Cognition and Relative Importance Underlying Consumer Valuation of Park-and-Ride Facilities

Article *in* Transportation Research Record Journal of the Transportation Research Board · January 2003

DOI: 10.3141/1835-15

CITATIONS
27

READS
106

4 authors, including:

Eric J E Molin
Delft University of Technology
103 PUBLICATIONS **1,786** CITATIONS
SEE PROFILE

Robert van der Heijden
Radboud University
94 PUBLICATIONS **829** CITATIONS
SEE PROFILE

Cognitions and Relative Importances Underlying Consumer Valuation of Park and Ride Facilities

Ilona Bos, Eric Molin, Harry Timmermans and Rob van der Heijden[1]

[July 2002]

Word count: 5046 + 5*250 = 6296

[1] Ilona Bos and Eric Molin are respectively Ph.D. Student and Assistant Professor at the Department of Transport Policy and Logistics Organisation, Delft University of Technology, Faculty of Technology, Policy and Management, the Netherlands, fax: +31 15 2782719, e-mail: d.m.bos@tbm.tudelft.nl; e.j.e.molin@tbm.tudelft.nl. Harry Timmermans is Professor at the Faculty of Architecture, Building and Planning, Eindhoven University of Technology, the Netherlands, fax: +31 40 247 5882, e-mail: eirass@bwk.tue.nl. Rob van der Heijden is Professor of Human Geography and Spatial Planning, University of Nijmegen, Nijmegen School of Management, the Netherlands, fax: +31 24 361 1841, e-mail: r.vanderheijden@nsm.kun.nl.

This paper originates from the research program Seamless Multimodal Mobility of TRAIL Research school (TRAnsport, Infrastructure and Logistics).

Ilona Bos, Eric Molin, Harry Timmermans and Rob van der Heijden

ABSTRACT. This paper reports the results of a study that was designed to identify the cognitive constructs underlying the valuation of P&R facilities and to measure the relative importance attached to the attributes of such facilities. Results show that the reliability of public transport is quite important. Furthermore, time and, to a lesser degree, costs considerably influence a traveler's decision to use P&R or not. The parking aspects are less important, except for the information aspects about parking. Finally, respondents evaluated the attributes about staying at P&R to be least important. These results do, however, seem to vary between user groups.

1 INTRODUCTION

Traffic jams and parking problems are becoming increasingly common in and around cities in industrialized countries as a result of the dramatic increase in the number of cars per family in the recent past. High on the political agenda, therefore, is the reduction in the number of cars entering the city center. One way of achieving this reduction is to build high-quality public transport systems to the city centers. In the Netherlands, park and ride (P&R) facilities have been created to feed such systems in an attempt to combine the advantages of public transport with those of the car. Unfortunately, however, recently realized P&Rs in the Netherlands do not attract the expected number of car users. One of the reasons may be that these facilities were built without high-quality market research to better understand the user needs. P&R facilities were built in a "we build it and they come" mood. The planning of more frequently used P&Rs may require a better understanding of car users' preferences.

The design of P&R facilities involves several decisions. First, it is obvious that the P&R facility should be accessible and that the number of parking places should be sufficient. However, arrived at the P&R, the traveller may consider the quality of the P&R facility, which involves among other things the parking costs at P&R, the liveliness at the car park and the distance between car and public transport. Arrived at the platform the traveler might use his/her waiting time by using additional facilities, such as heated waiting rooms, kiosks or supermarkets. The features of additional transport may be important as well; for example the type of transport, the frequency and the costs. Finally, the traveler may be informed about the attractiveness of the P&R facility, its location and the number of parking places. All such additional facilities require more money. Hence, the key question is whether higher-quality P&R facilities attract more car users, and how important each of these attributes are in the consumer choice process. Moreover, it is critical to know which segments of the population respond most favorably.

The present paper reports the results of a study, which was designed to address these research questions. Because the number of P&R facilities, especially those of higher quality, is very limited, it is impossible to answer these research questions using a correlational analysis of overt behavior. Given the lack of empirical, historical data, it is necessary to apply a stated preference (SP) approach. In the present project, first a compositional stated preference approach was used. The results of this study were then used as input to a stated choice experiment. In this paper only some key results of the compositional stated preference approach are reported.

The specific goal of this paper is to identify the cognitive constructs that underlie the consumer preference of P&R facilities and to examine whether there are differences in importance scores between different segments of the population. In particular, differences are described between male and female respondents, between two different age groups, between groups with different trip purposes and finally between respondents who are familiar and respondents who are not familiar with P&R facilities.

The paper is organized as follows: Section 2 describes the research design and in section 3 the results of the analyses are presented. The latter section contains the results for the total group of respondents and the results for the different segments. Finally, in section 4, some conclusions are drawn.

2 RESEARCH DESIGN

2.1 General principles

The aim of this paper is to better understand how different segments of the population form cognitions of P&R facilities and how they rate the various attributes in terms of importance. To provide answers to these research questions, the following research design was implemented. First, an as complete as possible list of attributes that might influence the travelers' choice behavior was elicited. Next, in a pilot study, we determined the maximum number of attributes that could realistically be processed by respondents. The resulting list of attributes was then included in a questionnaire and respondents were asked to assign an importance weight to each of the attributes, using a Likert scale. In addition, they were asked to group the list of attributes into clusters. Multidimensional scaling (MDS) was used to construct the cognitive maps and identify the cognitive constructs.

2.2 Operational decisions

A complete list of attributes, which potentially can influence the choice behaviour of the traveller, was obtained by analyzing from the literature (e.g. [1]) the successes and failures of already existing P&Rs. This list contains 60 attributes, which were tested in a pre-questionnaire study consisting of two rounds. In the first round, ten respondents were asked to evaluate the importance of 60 attributes on a scale from one (the attribute does not influence the choice behaviour at all) to seven (the attribute does certainly influence the choice behaviour). The respondents were also asked to add some additional attributes, if any, which influenced their choice behaviour. In the second round, ten other respondents tested these additional attributes. In both rounds the respondents were also asked to sort the cards with the belonging attributes into stacks, so that all the cards in a stack represented similar attributes according to the respondent.

After testing, it became obvious that the respondents could not handle the clustering of 60 attributes. Therefore, the number of attributes was reduced to 30, using two criteria. Attributes with too much overlap were combined to form a new attribute. Attributes which received very low scores and not being really prominent in the literature were also excluded from further analysis. Finally, a list of 30 attributes was obtained, which is described in Table 1.

In spite of the reduction in the number of attributes, it was obvious that the clustering of attributes with cards would be too time-consuming. Therefore, a computer was used to perform this task. This also provided the possibility to use the Internet. Using the computer, the task was simplified by showing the attributes separately to the respondent, thus making it possible for the respondent to place these attributes into a limited number of boxes or groups with a click of the mouse. It was decided to limit the number of groups to six, because these groups could clearly be arranged on the computer screen and preliminary research showed that respondents hardly ever formed more clusters. After placing the attribute shown on the screen in one of the six boxes, the next attribute appeared. The order of showing the attributes was randomized for each respondent. In doing so, the chance of inaccurately classifying attributes because of fatigue effects is equal for each attribute, implying a minimization of the aggregated error. This process was repeated until all attributes were grouped into clusters. It was also possible to introduce some changes by dragging the attribute in question to another box.

In addition to sorting the attributes to identify the cognitive constructs, respondents were asked to assign an importance weight to each of the 30 attributes. The order of the attributes presented was also randomized, differently for each respondent. The value attached to the attribute indicates a measure of influence in the respondent's decision to use P&R or not.

2.3 Sampling method and sample characteristics

To reach the target group, a link to the Internet page with the questionnaire was included in the electronic newspaper of *snelheidscontrole.com* e-mailed on 9 June and 16 June, 2001. This newspaper contains the expected speed checks in the Netherlands. The Dutch car users among the subscribers to this newspaper belong to the target group. Furthermore, a link was established in the daily electronic newspaper of *kranten.com*, e-mailed from 25 June until 28 June, 2001 (from Monday to Thursday); the link was also advertised on the site of *kranten.com* from 25 June until 1 July, 2001. This site presents the most prominent news from national leading newspapers.

A total of 558 respondents filled in the questionnaire completely. The characteristics of the response group are listed in Table 2, which shows that more male than female respondents filled out the questionnaire. The fact that men use the car more frequently than women [2] is an explanation of the overrepresentation of men. Table 2 also shows that a larger number of young respondents completed the questionnaire. The small number of respondents older than 50 can be explained by the fact that the Internet is less widely available to this group. A majority of the respondents had a bachelor's or master's degree. The number of highly educated respondents can be explained by the fact that people with a bachelor's degree or higher have a higher availability of the Internet [3]. More respondents filled out the questionnaire thinking more of work or school purposes than of leisure activities. A majority of the respondents have experience with using P&Rs. This can be explained by the fact that travelers who are not familiar with P&R facilities are less motivated to fill out a questionnaire about P&Rs. This might also be a serious response that should be kept in mind when interpreting the results.

3 RESULTS

3.1 Cognitive constructs: The MDS solution

The first research question intends to identify which cognitive constructs respondents use in their perception of P&R facilities. Therefore the multidimensional scaling (MDS) method is used. The purpose of this technique is to locate attributes in a perceptual space of the smallest dimensions, based on the similarity of attributes. The similarity of a pair of attributes is defined as the number of respondents who placed the two attributes into one cluster. The more similar pairs of attributes are, the closer they are positioned in the multidimensional space.

The input of the MDS calculations is a 30-30 data matrix with the dissimilarity data in the cells. These values are calculated as follows: the maximum possible number of times that attribute pairs can be grouped in the same cluster (i.e. 558 times) minus the real number of times that the attribute pair in question has been grouped in the same cluster. This matrix was used to calculate between-attribute dissimilarity scores, using the Euclidean Distance measure [4]. These dissimilarity measures were then input to an MDS algorithm. The coordinate axes of the solution describe the cognitive dimensions that were used in providing these judgments [5]. These dimensions have no direct meaning, but are used to place the attributes in a multidimensional space. The determination of the number of dimensions represented in the data is generally reached by one of the two following approaches. The first approach is to use a stress measure, which indicates the proportion of the variance of the disparities (differences in the computer-generated distances representing similarity and the distances provided by the respondent) not accounted for by the MDS model. The stress is minimized when the attributes are placed in a configuration so that the distances between the attributes best match the original distances. Stress always improves by increasing the dimensionality. A screen plot of the R^2 measures supports in making a trade-off between the fit of the solution and the number of dimensions. The second approach is a subjective evaluation of the perceptual maps by determining the most reasonable configuration. The more dimensions, the better the distances of the

observed similarities can be presented. However, the more dimensions, the more difficult it is to understand the solution.

Table 3 presents the results of this analysis. It shows that the MDS solution improves when increasing the number of dimensions. The gain is greatest when going from one to two dimensions. The change from two to three dimensions also leads to a better solution, but to a lesser degree, although the increase of the R^2 value is still substantial. The improvement of the solution is substantially smaller when a change is made from three to four dimensions. After studying the two-dimensional and the three-dimensional solution, the three-dimensional solution was chosen because this solution allows a better interpretation.

To interpret the three-dimensional solution, three plots are made: the x-coordinates of the solution against the y-coordinates, the x-coordinates against the z-coordinates and finally the y-coordinates against the z-coordinates (see Figure 1). In other words, these three figures are the two side-views and the view from above of a cube. Based on the MDS solution, the attributes can be grouped into the following five main clusters, also represented in Table 1: *public transport*, *time*, *parking*, *costs* and *staying at P&R*. Attributes in the same cluster are more similar to each other than to those in other clusters and thus belong to the same cognitive construct. From the plots it can be seen that the cluster *public transport* can be grouped in turn into two subclusters, i.e. *reliability* and *comfort of the public transport*. The attributes within the cluster *time* are positioned a little further away from each other, but nevertheless a clear cohesion can be seen. However, all attributes within the cluster *parking* are situated very close to each other. Hence, a dichotomy can be distinguished: on the one hand the information aspects, on the other hand the facilities about parking. Contrary to the short distance between *information about travel time* and the other attributes, *information about travel time* seems to be deviant with respect to the content. This information aspect has nothing to do with parking but, probably because of the cohesion with *information about the occupancy of the parking place* (also an attribute about information), it is grouped in this cluster. The three attributes within the cluster *costs* are positioned close to each other. Furthermore, it is noteworthy that the other attributes are positioned far away from this cluster. Finally, the attributes within the cluster *staying at P&R* have been positioned remarkably close to each other, except for *the possibility to rent a bike*. This can be explained by the fact that the remaining ten attributes are truly about *staying at the P&R* whereas *the possibility to rent a bike* is seen as an additional provision which does not directly have anything to do with *staying at P&R* itself. The remaining attributes can be grouped into subclusters that are about *safety*, *human contact* and *additional provisions*.

3.2 Cohesion of attributes in the determined clusters

Table 1 shows the cohesion between the different attributes in a cluster. This cohesion is the average distance between the attributes in a (sub)cluster. Thus, the smaller the value in the table (the average distance), the greater the cohesion between the attributes.

The attributes within the clusters *staying at P&R* and *costs* have the strongest cohesion. In addition, the cohesion within the subclusters in the cluster *staying at P&R* is measured by calculating the distances between the centers of the subclusters. From these calculations it is obvious that the subcluster *human contact* is situated between *safety* and *provisions*. The possibility of renting a bike instead of using public transport is situated somewhat separately. The attributes within the cluster *public transport* also have a strong cohesion. Within this cluster it is obvious that the attributes within the subcluster *reliability* are situated more closely together than the attributes within the subcluster *comfort*. The cohesion between the attributes within the cluster *parking* is less strong. The attributes within the subcluster *information* are more connected than the attributes within the subcluster *facilities*. Finally, the attributes within the cluster *time* have the smallest cohesion.

3.3 Relative importances

To measure the relative importance respondents attach to the attributes of a P&R facility, they were asked to evaluate the attributes concerning the influence of the choice behaviour on a scale from 1 to 7. The last column of Table 1 not only lists the average importance scores for each individual attribute but also for each (sub)cluster.

Table 1 shows that the *reliability* within the cluster *public transport* is considered most important. The respondents especially consider the frequency of the public transport to be important. Furthermore, the cluster *time* is important to respondents, especially the accessibility to the city, i.e. the time needed to find a parking place in the city itself and the traffic density of the city. Furthermore, the costs are important, primarily the comparison between the costs of the transfer and the costs of parking at the destination. Road pricing is less relevant in this cluster. The cluster *parking* is considered less relevant, but the information offered is more significant in this cluster than regarding parking facilities. The chance of finding a parking place is very relevant as well as the information offered about free parking places. Finally, the whole cluster *staying at P&R* is considered less important. Within this cluster the subjective safety is relatively the most important subcluster. In the other subclusters, only a heated waiting room is slightly appreciated. The possibility to rent a bike is not only a separate attribute concerning the cohesion with other attributes, but it also has the lowest importance.

3.4 Importance differences between segments

To identify possible differences between segments, it is necessary to rule out differences in scale use between the respondents. To that effect, first the importance scores of each respondent were standardized by using Z-scores, which are calculated by subtracting the arithmetical average from the respondent's scores and by dividing the remainder by the standard deviation of the respondent's scores. In this way, the manner of valuing is equal for each respondent; the average of the importance score assigned to all attributes by a single respondent is 0 and the standard deviation of those values is 1. The averages of the standardized importance scores of all attributes within the different groups are compared using t-tests.

Table 4 only lists the mean importance scores of attributes that are significantly different between segments. The significance of differences in standardized importance scores was tested for gender, age, educational level, trip purpose and experience with P&R facilities.

A first surprising result was that women have less interest in supervision at P&R. Women do however have a greater interest in a surveyed, lighted pedestrian route. This may be explained by the fact that women are feeling more uncomfortable in unsafe situations. Finally, women are to a stronger degree unwilling to walk from car to public transport.

The younger generation (age to 40 years) has more interest in the costs of P&Rs, which is not very surprising if it is realized that in general older persons earn more than younger persons. Furthermore, they gave a higher importance score to the punctuality of the timetable and appreciate the information about travel time better. It is striking that younger persons prefer the certainty of a seat more and the possibility to rent a bike less than older persons. Younger persons also have more interest in additional facilities. Finally, the older people prefer the possibility to reserve a parking place more, and have more interest in a well-maintained P&R.

People with a lower or intermediate education attach a higher importance to additional facilities such as a manned ticket service, a manned information desk, toilets and supervision at P&R. Higher educated people have more interest in the number of transfers, the chance of finding a parking place, the punctuality of the timetable and the extra travel time from the principal road to the P&R facility.

People traveling for work or school purposes, have more interest in the possibility to reserve a parking place than people traveling for recreational purposes. This is not surprising because people traveling for work or school do this more times a week and prefer a permanent reservation, whereas people traveling for recreational purposes do feel uncomfortable to make that reservation. In addition, people traveling for work or school are more time-bound, and consequently like to spend less time on finding a free parking place. Furthermore, they are more interested in the information about travel time per P&R and per car.

Experienced P&R users know that a heated waiting room, the possibility to reserve a parking place, a well-maintained facility, a manned information desk and the certainty of a seat are pleasant things of minor importance; however, they do not prefer the possibility of additional transport by rail better than people who are not familiar with P&Rs. Furthermore, experienced P&R users give a lower importance score to aspects regarding the situation of the destination, such as parking costs at destination, time needed to look for a parking place at destination and the amount of traffic toward/in the city. Finally, they value the chance to find a parking place at P&R and the walking distance from car to public transport lower.

4 CONCLUSIONS

The planning of more frequently used P&Rs requires a better understanding of the car users' preferences. In particular, it is relevant to better understand the cognitive constructs that consumers use, the relative importance they attach to the various attributes of P&Rs, and the existence of possible differences in importance rates between potential user segments. Information about cognitive constructs may be valuable to promote P&Rs. Likewise, importance weights can be used to make carefully considered decisions when designing P&R facilities. Differences between segments may provide clues as to which target group to address.

This paper has reported the results of a study that was developed to identify the cognitive constructs that users of P&R facilities apply, and to measure the relative importance they attach to the attributes of P&R facilities. Respondents' judgments about how thirty attributes influence their choice of P&R facilities show that the cognitive construct *reliability of the public transport* is quite important. Furthermore, the cognitive construct *time* and to a lesser degree the cognitive construct *costs* considerably influence a traveler's decision to use P&R or not. The cognitive construct *parking aspects* is less important, except for the information aspects about parking. Finally, respondents evaluated the cognitive construct *staying at P&R* to be least important. These results do, however, seem to vary between user groups.

Some differences in the relative importance scores are found between male and female respondents, between the younger and the older group of respondents, and between the respondents with a lower or intermediate education and respondents with a bachelor's or master's degree. Because of the overrepresentation of men, the younger group of respondents and the group respondents with a bachelor's or master's degree, these found differences should be kept in mind when interpreting the relative importance scores.

Furthermore, differences in the relative importance scores are found between respondents who are traveling for work or school and respondents who are traveling for recreational purposes. When the target group of P&R facilities to be realized are car drivers traveling in their free time, they are less interested in the possibility to reserve a parking place but more interested in real-time travel information about the travel time per car and per P&R. Finally, differences in the relative importance scores are found between respondents who are familiar with P&Rs and between respondents who are not familiar with P&Rs. When promoting new P&Rs, these differences should be kept in mind. On

the one hand, the quality of the P&R facility itself is more important to travelers who are familiar with P&Rs, such as the existence of a heated waiting room or a manned information desk and on the other hand, the attributes which describe the situation at destination are valued higher by travelers who are not familiar with P&R facilities. To attract new users, not only the quality of the additional transport and the P&R facility itself have to be kept in mind but flanking measures at destination are of great importance as well.

References

[1] Ministry of Transport, Public Works and Water Management (2000*), Transferia: een handreiking bij voorbereiding en realisatie*, Den Haag (in Dutch).

[2] Lucassen, S. (1999), Mobiele vrouwen, *Index* **6**, CBS, p. 10-11 (in Dutch).

[3] Bosveld, W. and J. Greven, Internet en klassieke methoden van marktonderzoek, *Onderzoek* **11**, p. 26-28 (in Dutch).

[4] Chatfield, C. and A.J. Collins (1980), *Introduction to Multivariate Analysis*, University Press, Cambridge.

[5] Kruskal, J.B. and M. Wish (1978), *Multidimensional Scaling*. Sage University Paper Series on Quantitative Applications in the Social Sciences, 07-011, Beverly Hills, Calif.: Sage.

List of tables and figures

Table 1: Clusters of attributes with values of influence on choice behavior

Table 2: Response group characteristics (N=558)

Table 3: Stress and R^2 values for each dimensionality

Table 4: Statistically significant differences of evaluation attributes between response group characteristics

Figure 1:The three-dimensional MDS solution

TABLE 1 Clusters of attributes with values of influence on choice behavior

No	Attribute	Cohesion	Importance
	1 Public transport (PT)	***0.26***[1]	***4.8***[1]
	Reliability	**0.15**[2]	**5.0**[2]
1	Number of transfers until destination		5.3
2	Frequency (number of departures per hour) of PT to the city		5.5
3	Separate free (bus) lane for PT to the city		3.8
4	Punctuality of PT from P&R (deviating from the timetable)		5.3
5	Number of destinations in the city to be reached without transferring		4.9
	Comfort	**0.45**	**4.2**
6	Transport to city also possible by rail		3.8
7	Certainty of seat in PT to the city		4.5
	2 Time	***0.82***	***4.7***
8	Time needed to look for a parking place at destination		4.9
9	Amount of traffic toward/in the city		4.8
10	Extra travel time from principal road to P&R		4.4
	3 Parking	***0.62***	***4.0***
	Information	**0.34**	**4.3**
11	Information on the way about travel time per P&R and per car		3.7
12	Information about occupancy of the parking place of P&R		4.2
13	Chance to find a parking place at P&R		5.1
	Facilities	**0.89**	**3.7**
14	Possibility to reserve a parking place at P&R		3.2
15	Parking lane to bring and meet travelers at P&R		3.3
16	Walking distance from parking place at P&R to platform PT		4.5
	4 Costs	***0.14***	***4.3***
17	Total costs of transferring (parking costs + costs PT)		4.9
18	Costs road pricing (per car kilometer) after passing P&R		3.5
19	Parking costs at destination		4.6
	5 Staying at P&R	***0.14***	***3.1***
	Safety	**0.20**	**3.8**
20	Supervision at P&R		4.1
21	Surveyed, lighted pedestrian route from parking place to PT		3.8
22	A well-maintained P&R (clean, no graffiti, paved parking place)		4.2
23	liveliness at P&R		3.1
	Human contact	**0.09**	**2.8**
24	Manned ticket service		2.8
25	Manned information desk at P&R		2.8
	Provisions of P&R	**0.11**	**2.8**
26	Heated waiting room		3.2
27	Kiosk		2.4
28	Toilet		3.0
29	Additional provisions (e.g. dry cleaner's, supermarket, filling station)		2.6
	Extra	**	**2.2**
30	Possibility to rent a bike at P&R		2.2

[1] Average cohesion importance score of the cluster concerned respectively *(in italics)*

[2] Average cohesion importance score of the subcluster concerned respectively **(in bold)**

TABLE 2 Response group characteristics (N=558)

	Absolute	*Relative*
SEX		
Male	424	76%
Female	134	24%
EDUCATIONAL LEVEL		
Bachelor's/master's degree	416	75%
Lower or intermediate education	142	25%
AGE		
18-30	256	46%
31-50	264	47%
51+	38	7%
TRIP PURPOSE		
Work or school	359	64%
Leisure activities	199	36%
EXPERIENCE WITH P&Rs		
Experience	377	68%
No experience	181	32%

TABLE 3 Stress and R^2 values for each dimensionality

Dim	Stress	Decrease stress	Dim	R^2	Increase R^2
1	0.49	0.51	1	0.60	0.60
2	0.31	0.18	2	0.80	0.20
3	0.23	0.08	3	0.89	0.09
4	0.17	0.06	4	0.92	0.03
5	0.13	0.04	5	0.94	0.02
6	0.10	0.03	6	0.95	0.01

TABLE 4 Statistically significant differences of evaluation attributes between response group characteristics

GENDER	Male		Female		
	Mean	SD	Mean	SD	Sign
Supervision at P&R	0.117	0.78	-0.053	0.81	0.034
Surveyed, lighted pedestrian route	-0.127	0.76	0.078	0.81	0.009
Walking distance from car to platform PT	0.255	0.81	0.466	0.75	0.009

AGE	18-40		40+		
	Mean	SD	Mean	SD	Sign
Total costs of transferring	0.58	0.87	0.34	1.08	0.011
Punctuality of PT from P&R	0.83	0.69	0.69	0.76	0.048
Information about travel time	-0.03	0.80	-0.32	0.77	0.000
Certainty of seat	0.38	0.82	0.19	0.86	0.021
Possibility to rent a bike	-1.07	0.82	-0.82	0.90	0.003
Additional provisions	-0.67	0.87	-1.02	0.70	0.000
Possibility to reserve a parking place	-0.50	0.82	-0.27	0.98	0.008
A good state of repair	0.08	0.78	0.29	0.73	0.005

EDUCATIONAL LEVEL	Lower/intermed. education		Bachelor's/ master's degree		
	Mean	SD	Mean	SD	Sign
Manned ticket service	-0.44	0.91	-0.70	0.83	0.003
Manned information desk at P&R	-0.36	0.82	-0.76	0.73	0.000
Toilet	-0.26	0.87	-0.63	0.77	0.000
Supervision at P&R	0.20	0.81	0.04	0.78	0.037
Number of transfers until destination	0.54	0.91	0.87	0.77	0.000
Chance to find a parking place at P&R	0.41	0.83	0.71	0.79	0.000
Punctuality of PT from P&R	0.65	0.73	0.84	0.70	0.010
Extra travel time from principal road to P&R	-0.02	0.83	0.31	0.84	0.000

TRIP PURPOSE	Work or school		Leisure activities		
	Mean	SD	Mean	SD	Sign
Possibility to reserve a parking place	-0.34	0.87	-0.60	0.84	0.001
Information about travel time	-0.04	0.81	-0.23	0.77	0.007

EXPERIENCE P&R	Experience		No experience		
	Mean	SD	Mean	SD	Sign
Heated waiting room	-0.36	0.79	-0.52	0.78	0.032
Possibility to reserve a parking place	-0.37	0.89	-0.57	0.82	0.012
A good state of repair	0.20	0.76	0.01	0.79	0.007
Manned information desk at P&R	-0.60	0.80	-0.78	0.70	0.007
Certainty of seat	0.40	0.85	0.20	0.80	0.013
Transport to city also possible by rail	-0.20	0.97	0.12	0.89	0.000
Parking costs at destination	0.29	0.91	0.64	0.83	0.000
Time needed to find a parking place at dest.	0.48	0.96	0.72	0.82	0.004
Amount of traffic toward/in the city	0.33	0.88	0.75	0.75	0.000
Chance to find a parking place at P&R	0.57	0.83	0.78	0.74	0.005
Walking distance from car to platform PT	0.26	0.79	0.41	0.80	0.037

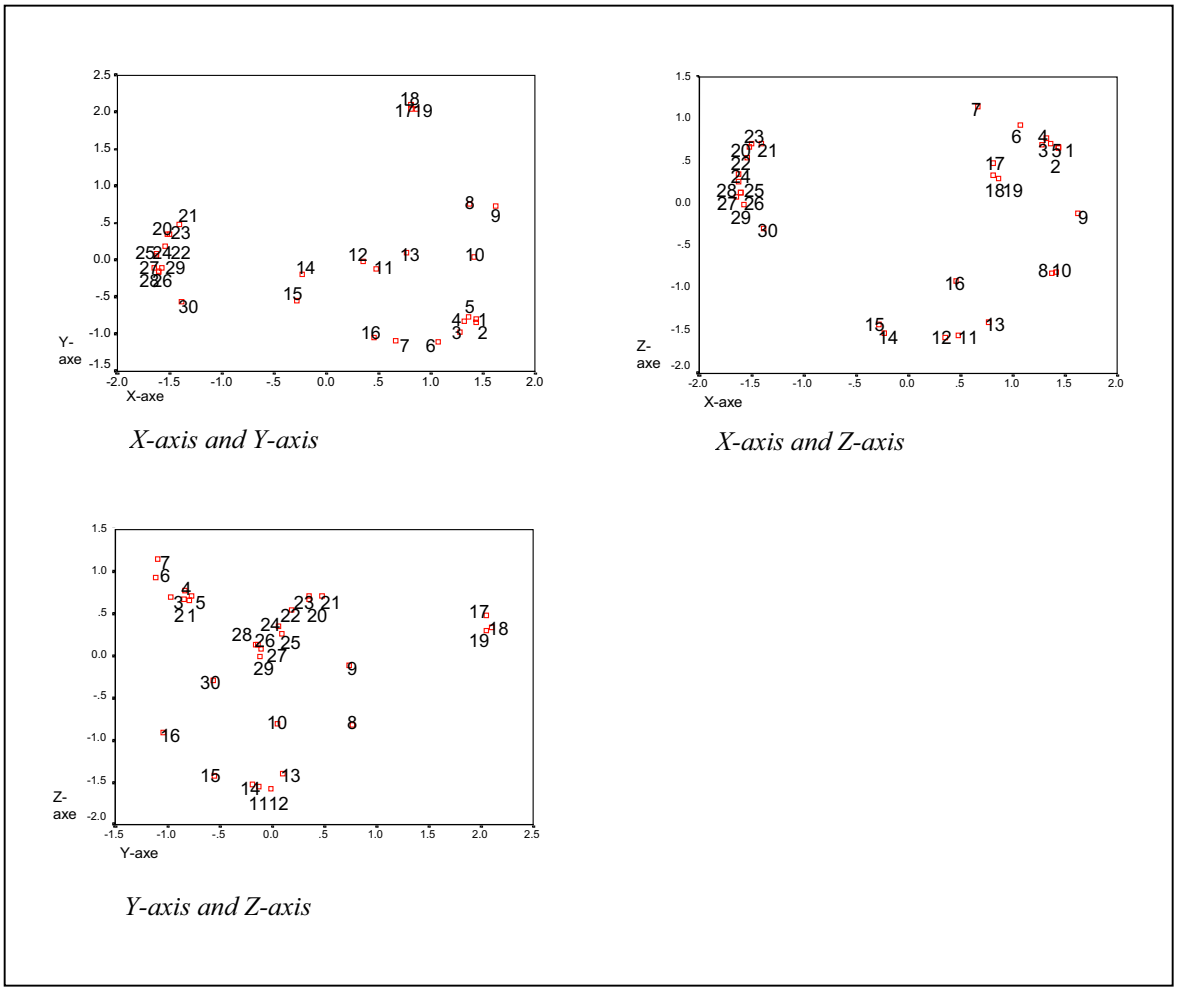

FIGURE 1 The three-dimensional MDS solution