46th Congress of the European Regional Science Association
August 30 – September 3, 2006, Volos, Greece

Access to railway stations in the Netherlands

Moshe Givoni* and Piet Rietveld
Department of Spatial Economics, Free University
De Boelelaan 1105, 1081 HV, Amsterdam, The Netherlands

Abstract

A rail journey is almost always part of a journey 'chain' which includes access to and egress from the railway station. The integration of the rail-journey components is essential to achieving a continuous travel, door-to-door, when using the rail and to make the rail an attractive alternative to the car, which requires seamless interchange at the station between the chain elements. Such integration has the potential to reduce the vulnerability of the passenger railway network and increase its attractiveness.

This paper focuses on two lines of investigation with regard to the above. First, the profile of the access and egress modes on journeys to and from railway stations in the Netherlands is analyzed. The analysis examines also how the availability of car affects the mode choice on access journeys to the station. Second, the effect of passengers' perception of the station and of the access/egress journey to the station on the overall perception of traveling by rail is estimated. The analysis is based on the Dutch railways (NS) customer satisfaction survey. The results show that most of the passengers choose green modes (walking, bicycle and public transport) to get to or from the railway station and that the availability of a car does not have a strong effect on the choice of access mode to the station. The quality of the station and the access/egress facilities was found to have an important effect on the general perception of traveling by rail.

1. Introduction

At the heart of the EU transport policy lies the goal to revitalise the railways in order to shift the balance between transport modes, especially from private to public modes, and from car and plane to the train. The 2001 transport White Paper explicitly states that "rail transport is literally the strategic sector, on which the success of the efforts to shift the balance [between the modes] will depend" (CEC, 2001: 13). The actions to revitalise the railways have, in the last decade, focused on the restructuring of the industry through major changes to the ownership and operation of the national railway companies (Thompson, 2003). The restructuring was recommended by the EU and was described in the White Paper – A strategy to revitalising the community's railways (CEC, 1996).

A railway journey is almost always part of a journey 'chain' that includes a journey to, and later from, the railway station by different modes of transport. The integration of these components is essential to achieve a continuous travel, door-to-door when using the rail, and in order to make the railway a viable and attractive alternative to the car. The EU

* Corresponding author. Email: mgivoni@feweb.vu.nl

emphasizes that "the creation of an effective Citizen's [transport] Network is crucially dependent on integration of transport modes" (EC, 1995: 45). The level of such integration depends on the extent to which the interchange between transport modes and services is seamless. It is therefore necessary also to look outside the 'train' element of a railway journey to continue the revitalisation of railway transport in Europe.

Since railway stations are usually located relatively far from each other, even within the major cities, often getting to them or from them is an important part of the journey, and the accessibility of a station can be a factor in determining if the railway is chosen as a travel alternative (Rietveld, 2000). Put in a different way, in a multi-modal journey where the different modes complement each other "an increase in the quality of a certain service (the price being constant) leads to an increase in the demand for other transport services" (Keijer and Rietveld, 2000: 216). Furthermore, for the passenger it is the entire chain that matters, not that of the individual elements in the chain although some elements in the chain might have greater importance (Keijer and Rietveld, 2000). In a railway journey chain, according to Krygsman et al (2004), the access and the egress stages of the journey are the weakest parts and they significantly contribute to the total disutility from traveling. Furthermore, "should the access and egress exceed an absolute maximum threshold, users will not use the public transport system" (Krygsman et al, 2004: 265). Finally, improvements to the accessibility of stations might be cheaper and overall more cost effective than improvements to the actual train journey. Therefore, by improving the accessibility to railway stations railway use could be increased. Investigating this potential is the aim of the IBRAM research – Integration Between Rail and Access-to-railway-stations Modes.

This paper is the starting point for the IBRAM research. It focuses on understanding which modes passengers use to get to or from railway stations in the Netherlands and the main characteristics of these passengers. The analysis also looks on whether railway passengers could have used a car for the journey instead of traveling by rail and how this influenced their choice of access mode to the station. Following this, the importance of the passengers' satisfaction with the access facilities (e.g. car parks at the station) in determining their overall satisfaction from using the train is estimated. The results are then discussed.

2. The data

The analysis presented in this paper is based on the Dutch Railways (NS) customer satisfaction survey carried out between 26 and 30 September, 2005 (Monday to Friday). 2,542 questionnaires were available for the analysis.

The main characteristics of the passengers surveyed are summarized in Table 1. Most of the passengers using the train on weekdays do so regularly, at least 4 times a week, but those who do not use the railway regularly (less than once a week) still comprise a significant share of the passengers (22%). Commuting to work and journeys to school or studies are the main reasons for traveling during the week, while non work/studies related

journeys account for about one-fifth of the journeys. With respect to age, over half of the passengers are in the 19-35 age group and a relatively small share are under 19 or over 65. The distribution of passengers by gender is 47% male and 53% female.

As expected, most commuters to work or school/studies use the railway regularly (95% use it over once a week). Amongst those who travel by rail for business or leisure purposes the distribution of the journey frequency is relatively uniform, probably indicating that many of these passengers use the railway also as commuters (but at the time of the survey were on a business or a leisure journey). The frequency of using the train is clearly decreasing with age, probably underlying the increase in car availability as age increases. 76% of the passengers of the age 18 and under use the train four or more time a week and this decreases to 61%, 42% and 3% for the age groups 19 to 35, 35 to 65 and over 65 respectively. This trend is also clear from looking on the age of those who had a car available for the journey (see section 4).

Table 1: The main characteristics of the railway passengers surveyed (% of trips made)

Age group	%	Journey frequency	%	Journey purpose	%
Under 19	9.8	4 or more times / week	54.0	Commuting	37.5
19-35	52.8	1-3 days / week	24.2	School/Studies	27.8
36-65	34.8	1-3 days / month	10.1	Leisure/Other	21.9
Over 65	2.6	Less than 12 days / year	11.7	Business	12.7

There are important differences between the access journey to and the egress journey from the railway station. In general, passengers will accept longer journey time and distance for the access journey than for the egress journey. More important, however, is the distinction between stations at the home end and the activity end of a journey, the former will be the origin station on a journey from home to work (home base journey) and the latter the destination station, and vice verse on a journey from work to home (activity base journey). Usually, not the same modes of transport are available for the passenger at the home end and the activity end stations, the main difference is the availability of private modes (e.g. car and bicycle). Thus, we can treat access to the home end station and egress from it almost the same (see below). Following from that, whether a station is more a home end than an activity end station has important implications for planning of stations and its organization. For example, car parks have little use for railway passengers at the activity end stations.

47% of the passengers surveyed were on a home base journey (i.e. traveled from home), 36% were returning home, and the reminder were not traveling to or from home (of which less than 1% were missing values).

3. Modes of transport used before and after a railway journey – the access and egress modes

Cycling, public transport (the reference in the questionnaire is to “Bus/Tram/Metro”) and walking are the main modes used in the Netherlands to get to or from the railway station.

These modes account for about 85% at the (access to) home end or 99% when including the car (traveler is a driver or a passenger). This makes the other modes of transport available, like taxi and motorcycle, negligible. At the activity end station public transport and walking dominate the (egress) modal share with 82% (the share of these modes at the home end station is only 47%). Together with bicycle and car (mainly when travelers are passengers) these modes account for 97% of the journeys from the railway station at the activity end (Table 2).

Table 2: Mode choice on the access journey to the home end station and the egress journey from the activity end station (%)

	Access at the home end station	Egress at the activity end station
Bicycle	38.3	9.5
Bus/Tram/Metro	26.7	34.6
(Only) walking	20.1	47.2
Car (driver)	7.2	0.9
Car (passenger)	6.6	4.6
Taxi	0.2	0.9
Motorcycle	0.1	0.1
Train taxi	0.1	0.0
Other	0.7	2.2
Total	100	100
Valid answers	1203	1196

Table 2 shows that most passengers use green modes before or after a railway journey. The car is only the fourth most popular mode used to get to (the home end) railway station and it is used by travelers to drive to the station as much as to be driven to it. Only when driving the car to get to the station, parking facilities are required, and this choice is made by only 7% of the passengers. The low share of the bicycle at the activity end suggests that relatively few passengers take the bicycle with them on board the train, opt to own another bicycle for use just at the activity end or rent a bicycle at the activity end. The Traintaxi initiative (where passengers can share Taxi services with other rail passengers at a fixed price within a specified area around the railway station) has a negligible share at both the home end and the activity end stations.

Table 3 shows the distribution of the access mode used at the home end station by journey purpose, frequency of using the railway and passengers' age. Analysing the access mode by journey purpose does not reveal major differences. Business passengers seem to use the car more often (driving it or being driven) and leisure and business passengers use less the bicycle compared to those commuting to work or traveling to school. In terms of the frequency of traveling by rail, those who do not use it often will tend to use the car more although also these passengers, in total, prefer public transport and also often use walking and cycling. Those passengers who do not travel frequently by train (less than once a week) represent 25% of the passengers, while those who rarely

travel (less than once a month) represent only 13% of the weekday passengers. Car use, mainly when the traveler is a driver, is increasing with age.

Table 3: Access mode at the home end station by journey purpose, frequency and age group (% of passengers)

		Of total passengers		Access mode to home end station (%)				
		N	%	Bus/tram/ metro	(only) Walking	Bicycle	Car (pass.)	Car (driver)
Pur.	Commuting	501	42	25	17	47	2	8
	Business	151	13	19	27	27	13	15
	School/studies	277	23	30	17	44	5	2
	Leisure/other	270	23	32	24	23	12	7
Fre.	4 or more/week	611	52	27	18	47	2	6
	1-3days/week	270	23	27	21	36	9	5
	1-3days/month	139	12	23	28	30	7	12
	Less 12 days/year	146	13	25	19	16	22	15
Age	18 and under	110	10	22	17	53	6	0
	19-35	547	48	32	19	39	5	4
	36-65	458	40	20	23	37	8	11
	Over 65	31	3	29	19	13	13	19

Note: Pur. = Journey purpose, Fre. = Frequency of using the railway.

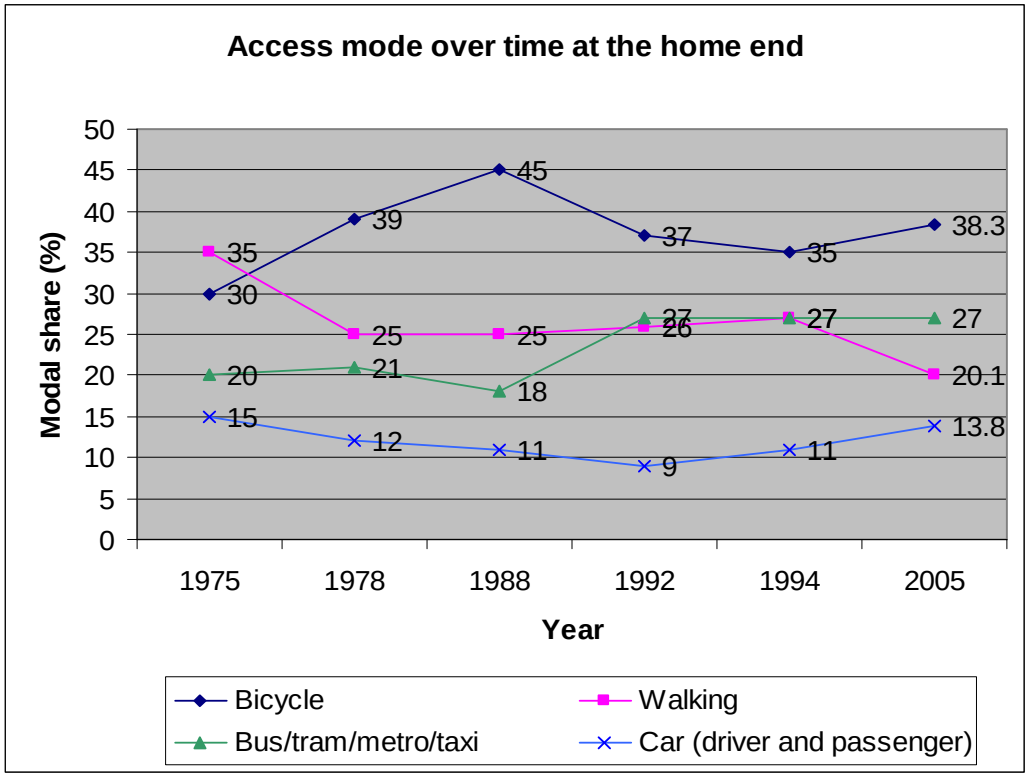
The distribution of the egress mode used at the activity end station by journey purpose, frequency of using the railway and passengers' age is not substantially different from the distribution in Table 3. Walking and public transport dominate across most of the groups analysed. Travelers ride the car at the activity end station mainly as passengers and this option is used mainly by those who are not often using the train, use it on leisure journeys, and/or are over 65 years old. Still these passengers prefer to use public transport and walking as egress modes. The bicycle is used at the activity end station more by commuters and those traveling to school/studies, those who travel frequently (more than 4 times per week) and those under 19, but again most of these passengers prefer public transport or walking. No significant differences in the mode used exist between the genders. The general picture emerging is that it is hard to recognize a group of passengers for which it is important, or worthwhile, to encourage the change of mode used to get to or from the railway station. Such a group would consist of frequent users of the train who relay extensively on the car to get to or from the station

Since NS questionnaire is carried out on board the train the results presented in the paper are inevitably biased towards those who use the train more frequently (their chances to be included in the survey are higher).

Combining the recent data from NS with Rietveld (2000) findings reveal the trend in the access mode choice over time. Bicycle was almost always the most popular mode to access the railway station at the home end. The sharp decline in bicycle use between 1988 and 1992, and the increase use of public transport is associated with the introduction of free public transport for students. Later this scheme was changed and students can travel

for free only part of the time (and at discount at the other time). Between 1994 and 2005 there is a sharp decrease in walking (of 7%) which is countered by an increase is using bicycle and the car. There was also a sharp decrease in walking between 1975 and 1978 and this decrease was compensated almost entirely by increase in the use of bicycle. In both cases, it might be that the changes reflect an increase in the number of people using the railway (not necessarily pointing to an increase in the railway's modal share) where most of these new passengers comes from further away from the railway stations where walking would not be a realistic alternative but bicycle (mainly in 1975 and 1978) and public transport would be.

Figure 1: Access mode at the home end station over time (%)



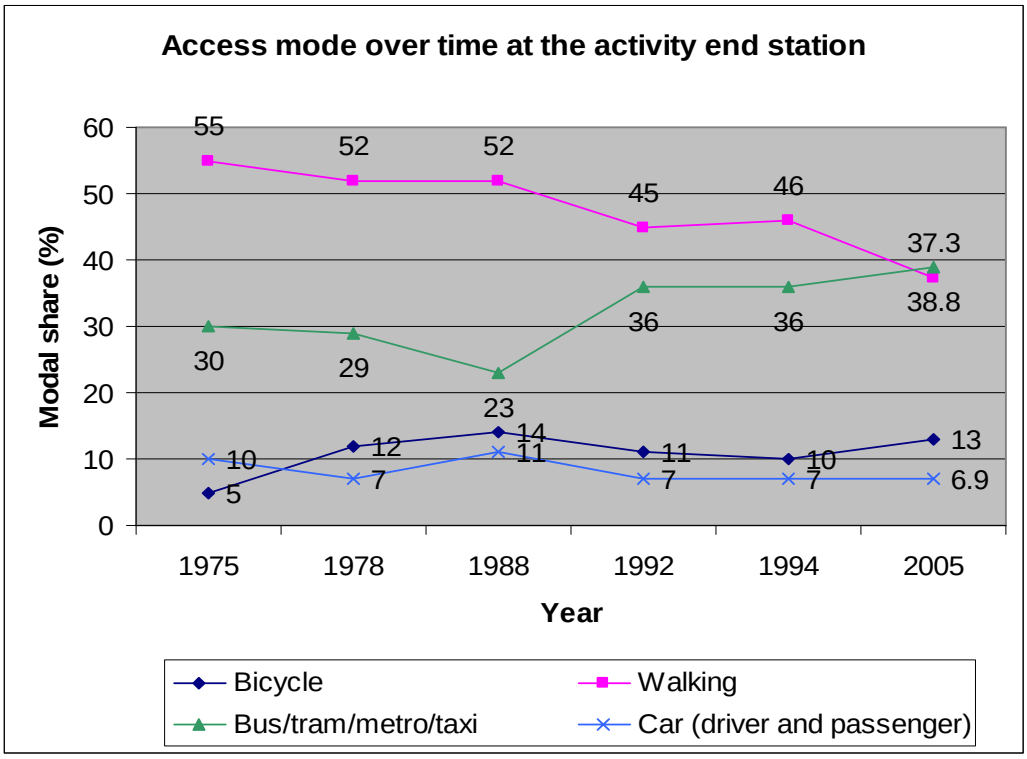
Source: for 1975 to 1994 – Rietveld (2000); for 2005 NS survey.

Access to the activity end station over time (Figure 2) was always dominated by walking and public transport but over the years there is a decline in the walking and an increase in using public transport. From a 15% difference in favor of walking in 1975, the share of public transport today is virtually the same as walking. Applying the explanation provided above for the access to the activity end station, the decrease in walking and increase in public transport might be connected with an increase in catchment areas of the activity end stations. After a decrease in bicycle use between 1988 and 1992 there is again an increase in its use, probably for the same reasons explained above.

In summary, the picture illustrated above is one in which those who use the railway in the Netherlands, probably preferring it over the car for the specific journey (or that a car is not available to them), choose to use what is regarded as 'green' modes to get to or from

the railway station. The substitution between bicycle and public transport, noticeable when free public transport was offered for students, highlights the possible side effects of improving public transport to/from railway stations to lure those who currently use the car to get to/from it. Given the large share of the bicycle and the small share of the car, improvements to public transport might result in an adverse environmental effect as more passengers will switch from the bicycle than from the car to the public transport (Rietveld, 2000). The current share of passengers using the car to access the railway station (especially drivers) is relatively small and might not justify actions. Furthermore, deterring those passengers from using the car to access the station might result in those passengers using the car for the entire journey instead of using the railway for part of it.

Figure 2: Access mode at the activity end station over time (%)



Note: the difference in the data for 2005 in Figure 2 and Table 2 is because in Figure 2 the egress journey from the activity end station is used and in Figure 2 the access to the activity end station is used. As noted above, no differences expected between the two and the ones found could not be explained.
Source: Source: for 1975 to 1994 – Rietveld (2000); for 2005 NS survey.

4. The effect of car availability on the mode choice to get to the station

NS's questionnaire asked passengers if they had a car available for use on the journey. This question provides some insights on how car availability affects the choice of access mode to the station. 43% of the passengers surveyed had a car available for the journey, and still they chose to use the railway. It means that almost half of the railway passengers are not 'captive' but passengers who have an alternative for the railway. Most of the passengers that could have used a car for the journey preferred also not to use it to access

the station (only 16% did so) some preferred to partly use it (be driven to the station) but most passengers preferred not to use the car altogether (Table 4). The bicycle seems to be the main substitute for the car when this is not available, not public transport as would be expected given that access by car is associated with larger distances from the station. The low share of passengers who did not have a car available for the journey but were driven to the station implies that when the car is not available it is probably not available also to access the station.

Table 4: Access mode to railway station on home base journeys for those with and without a car available (% of passengers)

Car available?	Yes (42.8%)	No (57.2%)
Bus/Tram/Metro	24.5	28.6
(Only) walking	17.8	21.7
Bicycle	31.5	43.3
Car (passenger)	9.2	4.5
Car (driver)	15.9	0.9*
Other	1.1	1.0
Total	100	100
Valid answers	511	683

* This is probably due to misunderstanding of the questionnaire. If a passenger could drive to the station and then park it there it should be assumed that a car was available for the journey.

Amongst the passengers who had a car available for the journey, but still opted to travel by rail, there are no discernable groups of passengers who preferred to use the car to access the station, considering the journey purpose and frequency and passengers' age. Business travelers tend to use the car more as an access mode and those who use the train frequently tend to use it less, these are probably the commuters and the passengers traveling to school/studies. Commuters who had a car available for the journey seem to prefer to use the bicycle while those traveling to school/studies prefer to use public transport. The findings underline that car ownership (i.e. availability) does not necessarily mean the railway is not considered as an option. In addition, when a car is available for the journey but the railway is chosen, the car is not the first choice of mode to get to the station.

5. The importance of the access and egress journey in passengers' overall satisfaction with the railway journey

NS's questionnaire asked passengers for their opinion on the quality of "connections between the railway and public transport", "the capacity of car parks" and the "quality of guarded bicycle parking" and "unguarded bicycle parking". The quality scale used was from 1 – "cannot be worse" to 10 – "excellent", 5 stood for "insufficient" and a score of 6 for "sufficient". Table 5 shows that most passengers view the quality of the access infrastructure somewhere in between insufficient and sufficient (the means are

statistically different at the 99% level). Examining the quality of the access infrastructure depending on the actual access mode used (grey cells in Table 5) does not reveal any pattern, such that the relevant infrastructure (e.g. car parks capacity) is viewed better or worse by those using it (those rail passengers driving to the station). This might indicate that most passengers used more than one mode to access or egress the station and are therefore familiar with the different facilities. The unguarded bicycle parking facilities are valued the least but the differences with respect to the perception of other facilities are relatively small. There are no substantial differences in the perception of the access facility between those who could have used a car and those who could not, it was expected that those who could have used a car for the journey, having an alternative, will view the quality of the access differently.

Table 5: Mean perception of access mode facility for each access mode used

Access mode used	Average perception of access journey facilities				N=
	Connections with public transport	Car parking capacity	Guarded bicycle parking	Unguarded bicycle parking	
Bus/Tram/Metro	6.47	5.28	6.45	5.05	815
Car driver	5.41	5.97	6.17	5.42	141
Bicycle	6.32	5.54	6.33	5.19	638
Walking	6.38	5.72	6.49	5.23	683
Mean	*6.34*	*5.53*	*6.41*	*5.17*	2277

Using NS's customer satisfaction questionnaire the effect of the access/egress journey quality on the overall satisfaction from traveling by rail was estimated. The "general opinion of traveling by train" was assumed to be a linear function of the general cost of traveling, measured as passengers' satisfaction with the price/quality ratio, the perception of the railway station and the perception of the access mode facilities. The variables used are summarized in Table 6 with their appropriate codes.

Table 6: Linear regression analysis of passengers' journey perception

Independent variable	Dependent variables		
Journey Perception	General cost	Station perception	Access perception
"General opinion of traveling by train" (t0)	• Price/Quality proportion of train traveling (t12)	• The station in general (S0)	• Connections with public transport (S1) • Capacity of parking space (S23) • Quality of guarded bicycle parking (S54) • Quality of unguarded bicycle parking (S55)

Except for the unguarded bicycle parking (which also has the wrong sign) all the estimated variables are significant and positive (Table 7). Passengers' satisfaction with the value for money of traveling by rail has the most influence on the overall satisfaction from traveling by train. The quality of the railway station also appears to have an

important influence on the railway journey perception. The access mode facilities, on the other hand, appear to have a more modest effect when considered separately. As a group, the overall effect of the access variables on the journey perception is similar to that of the station variable. Connections with public transport appear to be the most important access facility, this is expected considering the infrastructure required to provide good integration between public transport and the railway compared with the infrastructure required, for example, to provide integration with the bicycle.

Table 7: Regression results for Model 1 (t0 = t12 + S0 + S1 + S23 + S54 + S55, all respondents)

R square	**0.312**	N = **462**	
	Coefficient	t	Sig.
Intercept	3.504	12.697	.000
Price/Quality	0.246	9.321	.000
Station in general	0.144	3.942	.000
Connections with public transport	0.082	3.362	.001
Car parking capacity	0.044	1.995	.047
Bicycle parking (guarded)	0.064	2.568	.011
Bicycle parking (unguarded)	-0.051	-1.896	.059

Table 8: Regression model results for a specific access mode and access facility (t0 = t12 + S0 + S1 **or** S23 **or** S54 + S55)

Model 2: Access mode: public transport; facility: connections with public transport			
R square	**0.358**	N = **581**	
	Coefficient	t	Sig.
Intercept	3.398	14.107	.000
Price/Quality	0.297	13.000	.000
Station in general	0.165	4.928	.000
Connections with public transport	0.098	4.267	.000
Model 3: Access mode: car driver; facility: car parking capacity			
R square	**0.351**	N = **101**	
	Coefficient	t	Sig.
Intercept	2.895	5.017	.000
Price/Quality	0.200	3.352	.001
Station in general	0.301	3.381	.001
Car parking capacity	0.113	2.318	.023

Table 8: Regression model results for a specific access mode and access facility (cont.)

Model 4: Access mode: bicycle; facility: guarded/unguarded bicycle parking			
R square	**0.240**	N =	**226**
	Coefficient	t	Sig.
Intercept	4.042	11.311	.000
Price/Quality	0.248	6.738	.000
Station in general	0.188	3.660	.000
Bicycle parking (guarded)	0.011	0.315	.753
Bicycle parking (unguarded)	0.007	0.213	.831

The same regression model was estimated for passengers using a specific access mode (e.g. passengers using public transport) and the respective access mode facilities (e.g. connections with public transport). This did not yield considerably different results or a much better fit (Table 8). Surprisingly, the estimation for passengers using bicycle to access the station did not yield significant results for the bicycle parking and the effect of these variables was also small. This can suggests that cyclists do not care much about parking facilities. An F test for the access mode facility variables shows that as a group these variables are significant at the 1% level and also that the bicycle parking variables are significant (but at the 5% level). For passengers using public transport or bicycle to access the station the general perception of the railway journey is influenced more by the price element of the journey than by the station element, the reverse holds for passengers driving to the station.

Estimating a logarithmic form of the model and treating missing values in different ways did not lead to any better results. The variable “was a car available for the journey?” was found to be insignificant and to have no effect. A “general travel time” variable (accounting for waiting time and number of transfers) also found to be not significant. The findings show that the access/egress journeys, or more the connection between them and the train, have an influence on the overall satisfaction from using the railway.

6. Conclusions

The Netherlands is known as a country where the use of bicycle is common and amongst the highest in the world and it is also known for its good urban public transport systems. In addition, the Netherlands has a dense railway network. The mean distance of residents to the nearest railway station is about 4.5km and the mode of the distribution is about 1.3km only. Just 8.4% of the population lives further away from the nearest railway station than 10.0 km (Keijer and Rietveld, 2000). All these qualities provide for a relatively easy access to the station which does not have to depend on the car. The results presented above show that this access-environment is materializing into an access to station profile that is dominated by green modes – walking, bicycle and public transport. Furthermore, these qualities of transport networks are probably the main reason that car availability (or lack of it) is not a determining factor in the choice of mode to access the station.

Research has been carried out on the characteristics of the access and egress journeys to and from railway stations mainly with respect to distance and time (e.g. Keijer and Rietveld, 2000) and other supply oriented variables, such as Park&Ride spaces, number of bus connections, etc. (e.g. Kuby et al, 2004). The analysis here supplements previous research by including quality variables, and showing that these influence the general opinion of traveling by rail. This reinforces the conclusion that "the market potential of railway services depends to a considerable extent on the quality of the total chain from residence to place of activity and vice versa" (Rietveld, 2000: 74). The findings also emphasize the importance of making integration between the modes seamless and it confirms the findings that public transport passengers view the interchange negatively (e.g. Hine and Scott, 2000).

From a policy perspective, the current situation as emerged from the questionnaire requires no special actions, since there is no scope for improvements in the access to (egress from) station profile. As noted, changes in the quality of the station access/egress journeys might lead to undesirable results such that more passengers will shift to public transport from walking than from the car. However, two qualifications can be made. First, the results apply only when considering the people that choose to travel by train. Yet, passengers choosing to travel by train represent only about 8% of the total passenger-km of land transport in the Netherlands (EC, 2005). Although in some corridors rail achieves a much higher share of the market (mainly between the main cities in the Netherlands) on many routes its share is low. Second, many of the railway passengers use it infrequently and irregularly implying that they probably use the car more often. For these two groups, those who do not use the railway or seldom use it, there might be scope for increasing rail use through improvements to the accessibility of stations.

The main challenge in improving the access to railway stations and the transfer at the station between the access mode and the train therefore is in attracting more passengers to use the train (or use it more often). In other words, the challenge lies not in changing the way passengers get to or from the railway station but in attracting new passengers to use the railway by making it more accessible. A change of the travel mode and not the access mode is the real target, at least in the Netherlands. The fact that passengers place importance on the quality of the station and the access/egress journey indicates that some travelers avoid using the railway due to the relatively low quality (in their view) of the station and its level of accessibility.

In conclusion, it is important to note Goodwin's (2003) observation that the large share of the car in a country's modal share and the small share of the railways means that for the railway even a small change in the modal share can be very significant. In the Netherlands, 2% increase in rail modal share will mean a 25% increase in the demand for rail travel. Planned further research will focus on the general population in the Netherlands analysing the propensity to travel by train given different features of the population.

Acknowledgment
The IBRAM research is carried out as part of a Marie Curie Intra-European Fellowship and is funded by the EU. The project is affiliated with the Habiforum research program. The authors wish to thank NS for providing the data.

Bibliography:

CEC, Commission of the European Communities (1996), "White Paper – a strategy to revitalise the community's railways", Commission of the European Communities, COM(96)421final, July.

CEC, Commission of the European Communities (2001), "White Paper - European transport policy for 2010: time to decide", Commission of the European Communities, COM(2001)370, Brussels, September, [http://europa.eu.int/comm/off/white/index_en.htm (15/2/2002)].

EC, European Commission (1995), "The Citizen's Network – Fulfilling the potential of public passenger transport in Europe", European Commission Green Paper, COM(95)601, November.

EC, European Commission (2005), "European Union energy and transport in figures 2005", European Commission, Directorate-General for Energy and Transport.

Hine J., Scott J. (2000), "Seamless, accessible travel: users' views of the public transport journey and interchange", Transport Policy, **7**, 217-226.

Goodwin, P. (2003), "What future for the rail in the ten year plan for transport?", University College London, Report to the All Party Parliamentary Rail Group, November.

Keijer M. J. N., Rietveld P. (2000), "How do people get to the railway station? The Dutch experience", Transportation Planning and Technology, **23**, 215-235.

Krygsman S., Dijst M., Arentze T. (2004), "Multimodal public transport: an analysis of travel time elements and the interconnectivity ratio", Transport Policy, **11**, 265-275.

Kuby M., Barranda A., Upchurch C. (2004), "Factors influencing light-rail station boardings in the United States", Transportation Research Part A, **38**, 223-247.

Rietveld P. (2000), "The accessibility of railway stations: the role of the bicycle in The Netherlands", Transportation Research Part D, **5**, 71-75.

Thompson L. S. (2003), "Changing railway structure and ownership: is anything working?", Transport Reviews, **23**, **3**, 311-355.