car-sharing” was lower than indicated. Consequently, the Mobility eco-balance has the tendency to overestimate reduction.

So far, the concept and the problems of eco-balancing car-sharing have been explained. Even the final results for Germany are not available at the moment, the often provided idea that the access to car-sharing leads to major changes of the mobility behaviour must be reconsidered. Instead, it should be assumed that mobility and the everyday-life organisation of people change slowly and not directly related to the participation in a car-sharing scheme. More precise, car-sharing can give people the opportunity for modifications but these are mainly dependent on the everyday-life needs.

Transformation of the Car-Sharing System – The Way so far

In a comprehensive eco-balance, the future developments of car-sharing should be reflected as well. As the ecological effects mainly depend of the behaviour of the users, the perspectives of car-sharing in Germany are important. A look back to the transformation of the car-sharing system so far shows that the providers and the offered services (supply side) as well as the kind of customers (demand side) changed.

TRANSFORMATION OF PROVIDERS (SUPPLY-SIDE 1)

The organised form of car-sharing in Germany evolved, like in Switzerland, from local ecological movements and started as civic self-help projects and non-profit organisations. The aim was to offer those living without own car or those intending to sell their car an environmental sound possibility of satisfying casual demands of auto-mobility.

These roots are still reflected by the typical German car-sharing vocabulary, beginning with the term “car-sharing” and its literal meaning. People did not get customers but “members”, they “participated” and they used “joint cars”. They got part of a community or alternative society, frequently knowing each other and aware of sharing similar values, opinions and life styles.

From Local Monopolies to Competition

In the logic of non-profit self-help projects, no competing of-fers came up but each city’s “alternative society” organised a separate system. The fragmentation of car-sharing providers goes back to these roots. But in the second half of the nineties, a part of the providers started to develop “from an eco-project to a mobility service” (Franke 2001). A lot of car-sharing organisations previously ran as cooperative got transformed into commercial organisations. But still, the beginning of this market was not really characterised by competition. Apart from only a few single and special cases, local monopolies were prevailing until a few years ago. It would have been contradictory for each local provider to be competing against each other. A certain de-coupling from the local alternative society took place in periods of crisis, when providers from outside took over some car-sharing organisations.

At the moment, when single providers decided to enter already “occupied” local markets and to compete with local, already operating car-sharing organisations, the development from non-profit to profit orientation is completed. First the appearance of competition created a real market situation. Meanwhile, there are ten cities with competing car-sharing providers.

Patterns in the Variety of Models – a Provider Typology

Having in mind, that only a some of the car-sharing providers transform themselves, it is to underline that this was not a straight and stringent course but rather a movement of searching and testing. The present German car-sharing scene can still be described as heterogeneous. In a study made at the Sociological Research Institute of the University of Göttingen, the authors found out a set of models ranging from “civic self-help projects” up to “commercial orientation” (Byzio/Heine/Mautz: 185-191).

But the study of Byzio, Heine and Mautz emphasised a preferably complete record of the total spectrum of organisational models. Four years after that study, a different approach is focusing on the main points within this spectrum. Hence, it is possible to distinguish a relatively evident pattern in the variety of providers (see figure 1). According to the realised provider analysis of the project “The Future of Car-Sharing in Germany” (Wuppertal Institut 2004: 10) there still seems to exist a separation between the civic, non-profit and the commercial, profit orientated “philosophy”. Both groups include supra-local and local orientated provider.

Within this scheme, a further differentiation can be made in two strategic approaches of the supra-local and commercial Organisations: While one group is following a more classical model of enterprise, extending their market position through mergers and acquisitions or additional agencies, another group is trying to reinforce its position by cooperation. The second group seems to try keeping the former motivations of the local civic self-help projects and transform them to the supra-local level by emphasizing cooperation. Nevertheless, the representatives of both groups show a pronounced intention of expansion. This cannot only be read off their business policy but also their unmistakable respective profiling.

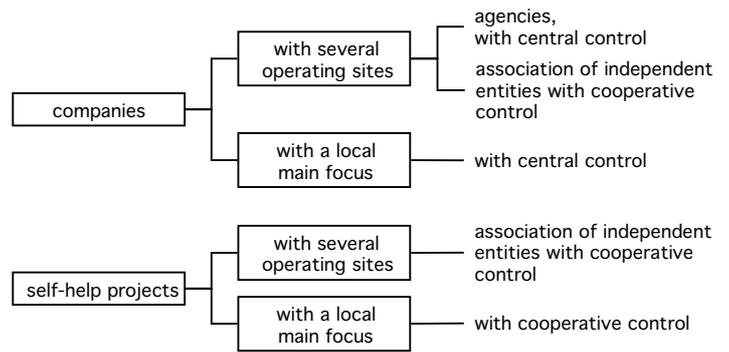


Figure 1. Categories of providers in German Car-Sharing divided into organisation form, range of activity and control mode. Source: Wuppertal Institut (2004).

These categories should be understood as a heuristic device. Nevertheless, they were confirmed in the frame of the provider analysis of the project. The overall number of customers in German car-sharing is concentrated in the three provider categories representing commercial orientation (January 2003: provider with several operating sites: 33,7%; associated provider 31,9%, local providers 28,4%). The share of self-help projects of German car-sharing customers is relatively low (5,9%) (Wuppertal Institut 2004: 12).

In the group of the car-sharing organisations, who are still operating as a civic self-help project, only the cooperation “Car-Sharing Südbaden” with the main player “Freiburger Autogemeinschaft” is known as a supra-local or regional network. The aim to cooperate (and not to take over other organisations) is a logical consequence of the “self-image” of the members of this network. Furthermore, enterprises and self-help projects on the local level differ mainly regarding their “ideology”: While the business strategy goes beyond maintaining existence and aims at extension of activities, the non-profit organisations follow a purpose, e.g. ecology.

Perspectives of Development

For a few years, the car-sharing business has been very dynamic. Some prominent examples are: The establishment of the cambio Mobilitätsservice holding company by cooperation of the local companies of Bremen, Aachen and Köln; in December 2001 the German railway company Deutsche Bahn AG set up DB CarSharing by using a franchise model; in 2003 the stadtmobil CarSharing GmbH (located in Dortmund and offering car-sharing especially in the Rhine-Ruhr area) was taken over by the oil company Shell and renamed in “shelldrive”; finally in 2004 the Dutch provider “Greenwheels” purchased more than 90 percent of the shares of the car-sharing provider Stattauto AG Berlin, which was the first car-sharing organisation in Germany.

Today, the four “big players” Stattauto AG, cambio, “Stadtmobil Südwest”-cooperation und Shelldrive have together more than 50% of all car-sharing customers. The commercial orientation of these companies is obvious. However, there are small differences because cambio and “Stadtmobil Südwest” have several cooperative elements. Further cooperative networks like the Freiburger Autogemeinschaft do not exist. Nevertheless, there are still a number of pro-

viders that understand themselves as small local businesses or self-help projects.

The provider DB CarSharing cannot be compared to the above-described categories, because it sets up cooperation with local providers and acts as a franchisor instead of being a full market player. Only in few cases, and with very few cars, DB CarSharing has "own" customers. However, in the field of business customers, there is a different strategy. There are already ten direct contracts with nation wide active enterprises. (Loose/Moor/Nobis 2004: 58)

Shelldrive is a special case in this typology as it stands for a new type of company representing a strong external investor. A recent episode is the start of Shelldrive in Hamburg. Like the relaunch of the stadtmobil service in Düsseldorf, Essen and Dortmund, the launch in Hamburg is accompanied by a major marketing offensive. The chance to expand, gain further market shares and enhance the market potential is probably closely related to the possibility for investments. But the financial basis of the German car-sharing companies is relatively weak and even commercially orientated providers do not have sufficient capital. Indicators for this are low salaries and a large proportion of honorary work in the sector. For most of the small businesses it is even an economic risk to set up a new car-sharing station. Some of the companies tried to manage this situation by opening up new fields of action and sources of income. E.g. cambio Mobilitätsservice is not only a holding but also a franchisor and system provider for other car-sharing companies. But the crucial point is probably not mere capital. Even investors like Shell want to earn money after a phase of market entrance. Instead of that the amount of risk capital allowing short-term supply extension as well as marketing activities is crucial. Therefore, a further differentiation of the categorization between access and no-access to risk-capital could be useful.

In summary, the branch expected a concentration and centralization in the 90s. This has happened at least to a certain extent. In contrary, the organisational models were further differentiated between the poles of "self-help projects" and "commercial orientation".

AMENDMENTS OF THE CAR-SHARING SERVICES (SUPPLY-SIDE 2)

Doubtless, the car-sharing service became more and more professional and the quality rose significantly. Improvements in the technology used for car access offered easier and more flexible handling of cars and IT solutions helped to make booking and accounting easier. Furthermore, the possibility to rent car-sharing cars in other towns was facilitated and extended. At the same time the barriers for customers were reduced more and more; e.g. the deposit was reduced or even abolished. However, overall standardization of service and technology did not happen. The DB CarSharing franchise system is a big step forward, but did not completely fulfil the expectations.

Regarding the future development, new rental options like "instant access" and "open end" that significantly increase the flexibility of users and make car-sharing more similar to using a private car are only exceptions. One-way use is not offered at all. An indicator for the change in the car-sharing fleet is the upsizing of services. As mentioned above, more and more providers do not only offer small cars,

estate cars and transporters but also diversify the fleet with middle class limousines, sports cars, and even upper class cars and cabriolets.

And, changes in the pricing system system happened as well. The general tendency is to simplify and adjust it to different target groups. Thus, in several cases the pricing system is further differentiated especially in regard to new customers (with very low fixed costs but higher using costs) on the one side and heavy users on the other side (with higher fixed costs but lower variable costs). A prototype for the first case is the pricing system of DB CarSharing that has no fixed costs at all but quite high costs for using. Furthermore, it is closer to the pricing system of conventional car rental companies as the time costs are much higher than the kilometre costs. However, this is not only a contribution to the car rental market but also to the cooperation with local car-sharing companies. These companies would not have accepted a franchise system offering a price that at least for the existing customers is cheaper than the local tariff (Projektgruppe Mobilität 2004: 115).

CHANGES IN THE KIND OF CUSTOMERS (DEMAND-SIDE 1)

German car-sharing and the number of customers is growing further on. At January 1st 2004, 76 000 people were registered. These people use ca. 2 500 vehicles (bes 2005). In relation to the number of driver-licence holders this number is still very low (ca. 0,15%). However, the annual growth rate is 10% in comparison to the year 2004. The growth was even higher in the years before. However, it can be attributed to a high degree to a spatial expansion of the car-sharing supply. This spatial expansion means the emergence of a service in former "not covered" cities and districts or neighbourhoods. Due to the fact that each car-sharing station only has a relatively small catchment area the geographical extension is linked to relatively high investments.

An interesting example is the development of the market in Dresden (Holm/Müller-Eberstein 2002). Since 1998, a service offensive and a marketing campaign in cooperation with the local public transport provider have led to a rapid growth. However, after 3-4 years this development was completed and since then no significant increase could have been observed. Such a development has been occurred in other cities as well. Therefore, it can be reasonably assumed that each city encloses a certain number of people with a car-sharing affinity. These people are mostly related to a certain social background (social milieu) and the maximum number of persons is limited. If adequate financial resources for marketing and service extension do exist, a rapid growth is possible. If these resources do not exist it takes longer but it is also possible to reach people step by step. This reason also supports the hypothesis of Pesch (1996: 129-130), arguing that car-sharing first spreads within a relatively homogeneously clientele.

Statements concerning the socio-demographic profile, the patterns of use and the motives to practice car-sharing are only possible in a comparative analysis of car-sharing studies. Because of different methodological approaches and spatial foci these studies cannot be conducted to a real panel. Long-term surveys do not exist.

However, some conclusions can be drawn: The socio-demographic profile of the customers seem to be relatively sta-

ble. The well educated middle classes with a relatively high income is dominating. Most of the customers are between 25 and 40 years old, the share of people with academic degree is over the average. Furthermore people are often employed in the service sector and the income level is medium to high. In addition, there are far more men than women among the customers and most of them live in small households (Franke 2001: 27, Steding 2004: 32-33). In Switzerland a shift towards a more average composition of customers was observed in the late 1990s (Muheim & Partner 1998: 54). The question, if such a change is also possible in Germany cannot be answered at the moment; recent data is missing.

ALTERATION IN PATTERNS OF DEMAND (DEMAND-SIDE 2)

Similar to the type of customers, the patterns of demand are relatively stable as well. The results of the provider survey carried out in the project (Wuppertal Institut 2004) represent typical behaviour: Car-sharing is used one to two times a month and mainly for leisure and transportation purposes. The average annual kilometre performance is around 1 000 km. The majority of customers have a kilometre performance lower than 750 km a year with car-sharing while the "intensive users" with more than 5 000 km a year are quite few. But the total number of this group of customers is inversely proportional to their turnover. Furthermore, a high share of passive customers is typically as well: It lies between 20% and 40%.

Motives for participating in a car-sharing scheme were and still are mixed. However, within these motive bundles ecology and economy have interchanged their position in the list of the key motives. While ecology has lost importance, economy has become more relevant (Franke 2001: 29-30). The Swiss tendency that comfort and, even more important, practical reasons have increased may be valid for Germany as well (Muheim & Partner 1998). Nevertheless, a general sensibility for ecologic questions is probably still a main factor for the decision to participate.

Perspectives: Current and New Car-Sharing in Comparison

Until now the transformation process mainly affects the supply side. As it is still an open question, how the demand side will develop, the actual empirical investigations of the research project "The Future of Car-Sharing in Germany" focus on the demand side. The following arguments are related to the project's research perspective and build up a theoretical basis of the project. First results of research are incorporated.

To describe the changes more concrete, two ideal-types are distinguished: the "current car-sharing" and the "new car-sharing". The current car-sharing is an advanced and existing system of short time car rental while the new car sharing represents a medium term perspective related to organisational and technological developments as well as scientific expectations. The new car-sharing is based on a scenario that the providers of car-sharing and the car-sharing services will become more and more professional(s. above). Furthermore it is assumed that a close network of car-sharing stations will exist at least in the cities.

CURRENT CAR-SHARING

Understanding individual mobility "as social practice" embedded into class-specific everyday-life structures (Bittlingmayer/Steding 2004: 134) the reasons for the so far comparatively modest numbers of car-sharing users becomes more clear. It has to be differentiated between customers not owning a private car, for which car-sharing is the (main) car option, and people owning a car using the service as an additional mobility option.

It can be assumed that current car-sharing is only compatible with a relatively limited number of everyday-life practices; at least as no major changes of behaviour is supposed. Furthermore, the car makes a differentiated everyday-life practice possible (see Krämer-Badoni/Wilke 1997, Rammner 1999, Wilke 2002a). Based on this hypothesis a possible differentiation of everyday-life is less feasible by using car-sharing than by owning a car.

In this context a common view brought up by car-sharing studies is that there is a causal connection between the decision for car-sharing and the abolishment of the private car. Consequently, a readiness for a more or less radical change of mobility patterns and other everyday-life practices is assumed. Especially the results of two recent studies (Franke 2001, Harms 2003) show that this does not represent reality.

Both studies concentrate on former car owners. They show empirically that mobility as part of everyday-life practice is routinized to a high degree (see also: Krämer-Badoni/Wilke 1997). To make changes in mobility patterns possible, it is necessary to break up with routines (or to change dominant routines incrementally). Changes in mobility routines are often based on changed contexts of action, i.e. changes of the personal situation like income increase, marriage or the birth of a child as well as other contextual events like moving to a new flat or changing the place of work. After the break up of habits a search for new routines starts that goes along with a reduction of the car-use and the establishment of new mobility patterns. Thus, only the changed mobility in the context of a change in everyday-life makes car-sharing an option. People become aware of car-sharing which may result in the decision to practice.

In other words: People give up their car because they are enabled or forced by a context change. Because of this change and an increasing use of busses, bikes or feet, car-sharing fits in everyday life and becomes an potential option to use. People already living without a car are potential customers anyway and do not need any context change to fit to car-sharing. This hypothesis also explains the effect, that advertising and commercials are more effective in the case of former public transport users. The fitting with car-sharing is much more obvious for those people (Harms 2003: 285).

Assuming, that most of the people living without a car are able to afford one, car-less households are an important potential. However, further differentiation is necessary. Besides the existence of a service and its product options, a central condition for the decision to practice car-sharing is a socio-cultural disposition. That means that only certain social groups or "milieus" (Vester et al. 2001, Bourdieu 1993) are relevant.

This hypothesis can be confirmed by the transaction cost paradox (Wilke 2002b: 610). Car-sharing users have to accept certain non-monetary transaction costs (booking, pick-

ing up and returning the car, etc.). These transaction costs are not always higher than the transaction costs for a private car, but they are different and result in additional need for action. Thus, the current car-sharing is an example for sufficient action orientation [8] and the service must be characterized as sufficient as well. This is independently from the individual use of the service and the question whether the kilometre performance is decreasing.

In the relevant social groups a life without a private car and the participation in a car-sharing scheme is part of the "socio-cultural interpretation patterns" [9] of a "good life". But car-sharing is not only a "good" or accepted behaviour. The symbolic benefits [10], related to the milieu-specific preferences, are recognized within the social group. Therefore the saldo of costs and benefits is positive ("ideological added value"). In these milieus car-sharing supports social integration, the same way like the car does in other milieus. Car-sharing is part of the group-specific style of living and signals the affiliation to a social group (integration) and the distance to others (distinction).

A close relationship between car-sharing participation and the affiliation to a milieu is supported from a study of Bittingmayer and Steding (Bittingmayer/Steding 2004, Steding/Herrmann/Lange 2004) carried out in the city of Münster. The authors explored the non-users and ended up in the result "that the use of car-sharing marks a specific position in the societal space. Thereby, it is of importance that in the lower social groups car-sharing is a sign for a lower social position. In the upper social segments it is similar: Car-sharing is not recognized as a position-adequate form of mobility" (Bittingmayer/Steding/ 2004: 144; translation). Thereby the authors confirm the milieu-specific heuristic, in which an asceticism connected with car-sharing is related to the cultural-sociological class model of Bourdieu (Bittingmayer 2000).

Fliegner (2002) also looked at non-users. He analysed the "demotorization potential" in the city of Halle under the condition of the existence of a certain car-sharing service. Within the sample he identified a potential of 15%. These people fulfil criteria that Fliegner developed for the fitting or aptitude to car-sharing. The criteria are: the detachment of the action orientation from the car, a multi-modal travel behaviour and the openness of the other household members. However, this is a theoretical potential. The confrontation of this group with an ideal-typical service offer called "car by call" shows an unexpected discrepancy between the demotorization potential and the interest in the service offer (Fliegner 2002: 215). Therefore, Fliegner draws the conclusion that the demotorization potential of car-sharing (or a car by call) is low (Fliegner 2002: 216).

A second result of Fliegner's study is remarkable as well. He found out that also a certain number of people that do not belong to the demotorization potential are interested in the car-sharing service as an additional car-option. Fliegner concludes that there is a relative important and so far underestimated potential for additional mobility needs (Fliegner 2002: 216). These findings are supported by a commercial study of Frick, Diez and Reindl (1998: 108-109) about car-sharing in the form of "kilometre leasing" supplied by car dealers. Even if a number of 7.6 Mio. interested people is overestimated, it shows that the offer of a commercial short-

time car-rental could be interesting for the owners of a car as well. Hence, a certain demand for additional cars exists.

It is an open question which role the affiliation to a social group plays in case of the current customers that use car-sharing in addition to their private car; and which mechanisms are relevant. The low annual kilometre performance of this group leads to the estimation that they come from related milieus than car-sharing customers living without a private car.

NEW CAR-SHARING

The Swiss development of a further market opening towards the average citizens (Muheim & Partner 1998) does not contradict this hypothesis, but describes the border between the current and the new car-sharing. If the new car-sharing is realized, the difference between the use of car-sharing services and the use of an own car will decrease significantly, i.e. car-sharing will be compatible to a greater number of everyday-life practices.

Due to the increasing flexibility in space and time, those people, who think positive about the car-sharing idea but have incompatible needs, become potential customers. However, it is not possible to transfer this group in future. As a consequence of reduced transaction costs and the assimilation of the car-sharing use and the use of a private car, the service will partly lose its alternative character, i.e. the group specific interpretation of car-sharing and its symbolic function will probably change.

Beside the increase of flexibility and the practice compatibility the change of the symbolic meaning and function is also a crucial requirement to extend the number of potential customers among other social groups. It is probably a precondition for major growth of the number of customers and of the providers. Possible problems with new customers could be that the patterns of behaviour are different from the current customers. Comparing motives and orientations of the pioneers and the later generations of customers in Switzerland (Muheim & Partner 1998: 54), it becomes obvious that the ecological orientation turns to be less important while economic, practical, pragmatic and comfort aspects are of growing significance.

The relatively strong interest in the car-sharing type "kilometre-leasing" (Frick/Diez/Reindl 1998) is on the one hand side explained by a fun and event orientation of potential customers. On the other hand it is reasoned in the interest of a growing car-availability (Frick/Diez/Reindl 1998). This is supported by the result that most of the interested persons expected to use the service offer in addition to a private car as a temporarily second or third car. Thus, this development could result in additional car-use and mobility needs. Therefore, the authors conclude that kilometre leasing could lead to further growth in the total car-use and volume of person-kilometre (Frick/Diez/Reindl 1998: 110-118).

The further affiliation of car-sharing to the use of a private car probably leads to a growing milieu-indifference of car-sharing. As a consequence, the ties to the pioneer milieus could be weakened. It is possible, that these people will no longer participate in commercial car-sharing but return to the old non-profit organisational forms. After a certain time the users who carry out additional mobility with the help of

car-sharing will become predominant. This could lead to an over-compensation of the existing eco-sufficiency effects.

Conclusions

The presented results and considerations lead to a (provisional) picture about a mid-term perspective of German car-sharing. It can be characterized by a model-dualism on the provider side and a corresponding split of the clientele on the demand side. In the future, this development will go on. Probably commercial enterprises will dominate the market offering non-ideological car-sharing in form of a short-time car rental without any symbolic meaning. But at the same time there will still exist car-sharing services which are offered by civic self-help organisations. While the former will address customers from all social groups, the latter will represent people similar to the current customers. In both cases organisation and service quality are professional. The market share of car-sharing as a self-help project depends on the further development of its societal basis.

The general assumption that many car-sharing users abolish their private car, change their everyday-life and adopt new mobility practices must be revised. Within the current car-sharing clientele two user-groups can be identified:

- People living in households without private cars so that car-sharing offers a car-option. The decision to live without a car is made before or simultaneously with the decision to participate in a car-sharing scheme. A crucial precondition for the decision for car-sharing is a specific socio-cultural disposition and the existence of fitting positive conditions in everyday life. These positive conditions can grow slowly or occur through a "break" so that taking part in car-sharing fits in everyday-life. Car-sharing is a supportive mobility option improving this situation, but the decision is made after the decision against the private car.
- People living in households with at least one private car so that car-sharing offers an additional car-option. In this case the context conditions have no major relevance.

Both groups are "optimisers", i.e. in both cases car-sharing is used to extend mobility options. The generally low number of realised trips with a car-sharing car and the low amount of travelled kilometres support the hypothesis that car-sharing does not serve as an equivalent to a private car (first or additional car) but as a complement to the existing mobility. The first group will probably be concentrated in self-help projects while the second group will be relevant mainly for commercial car-sharing providers.

The existence of a third group of users who follow the original car-sharing philosophy and give up their private car to join the idea of car-sharing is not excluded. A qualitative analysis within the project "The Future of Car-Sharing in Germany" shows that there are users who are willing to adjust their everyday-life to car-sharing (Vester et al. 2004). Regarding the current customers, this is only a small group.

If the presented hypothesis proves true and the share of this group in the overall number of customers is smaller than supposed, the current eco-balance of car-sharing is even worse than normally assumed. People who give up their pri-

vate car contribute to the comparatively positive ecological effect. A positive eco-balance is not possible without a relatively high number of customers with sufficiently oriented behaviour patterns. The group of people who give up their private car or do not buy a new one in order to use car-sharing services, is the most important group to reach this effect. The efficient handling of additional mobility only leads to a minimization of the negative effects that occur. A shift in the kind of customers endangers eco-efficiency of car-sharing.

The conclusions of Harms, that the main ecological function of car-sharing is to stabilize everyday actions without a private car (Harms 2003: 298) [23] are only true when people would buy their own car due to the lack of a car-sharing service. A similar argument is true for Fliegner's conclusion "that car-sharing mainly offers the attempt to limit future motorization, primarily the emergence of a second and a third car in households, which is the most rapidly growing segment. This is only the case if an attractive service is offered which does not regard the renunciation of a private car and the additional need for car-mobility as opposites but serves both objectives. Lastly, a service quality that provides both is crucial: Only if households want to realise their "half" second and third car, reasonable demotorization effects can be expected" (Fliegner 2002: 216; translation).

This estimation requires to regard the car-sharing system in Germany as a homogenous system. Assuming that in a mid-term perspective two different system variants will exist, a commercial and a non-profit one, each has to be assessed separately. Probably a commercial car-sharing service has negative effects while the civic self-help projects might have a positive eco-balance.

In the next empirical steps of the research project "The Future of Car-Sharing in Germany" the formulated hypothesis will be examined. Thereby, the explanation of the links between car-sharing and milieu affiliation is crucial. Contrary to former studies on car-sharing that tried to draw conclusions about new users basing on the analysis of the current users, the project concentrates on the *new* users of a *new* car-sharing. A central research question is, whether a changed service and an adjustment in its use to the use of a private car could lead to a car-sharing scheme that is able to replace private cars.

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Endnotes

- [1] The main objective of the research project is an empirically founded analysis of the mid-term perspective (time horizon 2020) Because of the climate relevance of the transport sector, the research project focuses on reduction of greenhouse gas emissions (main-indicator CO₂). In addition, potential effects on land use and life quality in cities are considered as well. More Information about the project is available at www.wupperinst.org/Projekte/fg1/3101.html.
- [2] The project runs until December 2005. Therefore intermediate results are presented.
- [3] Some earlier considerations and hypothesis are already published in German journals (Wilke 2002b, Wilke 2004).
- [4] Schrader (2001, p. 85-112 and p. 247-255) discusses property-replacing services on the example of car-sharing. The systemisation of this paragraph is related to Schrader’s results.
- [5] An eco-balancing requires the consideration of the effects of all transport modes.
- [6] See: www.db-carsharing.de.
- [7] More exactly: in addition to one ore more private cars.
- [8] The mentioned concept of “sufficiency” on the level of individuals must be distinguished from the environmental-economic sufficiency on a system level.
- [9] Related to the term “cultural interpretation pattern” by Honneth (1993: 64; cited from Krämer-Badoni 1993: 19) who looks at the society level.
- [10] The terms “costs” and “benefits” are used as metaphors.