VIENNA 2018 TRA
TRANSPORT RESEARCH ARENA
A digital era for transport
solutions for society, economy and environment

Proceedings of 7th Transport Research Arena TRA 2018, April 16-19, 2018, Vienna, Austria

Customers' demands for multimodal tariffs

Claudia Witte a, Carsten Sommer b*

[a] *Dipl.-Ing., Chair of Transportation Planning and Traffic Systems, Department of Civil and Environmental Engineering, University of Kassel, Mönchebergstraße 7, 34125 Kassel, Germany*
[b] *Prof. Dr.-Ing., Chair of Transportation Planning and Traffic Systems, Department of Civil and Environmental Engineering, University of Kassel, Mönchebergstraße 7, 34125 Kassel, Germany*

Abstract

Transport provider are facing the question of how to adjust their service as part of an integrated service. For the determination of potentials for different models of multimodal tariffs, a survey was carried out among occasional and regular users of public transport in the major city of Frankfurt am Main. 43 % of all adults in Frankfurt have a mobility suitable for multimodal tariffs: They are customers of public transport and require a car on an occasional basis. Only a quarter of the customers using public transport occasionally and one fifth of all regular customers are not interested in ticketing solutions including more than conventional means of public transport. Though, the preferences for content which is integrated in a multimodal tariff, are heterogeneous. Consequently, the content shouldn't be predetermined but modularly built. This conclusion is supported by conjoint analyses: Tariff combinations with selectable contents provide higher benefits. From the customers' point of view, price strategies including the use of transportation services at a discount are more valued than a limited use at no costs.

Keywords: Public Transport; Mobility as a Service; Intermodality; Multimodality; Info Systems; Ticketing

* Corresponding author. Tel.: +49-561-804-3381; fax: +49-561-804-7382.
E-mail address: c.sommer@uni-kassel.de

1. Introduction

People mobility and attitudes are facing a change. Mobility is more likely to be seen as a service than the ownership of cars. Amongst young adults living in cities the choice of means becomes multimodal depending on the situation (Nobis 2016). The importance of owning a car decreases (IFMO 2011) whereas the willingness to share and connect with other people increases for some individuals. This is shown by a rapid rise in shared-economy online platforms within shared mobility takes the lead (Scholl 2015). Precondition for sustainable mobility behavior is, besides a compact city of short distances, public transport. Due to given timetables and routes public transport cannot meet all customers' demands. Especially for transport of goods, ways carried out during off-peak times and within areas of low offer public transport is not qualified (Sommer and Mucha 2013). The mode of choice is mainly the private car.

The expansion of further transportation systems like e. g. bike and car sharing offers further alternatives and new mobility options, in particular to people without private car. In addition to public transport, these services can meet the demands of a flexible mobility. Since the 2010s the offer of bike and car sharing has risen sharply in Germany. In conjunction with further distribution and expansion of these services, the demand has risen as well. In 2016 Bundesverband CarSharing e. V. recorded 1,260,000 registered car sharing customers in Germany. In comparison to previous year, this an increase of 21.2 %. Furthermore, technical innovations e. g. electronic chip cards, smartphones and WiFi give access to information and public vehicles anytime and anywhere. In addition to public transport, these services can meet the demands of a flexible mobility. Transport provider are facing the question of how to adjust their service as part of an integrated service. A solution may be multimodal tariffs enabling customers to use different means of transport via one ticket. The scope to design a multimodal tariff is large.
The project "DieMoRheinMain" on which this report is based has been funded with funds from the Federal Ministry of Education and Research. The authors are responsible for the content of this publication.

2. Multimodal tariffs

In practice, keywords such as "seamless transport", "mobility from a single source" and "integrated public transport" combine various transport services into multimodal offers to form multimodal services ("mobility package"). The aim is to create and manage trips independently of the means of transport by providing a unified gateway. As a result, transport services are linked in varying degrees of integration in terms of communication, infrastructure, sales and/or tariff. The service providers' goals are customer acquisition and retention. Among other things, customers receive coordinated access to various transport services and, where applicable, economic advantages over the purchase of individual services.

A multimodal tariff is a special product that combines several transport services and, in the network, grants special conditions compared to the use of individual services. For the collective bargaining of multimodal offers there is a wide scope of action, which is mainly used for linking public transport and bike or car sharing. In most cases, public transport customers benefit from reduced prices for other transport services. However, the changes compared to a standard rate can also refer to each other.

The examples of tariff integrations can generally be traced back to the following basic forms and their combination:

- reduced one-off costs (admission fee, deposit or similar)
- free trial use,
- reduced monthly fee,
- reduced demand rate,
- credit,
- unlimited use (flat rate).

Discounts are often applied to one-off or fixed costs such as deposit, admission fee and membership fee. One example of reduced demand rates and a reduced monthly fee - and at the same time the oldest and most well-known multimodal tariff product in Germany - is "Hannover mobil". For a price of 9.95 EUR per month and a contract period of one year, customers receive 25 % discount on trips with train, 20 % discount on taxi rides as well as a discounted demand rate and a waiver of car sharing admission fee (ÜSTRA 2016). Other models include a free use of transport services within a time or monetary limit. While credits such as 50 free kilometres with the provider scouter car sharing (RMV 2016) or 30 EUR travel credits with book-n-drive (RMV 2016a) for eTicket holders of the RMV refer to one-off advertising campaigns as a "welcome gift", other cooperations continue: In

the case of the tariff product "Mobil in Düsseldorf", the monthly ticket for public transport includes 90 minutes per month for the use of car sharing of the provider car2go and 240 minutes per day for the use of the public bicycles of nextbike (Rheinbahn 2016). In addition, there are other, but less widespread, models of tariff linkage, e. g. that car sharing customers receive discounts for public transport use.

In Germany, multimodal tariffs are still niche products in the product portfolio of transport associations and transport companies with comparatively low demand (Ackermann 2013). In the market, it is primarily the regular customer of public transport who is addressed with multimodal tariffs. Offers for customers who use public transport only occasionally are rare - although the group of casual customers is the largest and shows variations in the choice of means of transport. Apart from some mainly inaccessible preliminary studies conducted by transport companies and experiences of field tests, the state of research on multimodal tariffs is low. Furthermore, there are considerable differences in the design of mobility packages and frequent changes that make comparisons difficult (Stein et al. 2017).

Taking into account the fact that there is a public transport connection, the occasional public transport customer represents the largest group of the adult population with around 42.3 million in Germany. In contrast to this, season ticket customers account for approx. 9.8 million adults, although they have a significantly higher intensity of use of public transport. Particularly high potentials for multimodal tariffs exist for people who have a public transport connection at their place of residence, are open to public transport and do not have access to a private car. This applies to around 6.3 million occasional customers of public transport and 3.3 million season ticket customers in Germany (Sommer and Krichel 2012).

3. Research questions

Even though multimodality is becoming increasingly important in the context of new transport services, information and communication technologies, this does not immediately imply that customers want to link transport services by means of a multimodal tariff. Transport associations and service providers are faced with the question of how they should position themselves on the market and what role and tasks they should assume.
The study therefore examines whether customers are interested in multimodal tariffs for public transport services in connection with a willingness to pay and, if so, which groups of people have which preferences for which models of multimodal tariffs. Based on this, the research question arises which factors influence the decision for or against a tariff product. For transport associations and transport service providers, it is important to know which demand potentials the respective products have on the market.

4. Method

4.1. Introduction

For the determination of potentials for different models of multimodal tariffs, a survey was carried out among occasional and regular users of public transport in the major city of Frankfurt am Main, Germany, in 2016/17. People with an affinity for public transport in particular have a high potential for multimodal tariffs. Public transport can only become a fully-fledged substitute for private cars in combination with sharing offers. Sommer et al. 2017 show that customers of sharing services use public transport more often than others and are open to multimodal services.

4.2. Survey of public transport customers on mobility behavior (stage 1, mobility survey)

The survey took place in two stages. At the first stage, in order to reach the target group of public transport customers waiting passengers were interrogated at public transport stations by means of a short computer-aided interview. Subjects of the "mobility survey" were:

- sociodemography (e. g. age, gender, occupation, education),
- mostly used ticket for public transport,
- possession of a driving licence,
- travel behaviour,
- attitudes towards means of transport and
- interests in mobility services.

The sample of respondents was n = 1,795. With the possibility of continuing and ending the interview in the means of transport, it was possible to keep the termination of interviews that had already been started at less than 4 %. Approximately one third of the respondents were resident outside the city of Frankfurt. Subsequently, the scope of the net sample comprised 609 regular customers and 216 occasional customers. A weighting and extrapolation method was developed for the transferability of the results to the entire population of Frankfurt.

4.3. Survey of public transport customers on multimodal tariff preferences (stage 2, preferential survey)

In the second in-depth interview, the preferences for combined tariff products and willingness to pay were examined in more detail with selected regular and occasional customers. The selection sample consisted of the respondents of first stage who had provided contact details and were ready to participate in a second survey. In order to increase the participation, each participant received a lottery ticket as an incentive. The interview was conducted as a computer-assisted, personal interview (CAPI) with a duration of approx. 30 to 45 minutes at the subjects' homes or in public rooms in Frankfurt. The contents of the preferential survey included:

- financial expenses for public transport and private car,
- suitability of tariff product used for public transport,
- attitudes towards modes of transport,
- meaning of the characteristics of a multimodal tariff and
- suitability and willingness to buy for various multimodal tariff products.

In this course, several possible multimodal tariffs were presented to the subjects and they were asked to rate them by means of suitability for personal needs and purchase intention. The framework for those stated-preference experiments were individual interests in service contents for integrated tariffs. The computer was also used to visualise unknown transport services, fictitious tariff products and their sales concept. The pictures illustrate car sharing, bike sharing, taxi, long-distance train, long-distance bus and parking in a simplified way and specify costs for an average journey. All participants should evaluate the multimodal tariffs under same framework conditions.

The measurement of preferences for multimodal tariff models was carried out by means of stated preference experiments in which different fictitious tariff products were presented to the respondents and they were asked to evaluate them according to their suitability for personal use and willingness to buy. For regular customers, the basic product is the current season ticket for public transport (monthly, annual, job or semester ticket), which is extended to a multimodal tariff product. Referring to practical examples, a price for the tariff product, the design principle for service content and the price strategy for services were identified as model-relevant properties. Table 1 shows the properties and characteristics of tariff products for regular customers. For occasional customers, additional transport services are meant as a supplementary component to the single ticket (Table 2).

Table 1. multimodal tariffs for regular customers

property		characteristic	
P: price of tariff product	no further costs	add. 10 EUR per month	add. 12 EUR per month
L: design principle for supplement transport services	predetermined	at choice	
S: price strategy of supplement transport services	standard	credit	discount

Table 2. multimodal tariffs for occasional customers

property		characteristic	
P: price of tariff product	free	15 EUR per month	18 EUR per month
L: design principle for supplement transport services	predetermined	at choice	
O: price strategy of public transport	standard	credit	discount
	2.80 EUR per trip	3 trips included	25 %
S: price strategy of supplement transport services	standard	credit	discount

Unique usage incentives, which are primarily advertising rather than tariff measures, are not considered. Similarly, flat-rate similar models for transport services outside public transport (e. g. the free use of car sharing (within the framework of a very high credit)), which may conflict with business, environmental and transport policy objectives, are not included. The values for tariffs, discounts and credits have been derived from practical examples for specific means of transport and have been simplified in some cases to make it easier to understand the costs.

In order to ensure that a product is not rejected on principle because of uninteresting service contents - and thus irrespective of the tariff model - the transport services included correspond to the respondent's wishes or the typical wishes of the relevant group of people. The sales concept is given to the interviewee as a constant framework condition for all concepts. Using the Orthoplan procedure in SPSS, a test plan with nine tariff products was created (see Table 3). These tariff products, so-called stimuli, are presented to the test persons in random order and independently of each other for evaluation.

Table 3. experiment design for regular customers

No.	P: price	L: design principle for supplement transport services	S: price strategy
1	add. 10 EUR per month	at choice	discount
2	add. 10 EUR per month	predetermined	standard
3	add. 12 EUR per month	predetermined	standard
4	add. 10 EUR per month	predetermined	credit
5	no further costs	predetermined	credit
6	no further costs	predetermined	discount
7	no further costs	at choice	standard
8	add. 12 EUR per month	predetermined	discount
9	add. 12 EUR per month	at choice	credit

The assessment is based on the preferential value method, according to which each tariff product is valued on a rating scale by means of a preferential value. The question "How good is the following mobility product for your personal needs?" serves the evaluation with the values 1 = "very poor" to 7 = "very good" and is interpreted as a quasi-metric value with equal intervals between the levels. The tariff products are assessed holistically with all characteristics.

4.4. Methods for determining preference structures for tariffs

Preference structures are derived by means of conjoint analyses based on the empirically determined evaluations of the various tariff products and the assessment behaviour of several people. The aim of conjoint analyses is to draw conclusions about the attractiveness and significance of the individual components from the holistic evaluation of some products (stimulas) with several properties and characteristic features. According to the additive model of conjoint analysis, the total utility value of a product is the sum of the partial utility values (Backhaus et al. 2016):

(1)

$$y_k = \sum_{j=1}^{J} \sum_{m=1}^{M_j} \beta_{jm} \cdot x_{jmk}$$

k = stimulus

j = property

m = characteristic of property j

y_k = estimates total benefit of stimulus k

β_{jm} = part worth value of chacteristic m of property j

$$x_{jmk} = \begin{cases} 1 & \text{if stimulus } k \text{ has chacteristic m of property j} \\ 0 & \text{else} \end{cases}$$

In the model, the properties of the products represent the independent variables on which the overall benefit depends. The aim is to determine the part worth values for the individual property characteristics, so that the estimated total benefit corresponds as well as possible to the empirically measured assessment.

In order to determine part worth values based on metric preference values, the model is extended by a constant (equation 2), which reflects the average evaluation of all products as a basic benefit (Backhaus et al. 2016). The characteristic values differ from this in a positive or negative way.

(2)

$$y_k = \mu + \sum_{j=1}^{J} \sum_{m=1}^{M_j} \beta_{jm} \cdot x_{jmk}$$

A variance analysis can be used to solve equation 2. In the case of discrete factors, the part worth value for a property specification results from the difference between the mean empirical evaluation of all products containing this property characteristic (e. g. in the case of the "L: design principle for supplement transport services", products that contain the specification "at choice" (no. 1, 7 and 9 in Table 3)) and the preference mean of the property (Backhaus et al. 2016).

(3)

$$ß_{jm} = \bar{p}_{jm} - \frac{1}{l_j} \sum_{v=1}^{l_j} \bar{p}_{jv}$$

$\bar{p}_{jm}$ = average empirical utility value of the characteristics m of property j

l_j = number of values of the property j

Another way is the estimation of part worth values by means of regression analysis. SPSS (Statistical Package for the Social Science) software estimates the linear model in equation 2 on the basis of ordinary least squares (OLS). The target criterion is achieved if the quadratic deviation between the empirical and estimated utility values is minimal (see (Backhaus et al. 2016)):

(4)

$$\underset{\beta}{Min} \sum_{k=1}^{K} (p_k - y_k)^2$$

p_k = empirical total benefit value for stimulus k

In addition to the absolute contribution to the overall benefit, the relative importance of the property for the attractiveness of the product is of interest. If variations in the characteristics of a property do not lead to significant changes in the overall utility, then the design of this factor is of minor relative importance. The significance of properties is measured by the range between the lowest and highest partial utility value of characteristics of a property. The relative importance of a property is derived from the range of the factor divided by the sum of the ranges of all properties (Backhaus et al. 2016):

(5)

$$w_j = \frac{\max_m \{\beta_{jm}\} - \min_m \{\beta_{jm}\}}{\sum_{j=1}^{J} (\max_m \{\beta_{jm}\} - \min_m \{\beta_{jm}\})}$$

The values and importance of the part worth values determined in this way represent the individual preference structures of a customer. However, since the overall demand potential of multimodal tariff products is of interest for the group of regular and occasional customers of public transport, the partial utility values and importance are aggregated by forming the arithmetic mean values for each group of persons. By adding the empirical estimates for the part worth values according to equation 2, the total benefit of any tariff product can be calculated.

5. Results

5.1. General conditions

The basic prerequisites for multimodal tariffs are available and usable transport services as well as the willingness of transport service providers to enter into cooperation with one another. The survey was conducted on the assumption that the transport services to be linked were available. In large cities in Germany (> 500,000 inhabitants), bike and car sharing offers are (almost) exclusively available and already integrated into the public transport system. With the size of the city, availability tends to decline. While station-bound car sharing offers are still available in some cities with less than 50,000 inhabitants, bike sharing offers are only available in cities with more than 50,000 inhabitants (Sommer et al. 2015). The following results refer to the city of Frankfurt am Main with its 727,000 inhabitants (Frankfurt 2017). The city of Frankfurt am Main has a very well developed public transport system. In addition, four car sharing providers - including the free floating system Car2go - and two bike sharing systems already offer an established range of complementary transport services.

5.2. Multimodal mobility behaviour

Demand potential for multimodal transport services arises for people who show variations in the choice of means of transport, i. e. who are multimodal. From an economic and organisational point of view, car sharing is a sensible supplement or even a substitute for an own car if the rental vehicle is only occasionally needed. In the city of Frankfurt, around 34 % of the adult residents have a season ticket for public transport (mainly monthly, annual, job and semester tickets). Occasional customers who are users of single, one-day or weekly tickets account for 51 % of the population. In contrast, 8 % of the population never use public transport. (data basis SrV 2013)

According to subjective estimates, one in three adults in Frankfurt uses a car every day or almost daily, although half of them also occasionally use buses and trains. After deducting groups of people who use cars to a high degree or never and those who are not public transport affinities, the potential for the demand for multimodal offers is 43 % of the adult population.

5.3. Attitudes towards modes of transport

The public transport offer gives Frankfurt's customers a high sense of autonomy, which means that many everyday journeys can be made by bus and train (see Fig. 1). In addition, the high level of approval from 80 % and 90 % of public transport customers respectively with regard to the statement that everyday life can be arranged very well even without a car speaks for the fact that ownership of one's own car is obsolete in many cases.

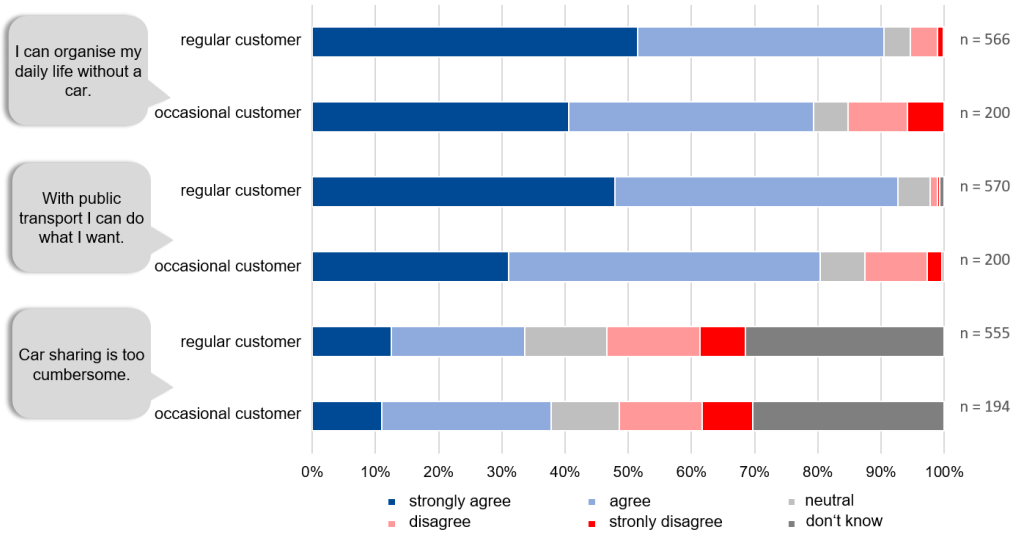

Fig. 1 attitudes toward public transport and car sharing

This creates positive framework conditions for linking car sharing and public transport. Given that 57 % of local public transport customers and 40 % of regular customers (almost) always have a car at their disposal (data basis SRV 2013), there is high theoretical potential for the elimination of private cars. However, the results also show that car sharing is too cumbersome for one-third of public transport customers and that they are unable to assess the offer. If car sharing is already regarded as not utilisable, this reduces the chances of success for an integrated tariff product consisting of public transport and car sharing.

5.4. Requirements for the scope of multimodal tariffs

The basic interest in having other transport services in a tariff product in addition to public transport is high. In the mobility survey, only a quarter of occasional public transport customers and a fifth of regular customers refused to include any additional services in a desired tariff product.

	% of public transport customers	long-distance bus	car sharing	bike sharing	parking of cars	taxi	long-distance train
regular customer	long-distance bus	19%					n=609
	car sharing	5%	24%				
	bike sharing	7%	8%	22%			
	parking of cars	5%	6%	5%	23%		
	taxi	6%	5%	5%	6%	26%	
	long-distance train	14%	8%	11%	7%	12%	41%
occasional customer	long-distance bus	17%					n=216
	car sharing	8%	28%				
	bike sharing	7%	14%	25%			
	parking of cars	6%	9%	7%	26%		
	taxi	7%	10%	10%	11%	29%	
	long-distance train	12%	15%	15%	10%	17%	39%

Fig. 2 proportion of public transport customers who have chosen at least the additional service or combination of these for a tariff product

Figure 2 shows the preferences for service content for a multimodal tariff product, which includes other transport services in addition to public transport. The proportional values in the main diagonal indicate how often this transport service has been mentioned in a product that can be assembled by the customer, irrespective of whether further service contents have been selected. Customers of urban public transport have the highest demand for long-distance services via train. Below the main diagonal is the demand for tariff products consisting of at least the two services mentioned above (plus other services, if applicable). The preferences for the service contents of a multimodal tariff product are very heterogeneous. In addition, there are no dominant differences between regular and occasional customers. This suggests that multimodal tariffs should be modular (modular principle) so that customers can ask for the transport services relevant to them. By contrast, the specified service contents only appeal to a small number of customers. If a tariff product consists of two other transport services, only a maximum of 14 % of regular customers and 17 % of local public transport customers are addressed. The most popular combination, in addition to local public transport, is for regular customers from long-distance trains and long-distance buses, and for occasional customers from long-distance trains and taxis.

5.5. Requirements for the design of multimodal tariffs

The following preference structures for multimodal tariff models are examples of the conjoint analysis for regular customers of public transport. The examples are based on a valid sample size of n = 29. In addition, the results are based on unweighted cases. Generally speaking, it cannot be ruled out that the sample shows distortions in relation to the population of regular customers of local public transport companies residing in Frankfurt, so that a weighting is necessary. The survey design requires the willingness to participate in two interviews. In addition to differences

in sociodemography, it can be assumed that the above-average interest of the respondents in the subject matter of the survey has an influence on the preferences for multimodal tariffs. This must be taken into account when assessing the results.

The model according to equation 2 is used to determine the influence of the properties of multimodal tariffs on the attractiveness of public transport customers. The tariff description is based on the characteristics in Table 1.

(6)

$$G_k = \mu + \beta_P \cdot x + \beta_{Lm} + \beta_{Sm}$$

G_k = total utility value for the rate product k

μ = constant term of benefit estimation

β_P = part worth value for the property price

x = price of the tariff product

β_{Lm} = part worth value for the characteristic m of the property service contents

β_{Sm} = part worth value for the characteristic m of the characteristic price strategy

The characteristics of the tariff products are presented as independent variables. The dependent variable, on the other hand, is the total metric benefit, which has been empirically determined in the state preference experiments according to the experimental design in Table 3. The tariff products assessed by the respondents are the observations used to estimate the model. The aim is to determine the partial utility values for each property and characteristic on the basis of the total utility value. The properties pricing for service content and service are nominal variables for which the assumptions are made that there are no factual relationships between the characteristic values and the preferences. On the other hand, it is assumed that the price is linearly related to the benefit, i. e. the higher the price, the lower (negative) the benefit.

The result for the model estimation is shown in figure 3. The basic benefit (constant) for a multimodal tariff product is 5.811. On the basis of the benefit estimate, there is a tendency for regular customers to prefer a discount over a credit balance for the use of other transport services in order to implement the pricing strategy. The theory that a modular principle for the independent choice of transport services is preferred to pre-defined content - although this was already preferred in the experimental set-up - is supported by the experiment.

utility

		Part worth estimates	standard error
S: price strategy of supplement transport services	standard	-,755	,085
	credit	,257	,085
	discount	,498	,085
L: design principle for supplement transport services	predetermined	-,451	,064
	at choice	,451	,064
P: price of tariff product	no further costs	,000	,000
	add. 10 EUR per month	-1,361	,115
	add. 12 EUR per month	-1,633	,138
(constant)		5,811	,106

coefficients

	B-coefficient estimates
P: price of tariff product	-,136

evaluation of reverses

Number of reverses	Number of persons
1	1

importance

S: price strategy	38,618
L: design principle	24,020
P: price of tariff product	37,362

correlations[a]

	value	Sig.
Pearson-r	,993	,000
Kendall-Tau	,944	,000

a. Correlations between observed and estimated preferences

Fig. 3 utility estimation of regular customers

The reverse evaluation in figure 3 shows that in the experiment, a subject has decided against the assumption of decreasing utility with rising price - which is not implausible if a high price is assessed as an indicator of high quality. The importance values show that for the subjects, the properties that influence the costs of transport services are of greater relative importance than the principle of how the service contents are formed. The correlation coefficients show a high internal validity of the model. While Pearsons's R describes the correlation between total metric utility values and the empirical ranks, Kendall's Tau measures the correlation between empirical and conjoint rankings (Backhaus 2016).

6. Conclusion

The studies provide initial indications of how multimodal tariff products are to be designed so that they address the interests of customers. The estimated partial utility values and the model according to Equation 6 can be used to determine the total benefit of any tariff product that has not been empirically verified. The tariff product with the highest attractiveness does not cause any additional costs for the customer, it contains freely selectable transport services for which discounts are granted. In addition, the probabilities for different tariff products on the market can be determined on the basis of the utility values, for example by using a max utility or logit model.

In practice, there are already multimodal tariff products for public transport customers on the market. However, the target group of occasional customers is not addressed. Therefore the research interest is high, because on the one hand the quantity structure of potential customers is large and on the other hand little is known about this group. What is new, for example, is the binding to a tariff product. Another challenge is to derive realistic demand potential for the tariff products from the sample's preference structures. The composition of the respondent sample with a presumably increased interest in multimodal tariff products will lead to an overestimation of the total benefit of multimodal tariffs and the willingness to pay for them when they are transferred to all public transport customers. Furthermore, the hypothetical questioning situation with fictitious tariffs represents an abstract decision situation, which can deviate from the actual behaviour reactions. At the same time, demand for a multimodal tariff product is not only influenced by the tariff in reality. Thus, the conditions for transport services to be available and usable and linked to public transport at the infrastructural, sales and communication levels in accordance with customer requirements will not be fully met. Here, the dialogue with experts from practice is intended in particular to help classify theoretistic potentials and to examine the derived recommendations with regard to their suitability for practice.

7. References

Ackermann, T., 2013. Zukünftige (neue) Vertriebswege – Mobilitätskarten. ZBV-Jahresversammlung, Bremen, 27. September 2013.

Backhaus, K. et al. 2016. Multivariate Analysemethoden: Eine Anwendungsorientierte Einführung. 14. Auflage, Springer-Verlag, Berlin.

Bundesverband Carsharing, 2016. Wachstum und Konsolidierung im deutschen CarSharing-Markt. <http://www.carsharing.de/sites/default/files/uploads/pm_carsharing-bilanz_2016_0.pdf> (07/08/2016).

Frankfurt, 2017. Bevölkerung. <https://www.frankfurt.de/sixcms/detail.php?id=2912&_ffmpar%5B_id_inhalt%5D=7524> (01/26/2017).

IFMO, 2011. Mobilität junger Menschen im Wandel – multimodaler und weiblicher. Institut für Mobilitätsforschung (Hrsg.), <http://www.ifmo.de/tl_files/publications_content/2011/ifmo_2011_Mobilitaet_junger_Menschen_de.pdf> (01/24/2017).

Nobis, C., 2015. Multimodale Vielfalt – Quantitative Analyse multimodalen Verkehrshandelns. Dissertation, Humbolt-Universität zu Berlin, Mathematisch-Naturwissenschaftliche Fakultät II, Berlin.

Rheinbahn, 2016. Mobil in Düsseldorf. <http://www.rheinbahn.de/tickets/weitere_ticketangebote/Seiten/Mobil-D%C3%BCsseldorf.aspx> (11/08/2016).

RMV, 2016. Nutzen Sie scouter Carsharing mit Ihrem eTicket. <http://www.rmv.de/de/Fahrkarten/Die_richtige_Fahrkarte/eTicket_RheinMain/Zusatzangebote/68846/zusatzangebote_scouter_carsharing.html> (11/08/2016).

RMV, 2016a. Nutzen Sie mit dem eTicket die Angebote von book-n-drive Carsharing. <http://www.rmv.de/de/Fahrkarten/Die_richtige_Fahrkarte/eTicket_RheinMain/Zusatzange bote/63782/Zusatzangebot_book-n-drive.html> (11/08/2016).

Scholl, G., 2015. Peer-to Peer Sharing: Stand, Debatten und Perspektiven. I-share Symposium, Berlin, 26. November 2015, <http://www.i-share-economy.org/kos/WNetz?art=File.download&id=124&name=Gerd+Scholl+at+the+i-share+Symposium+2015.pdf> (01/26/2017).

Sommer, C. et al., 2017. Umwelt- und Kostenvorteile ausgewählter innovativer Mobilitäts- und Verkehrskonzepte im städtischen Personenverkehr – Teilbericht 1, Forschungsbericht 371296101, UBA-FB.

Sommer, C., Krichel, P., 2012. Wer nutzt welche Verkehrsmittel. In: Der Nahverkehr 03/2012, pp. 15-21.

Sommer, C., Mucha, E., 2013. Multimodale Angebote zur Ergänzung des klassischen ÖPNV. In: Der Nahverkehr 06/2013, pp. 18-22.

SrV, 2013. Own evaluation of Mobilität in Städten 2013, household survey of TU Dresden by order of Stadt Frankfurt am Main, Dezernat Verkehr, Referat 66A/traffiQ.

Stein, A. et al., 2017. Bewertung von Multimodalitätsstrategien für Verkehrsunternehmen, -verbünde und Kommunen, Endbericht, Berlin.

ÜSTRA, 2016. Hannovermobil – unser Mobilitätspaket. <https://www.uestra.de/mobilitaetsshop/hannovermobil/> (07/08/2016).