

How to develop target group oriented mobility services: Psychological Dimensions and Planning Aspects

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Within the concept of mobility management new mobility services are considered as the essential instruments to develop a sustainable transportation system. Their application in the transportation system and usage by the consumers should lead to a decrease in negative transportation related impacts whilst maintaining or even improving individual mobility. The preconditions are the existence of appropriate services orientated at the individual mobility demand. The expectations are high regarding the environmental effects of eco-efficient mobility services but acceptance and practical relevance – especially in competition to the private car – are to a large extent unknown.

The research group MOBILANZ investigates the possibilities for the reduction of energy consumption and material flows of various mobility patterns by introducing target group oriented mobility services. The project is embedded in the research program “social-ecological research” supported by the German Federal Ministry of Education and Research (BMBF).

In the year 2003 a survey of about 2000 people in three large German cities was carried out. Based on this empirical work the results concerning selected mobility services are presented: the taxi as an example for a quite traditional mobility service with a high market share, private car sharing as an informal mobility service, and finally mobility services supporting cycling like bike rental and linkages to public transport.

Method: Aim of the survey and how it was carried out

From June until December 2003 a total of 1,993 people living in Augsburg, Bielefeld, and Magdeburg between 18 and 80 years of age (average age 46.7) took part in a standardised personal interview. Among these were 937 male and 1,056 female. In order to consider the different levels of accessibility and transportation infrastructure within the cities three typical urban settlements have been selected for the inquiry. In each city about 220 inhabitants of a settlement situated close to the city centre, of a settlement located at the border of the city, and of a settlement in the suburban area of the city were interviewed.

The survey aimed at receiving information about the concrete mobility behaviour as well as about the availability of and the access to different transportations modes. Furthermore, psychological variables have been inquired because of their postulated influence on travel mode choice. These variables are attitudes towards the different transportation modes, norms, value orientations, intentions, and perceived behavioural control. Additionally, the current use of selected mobility services has been examined. Due to the increasing importance of new technologies for the management of the individual mobility, the status of technical equipment and the usage of technically based services for mobility purposes have been ascertained as well as the attitudes towards new technologies.

Table 1 shows how people of the three types of residential areas differ in demography, availability of a private car, access to public transport, and their use of different travel modes. People living near the city centre do most activities by foot or bike while especially for people in suburban areas the private transport has the highest importance and the public transport the lowest. This is reflected in their modal split as well as in their average number of cars per household and the low quota of people who own a commutation ticket. People in suburban areas have the highest income while people in the settlements at the

city border have the lowest income and also the lowest percentage of people with a driving licence.

Table 1: Description of the sample regarding the urban structure

	city centre <i>n</i> = 664	city border <i>n</i> = 649	suburban area <i>n</i> = 678
sex			
male:	49%	46%	46%
female:	51%	54%	54%
age**	43.60	50.12	46.34
income over 2500 €**	31%	29%	50%
cars per household**	0.95	1.10	1.53
driving licence**	87%	79%	90%
commutation ticket**	35%	35%	20%
modal split**			
private transport:	35%	47%	62%
bike / foot:	50%	36%	29%
public transport:	15%	18%	9%

***p* < .001

Looking into these different dimensions of mobility the understanding of the relation between urban structures, transportation infrastructure, and attitudes will increase. With this knowledge the design of specific mobility services, which have the potential to reduce transportation related impacts, will be possible.

A great number of mobility services are already established in the transportation system. Within the first empirical phase of MOBILANZ the relevance of selected mobility services for the consumer was examined. Therefore mobility services with a relevant market presence had to be chosen in advance. One kind of mobility services which has been selected is related to different transportation modes. Car-oriented services as well as services related to bike and public transport were considered. Products like taxi, car rental, professional car sharing, and common car use organised on a private basis are car oriented products. Bike rental, bike carriage by bus, tram and train are related to public transport, but are as well cycling oriented services. The second kind of services which have been selected are transportation information services. They are (often) the precondition for the consumer to use the transportation system practically and efficiently. In order to perceive transportation information the consumer does not only need cognitive competences but first of all media and technical infrastructure like phone and internet.

The use of information services

The availability of telephones is definitely standard (98%); even the equipment with mobile phones (80%), computers (72%), and internet access (62%) is quite high (average numbers of technologies per person: 3.6). Up to now a PDA is seldom available (7%). Looking at the usage of the mentioned technologies it can be said that if the technologies are available they are also used quite frequently.

But what kinds of media are important for planning processes? Which relevance has the traditional media in comparison with new technologies or individual planning processes compared to services? Figure 1 based on the means indicates the importance of media and services for planning processes concerning car, bus and tram, and train.

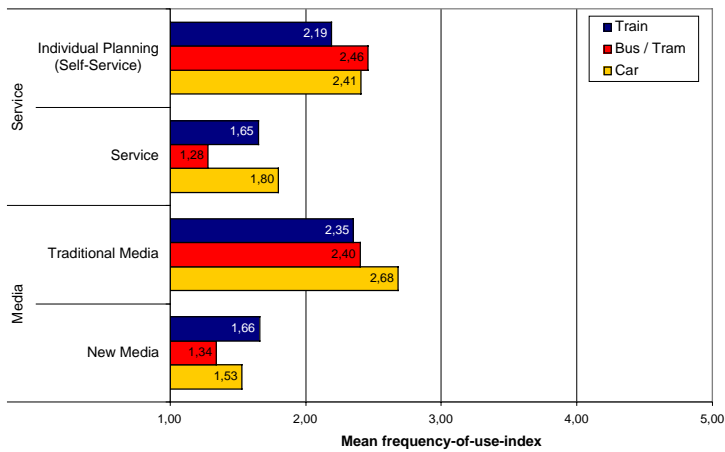


Figure 1: Relevance of media and services for planning processes regarding car, bus / tram, and train use

Further analysis of the data regarding users and non-users of media and services shows significant differences: 68% of people plan individually *and* use services either *both* above-average or *both* below-average ($\chi^2 (1, N = 1982) = 284.33, p < .001$). Likewise 64% of people use traditional *and* technical media *both* above-average or *both* below-average ($\chi^2 (1, N = 1983) = 152.30, p < .001$). The consequence is that we can distinguish two groups of people: the informed (70%) and the not-informed (30%).

The use of mobility services

Following the frequencies and main purposes for the use of the mobility services are presented as well as the use of information services.

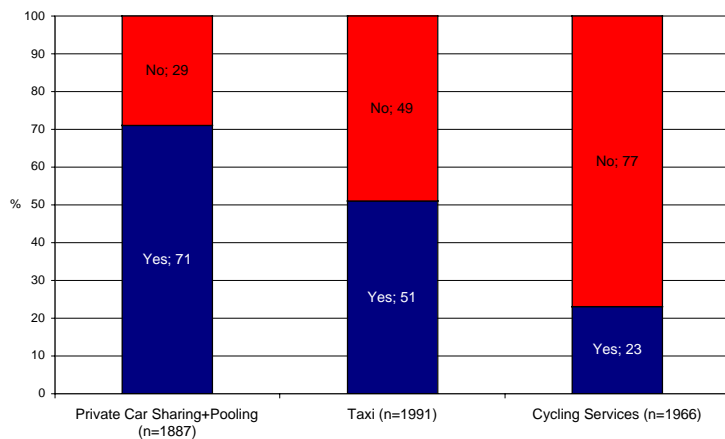


Figure 2: Users and non-users of selected mobility services

If you compare the frequencies of the different mobility services (see Figure 2) you will see that the percentage of people who use private car sharing and pooling (sharing, pooling, lending or bowering) is surprisingly high. In detail: 30% said that they share a car on a regular basis mostly with the partner (80%) or relatives (16%). Even higher is the percentage of people (50%) who confirm the use of car pooling at least once a month.

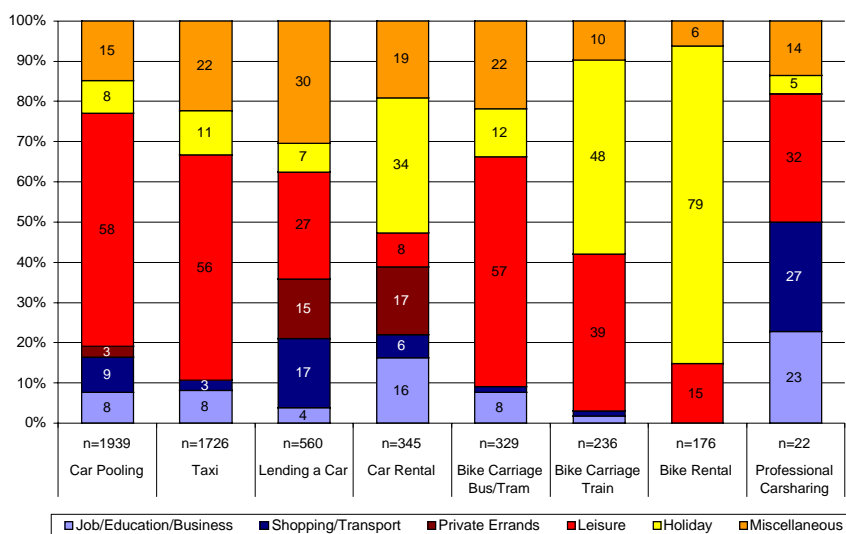


Figure 3: Purposes of mobility-service usage

These results correspond to the findings of a large empirical expertise about mobility behaviour in Germany (www.kontiv2002.de). The percentage of people who are members of a professional car sharing organisation (0.6%) is, in comparison with the share of private car sharing, quite low. Approx. 12% confirm the use of a professional transport broker. According to the market presence of taxis nearly 51% approve the use of taxis at least once a

year. The report of purposes for which mobility services are used shows that the emphasis of the services is on leisure activities and on holiday (Figure 3).

How does the user of selected mobility services look like

Now we want to take a closer look at the group of people who take advantages of the considered mobility services and compare them to those who do not use them. The users and non-users are described by demographic variables, their residential area, their availability of a private car, and their access to public transport. In addition, differences in value orientations and five psychological scales are investigated. The psychological scales have been developed via item and factor analysis out of 20 single items (attitudes to mobility and to different means of transportation, social and personal norm regarding travel mode choice). Their internal consistency is between .67 and .85 (Cronbach's alpha).

Taxi users

We call people "taxi users" when they take a taxi at least once a year while non-users go by taxi never or almost never. Users differ from non-users on the scale "mobility obligation". This means they feel a higher obligation to be mobile all the time than non-users ($M_s = 3.35$ vs. 3.15 , $t(1969) = -3.23$, $p < .001$). People who use the taxi daily or almost daily have the highest degree of mobility obligation ($M = 3.82$). It turns out that users differ from non-users in respect of their value orientations. Their degree of self-realization (readiness for change and aspiration for success) is higher compared to non-users ($M_s = 3.95$ vs. 3.65 , $t(1986) = -5.19$, $p < .001$). However, there are no differences regarding their attitudes towards various transport modes (car, bicycle, and public transport) as well as regarding their usage (see Figure 4).

Looking at their residential area, we find that taxi users live more often near the city centre than at the border of the city or in suburban areas ($\chi^2(2, N = 1990) = 68.70$, $p < .001$, see Figure 5). Furthermore taxi users have a higher income, spend more time working, and have a higher educational level than non-users (U -Tests, $p < .001$). Non-users are more often female (57%) than male (43%, $\chi^2(1, N = 1991) = 12.09$, $p < .001$). There is no age difference between both groups. They also do not differ statistically significant in their availability of a private car and access to public transport. Roughly speaking one can say that the typical taxi user is a busy, success-oriented person with money who lives near the city centre.

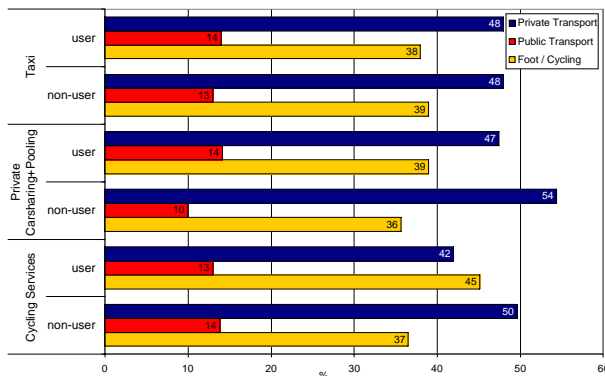


Figure 4: Modal split of users and non-users

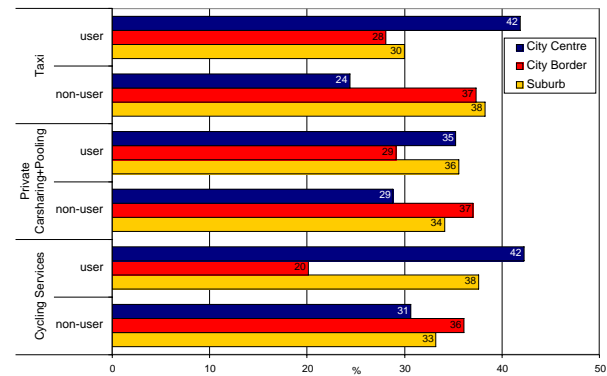


Figure 5: Residential areas of users and non-users

Users of private car sharing and pooling

Under "private car sharing and pooling" (*car ms*) we summarise sharing a car with somebody of the same household, lending someone a car, borrowing a car from people of other households, or driving together with other people not living in the same household. People who show one of these activities at least one time per month are called users. Figure 6 shows that users are different from non-users with regard to several psychological dimensions.

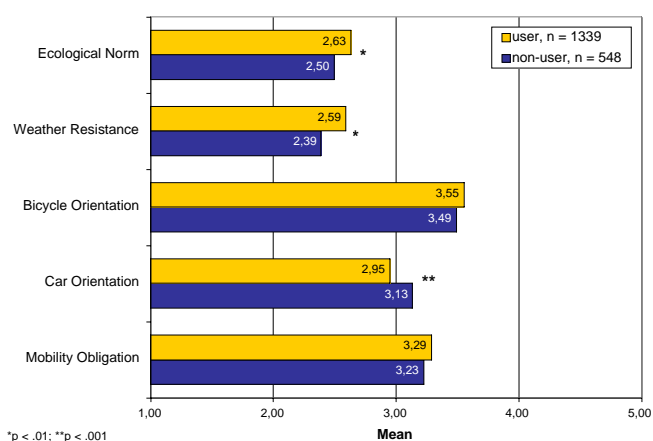


Figure 6: Users and non-users of car sharing and pooling

Users have a lower car orientation, are more resistant to weather conditions and have a higher ecological norm orientation. Like taxi users they also dispose of a higher extent of self-realization ($M_s = 3.91$ vs. 3.59 , $t(1882) = -4.68$, $p < .001$). Concerning their modal split they use more often public transport, $t(1880) = -3.73$, $p < .001$, and less private transport, $t(1880) = 3.88$, $p < .001$, while non-users show the highest private transport quota of all groups (see Figure 4). However both groups do not differ in the availability of a private car and the access to public transport. Compared to non-users a higher percentage of *car ms* users live near the city centre (35% vs. 29%) while non-users mostly live on the border of the city (37% vs. 29%, $\chi^2(2, N = 1886) = 12.78$, $p < .01$). Users are better educated and younger than non-users (U -Tests, $p < .001$). Additionally a higher proportion is female (55%) than male (45%, $\chi^2(1, N = 1887) = 16.67$, $p < .001$). Both groups do not differ in their income, which means that it is not the lack of money that motivates people to use *car ms* instead of using a private car. While the users of *car ms* are more corresponding with the average, the typical *car ms* non-user can be described as a male who is fascinated by his private car and has an aversion to public transport, which is expressed in attitude and behaviour. Furthermore the non-user is more sensitive to bad weather conditions (weather resistance has been found as a good predictor for the use of the private car) and has a low ecological norm orientation.

Users of cycling services

People who take advantage of cycling services (renting a bike, carrying a bike in a bus, a tram, or a train) show obvious differences compared to non-users concerning the psychological dimensions (see Figure 7).

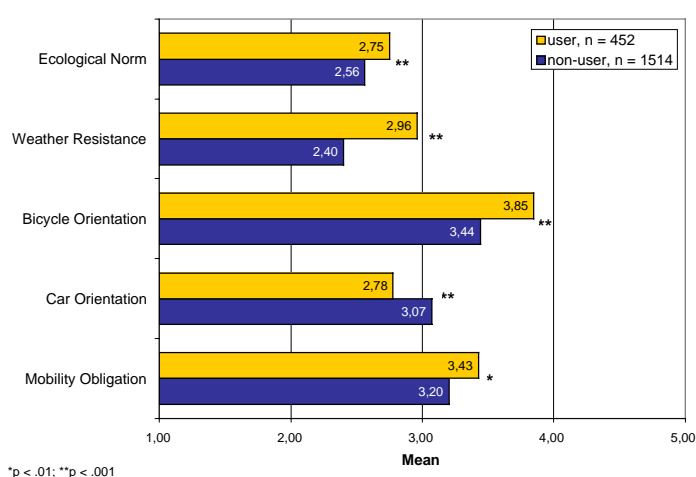


Figure 7: Users and non-users of cycling services

As expected the users of cycling services (*cycling ms*) have a significantly lower car orientation and a higher bike orientation. The strongest mean difference is found in weather resistance. That is, *cycling ms* users are less sensitive to bad weather conditions. Furthermore they have a higher ecological norm. In accordance with their attitudes they use private transport less often, $t(1958) = 4.37$, $p < .001$, and go more often by foot or bike than non-users, $t(1958) = -5.07$, $p < .001$. However, there is no difference between both groups regarding the use of public transport (see Figure 4). Like taxi users and *car ms* users *cycling ms* users also have a higher self-realization ($M_s = 3.97$ vs. 3.76 , $t(1961) = -2.91$, $p < .01$). They mostly live in the city centre (42%) or in suburban areas (38%) and rarely on the border of the city (20%), whereas non-users are found in all areas almost to the same extent, $\chi^2(2, N = 1965) = 43.29$, $p < .001$. Both groups do not differ in their access to public transport and to the private car. Summarizing *cycling ms* users are younger than non-users, have a higher level of education, and are more often employed (U -Tests, $p < .001$). There

is no difference in sex. The typical *cycling ms* users can be described as young, well educated, and ecological oriented. They are cycling fans and dislike car use both regarding attitude and behaviour.

Conclusions

Although the considered mobility services require different consumer competences and demands there are some aspects all users have in common: a higher level of education than non-users, a higher readiness for change and aspiration for success (self-realization), and a higher probability of living in more urban structures like the city centre.

It can be expected that this is even truer for mobility services which require more cognitive and planning competences such as professional car sharing. Besides these similarities, at least the users of *car ms* and *cycling ms* have an individual profile concerning attitude and behaviour. While both user groups have a lower car orientation and thus a lower use of private transport, the *car ms* users more often take public transport and the *cycling ms* users have a higher bike orientation and more often go on foot or cycle.

There are no differences between users and non-users concerning both availability of a private car and access to public transport. Hence we can assume that the different usage of mobility services is not a result of urban and infrastructural differences but follows from different attitudes and value-orientations of people living in different residential areas. In fact, the data show that people with a higher degree of self-realization and a higher level of education live more probably in the city centre whereas people with a lower level of education and self-realization can be found mostly at the border of the city. The most decisive aspects determining the use of mobility services are thus the individual characteristics, especially attitudes, value orientations, and demographic aspects.

Perspectives

Our first survey proves that individual characteristics are to a large extent responsible for the acceptance and usage of mobility service. Thus target oriented processes that put emphasis on communication and individual awareness are essential for promoting mobility services. As a general result it can be stated that mobility services have to be designed less complicated in order to reach further user groups, especially people with a lower level of education. The crucial requirement of simplicity of the concrete mobility product is also formulated by other studies (e.g., by a study of the Research Centre Berlin about professional car sharing). As a matter of fact, the model for car-oriented mobility services is the private car.

The mode of transportation, which could meet consumers' requirements, is the taxi because of its level of awareness and availability. To support multi-mobility and inter-mobility, taxi driving could be a relevant module, which should be further developed. Actually, if you want to promote taxi driving the service must be less expensive. Experiences of local projects show that the establishment of cooperation with taxi business is pretty difficult. A pilot project in the region of Hannover (Germany) which aims at the integration of taxi driving and using public transport in a mobility card could be a promising approach.

Cycling services and the linkage between cycling and public transport should definitely be paid more attention to. Transport scientists emphasize the importance of the bike for urban transport as an individual mean of transport besides the car. The bike is qualified to cope with disperse transport activities but is discriminated by increasing distances. A stronger cooperation between cycling and public transport can extenuate this disadvantage. The results show that the percentage of people using cycling services is relatively low. However, it can be assumed that there are many potential users who are not reached by the current services yet. Concerning communication of cycling services two strategies can be distinguished: Concentration on the typical user or the non-user which means to strengthen customers' loyalty or to gain new customer groups for current services or probably newly designed services.

Regarding the considerable percentage of people who practice private car sharing and pooling it is a question if and how these informal mobility services can be supported. Current pilot projects give a notion of the complexity of this topic. Several attempts to transform informal structures into formal already failed more or less.

The differences between users and non-users of informal car sharing and pooling regarding ecological norm orientation and car orientation can give important hints for promoting professional car sharing. Real car-fans (the non-users) can be attracted to car sharing if extraordinary car models, which promise the desired driving-fun, are offered. Roadsters or cabriolets are already part of the portfolio of several car sharing suppliers. When addressing both groups one difficulty is not to irritate the ecological car-sharing users at the same time. To weaken the strong relationship to the private car can be regarded as the crucial challenge to promote both private and professional car sharing.

Based on in-depth interviews – the second empirical phase of MOBILANZ – further potentials and restrictions of mobility services will be analysed. There are still several open questions which have to be answered in order to receive fundamental knowledge about the perspectives of mobility services, including the general relationship between using services and possessing products; the adjustment of services to daily routines; the choice of the appropriate locations for the services; the relevance and the acceptance of costs; the requirements of smart use; the reception of information and media as well as successful marketing strategies.