HIGH-SPEED RAILWAY DEVELOPMENTS AND CORPORATE LOCATION DECISIONS

THE ROLE OF ACCESSIBILITY

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Abstract:

Accessibility is a major factor that determines the effects of transport infrastructure developments on corporate location decisions. High-speed railways have an impact on accessibility by reducing travel times and increasing comfort. However, little research on its effects on location choices has been carried out so far. Still, high-speed railway infrastructure development is advocated for these effects on regional economy. This research uses interviews among corporate decision makers to determine how a change in accessibility due to new high-speed rail infrastructure is perceived by these corporate decision makers and what impact high-speed train connections have on the location choices of firms. It differs from most previous research because it links the empirical results of a qualitative research to theoretical concepts about accessibility, thereby primarily focussing on the areas around large railway stations with a high-speed train connection. In-dept interviews are held among recently (re)located firm branches to

identify accessibility related factors that play a role in the location decision process. For these interviews we start from the assumption that for firms three aspects of accessibility by passenger transport systems are of importance: access and accessibility for (1) current and potential employees, (2) current and potential business partners, and (3) current and potential customers. Furthermore, corporate decision makers perceive different transport modes in a distinct way. Hereby for example, the level of comfort of the transport mode can be of importance – it might be of more importance for business trips than for commuting. In this paper special attention is given to how the accessibility by high-speed trains is perceived. The interviews shed light on how new high-speed rail infrastructure affects the perception of accessibility by corporate decision makers. By questioning different firm types and sizes it is made clear what types of firms are mostly influenced by this change in accessibility. From the interview it appears that the perception of the accessibility of a certain place differs strongly among firm establishment, because the policy makers of distinct firms appreciate the several facets of accessibility differently. This depends on the activities that take place in the firm branch, for example how often face-to-face contact with (international) business partners occurs. Presumably for firms a trade off exists, based on their characteristics, between the accessibility of a location and the higher prices of real estate that are usually associated with a good accessibility. Besides the 'objective' factors of reduced travel times and/or costs, subjective properties of accessibility might also be of importance to corporate decision makers. Being settled on good accessible transport hubs can contribute to the firm's image.

Introduction

The realisation of new transport infrastructure is frequently seen by policy makers as a means to stimulate the regional economic development. This is particular the case for high-speed railway infrastructure, which reduce travel times between the main metropolitan areas in Western Europe. An important issue for the regional development is the extent to which high-speed railway developments influence the location decisions of firms.

The effect of transport infrastructure on the location choices of firms (and households) is explained by the land-use/transport interaction theory (Webster *et al.*, 1988; Wegener and Fürst, 1999). This theory states that the transport system influences the accessibility of locations by shortening travel times, lowering transport costs and/or increasing travelling comfort. Accessibility is one of the factors on which the location choices are based. The locations of activities, in turn, affect the transport system, thereby completing a feedback loop. Accessibility is a central factor in the effect of transport infrastructure on the location of firms. However, not much is known about how corporate decision makers perceive accessibility in general and accessibility by high-speed train in particular. Nor is it completely understood how accessibility influences the location decisions. As a result, the indicators that are used to calculate accessibility may very likely be susceptible for improvement.

This paper focuses on the role of accessibility in corporate location decisions by describing the results of an empirical survey. The objective of this research is to gain insight into what accessibility factors influence location decisions and how these accessibility factors are taken into account. With 'accessibility factors' we thereby refer to subdivisions of the more abstract concept of 'accessibility': firstly, with respect to transport modes (*e.g.* accessibility by road, accessibility by rail); secondly, with respect to trip purposes (*e.g.* accessibility for employees, accessibility for clients or customers). Furthermore, the interviews are aimed to reveal the differences among firms in the perception of accessibility. Special attention will be given to the accessibility by conventional and high-speed trains. By focussing on a small number of firms, the purpose of this research is to gain qualitative information of different approaches among firms rather than to gain a representative image. A more quantitative approach will be carried out in a follow-up study.

The first section of this paper shortly presents a literature survey among different types of researches that are related to the current topic. The second section then describes the methodology of the current research. Subsequently, the third section gives the results of the survey. In section four follows a discussion on the research and its implications. Finally, in section five some conclusions are drawn.

Literature survey

Several authors (*e.g.* Van den Berg and Pol, 1997; Vickerman, 1997) have already pointed out that the primary effect of high-speed railway infrastructure is the increase in accessibility of the connected cities and regions. This increase in accessibility then makes these cities and regions more attractive as locations for firms, thereby boosting the regional-economic development. However, not all firms perceive the accessibility of a location in the same way. It should be recognised that a good accessibility is not a goal in itself, but rather a means to achieve other purposes. For example, accessibility can play a role in attracting customers and acquiring new employees. As different firms have distinct priorities in their location choice, this results in different perceptions of accessibility. The accessibility by different transport modes may also be perceived distinctively, corresponding to the transport modes that are most commonly used by the employees, customers and other visitors.

A first point to consider is that location decisions are not based on accessibility alone. Therefore, the importance of accessibility relative to other determining factors for the location choices of firms should be known. The relative importance of accessibility appears from the economic-geographic surveys that determine the importance in location decisions of a full range of factors. Surveys of this type are regularly performed on different spatial scales and clusters of firms. The quantitative results of four of these studies are shown in an appendix to this paper. It is not the purpose of this paper to give a full overview of this type of research. The four studies were selected because they include the study area of the current paper and because they give a good representation of the researches in this field. From the four examples it appears that there are considerable differences between these surveys on the overall approach, the factors that are taken into account, as well as the results. Especially the different formulations of the factors that are included in the surveys make comparison between the studies difficult.

Among the surveys, the study by Healey & Baker (1996) distinguishes itself by focusing on a special category of firms: large firms with an international orientation. The three other studies (Pellenbarg, 1985; Jansen and Hanemaayer, 1991; Sloterdijk and Van Steen, 1994) deal with all firm categories, which has the advantage that comparisons can be made between branches of industry, but also the disadvantage that the factors cannot be easily adapted to separate categories of firms.

All four studies have included several accessibility factors in their survey. Accessibility is thereby subdivided with respect to transport mode or trip purpose. Furthermore, accessibility factors are sometimes embedded in more broader factors; for example, the factor 'availability of personnel' in Pellenbarg (1985) depends on the accessibility for (potential) personnel. In most cases, the quantitative results from these surveys give only information about the relative importance of different factors for the location decisions and not about the way in which these accessibility factors are taken into account. However, some factors are more specific defined by the authors; this is for example the case for the factor 'Presence of an international airport within 1 hour' in the study by Sloterdijk and Van Steen (1994). These are exceptions, nevertheless.

The results of the different surveys show that in general accessibility plays an important role in the location decision. In both Healey & Baker (1996) and Jansen and Hanemaayer (1991) an accessibility factor ('Easy access to markets' and 'Accessibility by road' respectively) is the most important factor for the location choice. Moreover, from Jansen and Hanemaayer (1991) it appears that in all 7 branches of industry the accessibility by road is for most firms more important than the accessibility by public transport. Both Pellenbarg (1985) and Healey & Baker (1996) found that the accessibility to the market is often more important than the availability of (and thus accessibility for) personnel. Finally, the proximity of airports is of minor importance for many corporate location choices.

The general economic-geographic surveys, however, do not give information about how firms take account of the various accessibility factors. Information on this topic can be found in empirical studies that focus more specifically on the role of accessibility factors in corporate location choices. An example of such a study is the research by Rietveld and Bruinsma (1998), who performed a stated preference analysis on the basis of binary choice scenarios. In this way, a relative judgement was achieved of four accessibility factors, investment subsidies and the price of land. The price of land

appeared to be the most important factor; the factors 'investment subsidies', 'distance to a highway access', 'distance to suppliers/consumers' and 'distance to a large city' were also significantly different from zero. Only the distance to a railway station did not significantly differ from zero.

Another source of information on how the location choices of firms may be influenced by accessibility, are concepts from theoretical studies on accessibility. There exist different types of accessibility indicators that can be used to represent different accessibility factors (for an overview of accessibility indicators see Bruinsma and Rietveld, 1998; Geurs and Ritsema van Eck, 2001). Accessibility indicators typically calculate the sum of the product of an attraction factor (for example the number of firms in a zone) with an impedance function; this impedance function can for example incorporate distance, travel times and/or travel costs. Rietveld and Bruinsma (1998) argue that it is important to take account of the level of service by the transport network when dealing with accessibility and its impact on the valuations of cities.

The accessibility indicators differ from each other in a couple of aspects that should be given attention in the current study. At first, this is the shape of the impedance function that is used in the indicator. The impedance function can be the inverse of for example distance or travel time; but another possibility is to keep the weighting factor constant until a certain time limit, after which the weighting factor equals zero (*cf.* Gutiérrez, 2001). Different impedance functions are used to represent distinct types of trips.

The second issue is whether or not a possible competition between actors is taken into account. Not taking account of competition effects is an important shortcoming of most accessibility indicators (Van Wee *et al.*, 2001). With 'possible competition between actors' we mean that, for example, the ease with which a firm is able to recruit new employees depends not only on the absolute number of potential employees in the surroundings of the firm's location, but also on the number of other firms that is trying to employ the same persons.

The last aspect we discuss, is whether or not the properties of supply and demand are taken into account. This addresses for example to the question what part of the working population does have the right skills for a certain vacancy. As the composition of the labour market differs per region, an accessibility measure based on the whole population may not be a good approximation of the ease with which a firm is able to find appropriate new employees.

Finally, more information on the effects of high-speed railway on the location of firms can be found in several studies on the regional development effects of high-speed railways on a macro level. In France, Bonnafous (1987) studied the impact of the TGV sud-est high-speed railway line on the location of industries. A survey was held among entrepreneurs in the southeastern Rhone-Alps region. The results pointed out that other factors than the transport system in general and the TGV in particular play a much larger role in the location decisions. The availability of the TGV is often seen as a "bonus" factor. However, the TGV can be an important factor when the firm does not have other spatial constraints, for example in case a new firm establishment is set up.
In Japan, both Hirota (1984; according to Brotchie, 1991) and Nakamura and Ueda (1989; according to Sands, 1993) found positive correlations between the proximity of a Shinkansen station and several regional indices, such as income per capita, employment and land prices. These researches do, however, not give information about the causality of the relationships.

Methodology

As has been mentioned in the introduction, the purpose of this paper is to identify what accessibility factors are important for the location choice of firms and how these accessibility factors are taken into account. Because of the orientating nature of the current study, a series of in-dept, largely qualitative interviews among firms is seen as the most appropriate research method. A database of the Chambers of Commerce was used to select a set of firms and firm establishments (henceforth: firms). The firms were thereby tested to satisfy the following criteria:

1. The firms had moved or were newly established in the last five years,
2. The firms were situated near the central station of Utrecht, the central station of Rotterdam or in a business park elsewhere in the city of Utrecht,
3. The firms had at least ten employees and were not active in the retail, hotel or catering industries.

Ad 1: In firms that had made a location decision in the last five years the staff and people involved in the location decision process, were supposed to have this process still clear in mind. The interviews were held with the actual decision makers or with employees that had been involved to a great extent in the location decision process. With recently relocated or established firms there also was a higher chance that these people were still working within the firm.

Ad 2: To evaluate how firms take account of railway stations in the location choice, the interviews were held among corporate decision makers whose firms are situated in the within walking distance of a railway station. We are aware that 'walking distance' is a rather subjective measure that varies among individuals, but this does not seem to be an important issue for this particular research. We have therefore adopted the value of 500 metres for walking distance, in accordance with Blom (1982). To determine the role that high-speed trains can play in the location choice, two station areas were selected that both have regular high-speed railway connections: the central stations of Utrecht and Rotterdam. To determine the effect of the distance to the station, also some firms in business parks elsewhere in Utrecht were selected. These business parks are provided with frequent direct bus connections to the central station.

Ad 3: Firms with ten or more employees are more likely to have thoroughly studied all the different aspects of accessibility, such as finding employees and hosting visitors. It should be noted that the purpose of these interviews was not to achieve a representative image, but rather to identify the main different approaches among firms. Firms from the retail, hotel and catering industries were seen as special types of firms that would require a whole separate research.

Utrecht is a city in the centre of the Netherlands and the eastern part the Randstad area. Because of its centrality, the city is a major node in both the Dutch national railway and motorway networks. With an average of 130.000 travellers a day, Utrecht central station is the busiest public transport terminal in the Netherlands (Gemeente Utrecht, 2002). Utrecht is connected to the European high-speed railway network by the ICE line Amsterdam – Frankfurt (see Figure 1), which has six trains running a day in each direction. Within the Netherlands and a part of Germany, this train service uses conventional railway

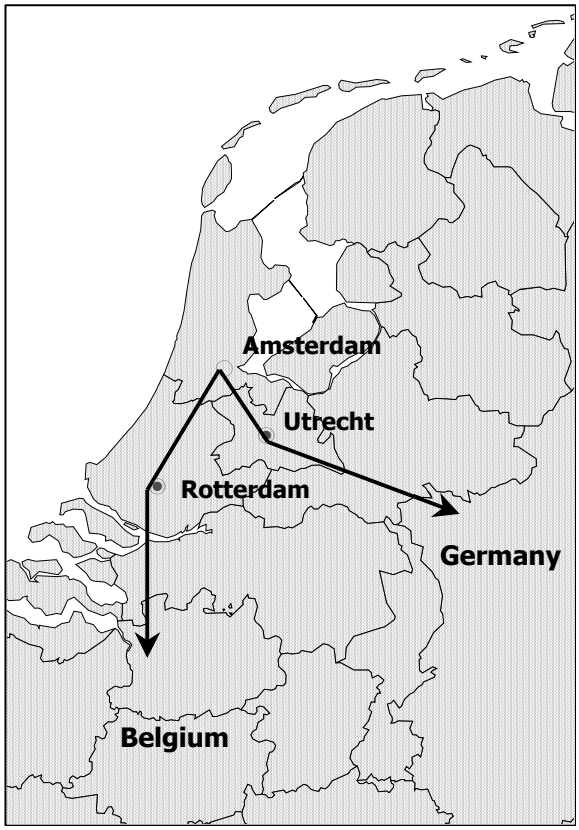


Figure 1: The study area.

track. Utrecht has a ring road and motorway connections to seven directions, but the central station area is connected poorly to these motorways (UN, 2002). The main business locations are the surroundings of Utrecht central station and alongside the city's ring road.

Rotterdam is situated in the western part of the Netherlands and the southwestern part of the Randstad area. Rotterdam central station is connected by the Thalys service Amsterdam – Paris, which runs six times a day in both directions. Nowadays the high-speed trains use conventional track, but starting from 2007 a new high-speed line can be used from Amsterdam to Antwerp that allows for a maximum speed of 300 km/h (Projectorganisatie Hogesnelheidslijn-Zuid, 2003). Then also the frequency of services will be increased. The city centre of Rotterdam has good connections to the surrounding motorways compared to other large cities in the Netherlands. As Rotterdam does not have an old inner city with restrictions for building, the city is well known in the Netherlands for its modern architecture.

The first selection procedure resulted in a set of 39 firms. These firms were contacted by telephone to verify the data. Three firms could not be contacted at all; they probably had moved again or do not exist anymore. Four other firms were found out to have moved again. Out of the other firms, 10 firms appeared not to have moved or be newly established; they were present in the initial selection because of a changed company name or a change in organisational or legal structure. Five firms could not cooperate because the responsible decision makers did not work for the firm anymore or because the location decision had been taken in the company's head office, which was located elsewhere. Finally, five firms refused to take part in the research, either because they did not have time or they principally did not want to reveal their decision motives.

An interview questionnaire was designed, based on theoretical concepts from literature. The questionnaire consisted largely of open questions to find out whether and (if positive) how the firms have taken account of different accessibility factors in their recent location choice. A distinction was made between different trip purposes:

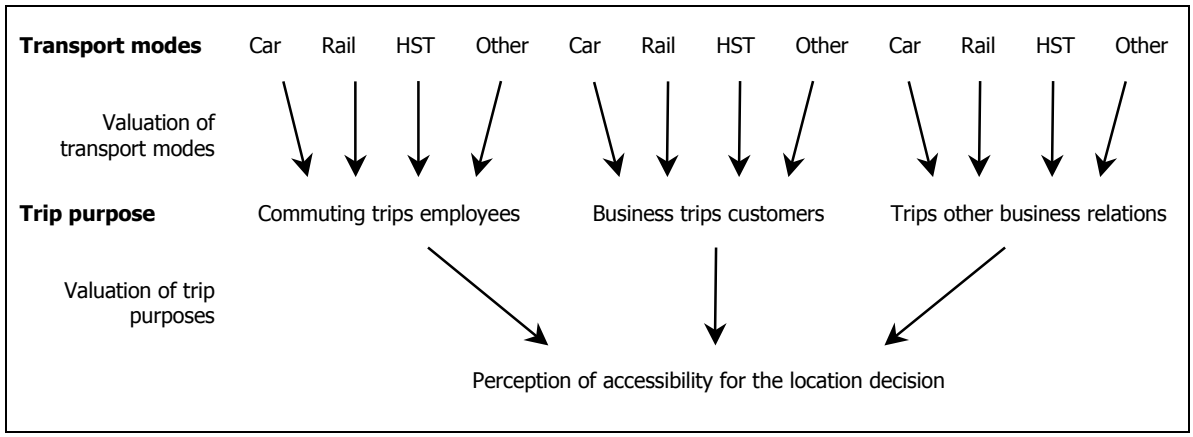
1. the accessibility for current and potential employees,
2. the accessibility for/towards current and potential customers,
3. the accessibility towards other establishments of the firm, and
4. the accessibility for/towards other current and potential business partners.

Questions were asked that are related to theoretical issues, such as whether or not the firms have taken account of competition. Furthermore, questions were asked about the actual travelling patterns of employees and visitors.

For each of the trip purposes attention was given to the perception of accessibility by different transport modes. The research thereby especially concentrated on the accessibility by rail in general and by high-speed rail in particular. Moreover, questions were asked about related issues, such as the role of image in the location choice and the importance of comfort for travelling. The conceptual outline of the interviews is summarized in Figure 2 below.

At the end of the interview, quantitative scores on a scale of 0 (= unimportant) to 4 (= very important) were asked about the importance for the location choice of several accessibility factors and some other factors that can be relevant for the location choice, such as the price of real estate. This scale was chosen, because the answers can have an absolute zero, there is a clear middle value (2) and the scale does not have too many values to be uneasily comprehensible.

Figure 2: Conceptual outline of the perception of accessibility in location decisions.



Results

From the database of the Chamber of Commerce the branch of industry of the participating firms were acquired; the results of this are shown in Table 1. The table shows that the firms are predominantly active in the business services industry. It should be noted that the classification of the firms does not always seem to reflect fully the activities of the firms. This is most evidently the case for the firm classified in the 'Culture, sports and recreational activities' sector, which is in fact a service and research agency for the health sector. Among the firm establishments four are the only

establishment of the firm, three are the firm's (national) head office and two establishments are lower in the corporate hierarchy. Three firm establishments are part of an international organisation. Furthermore, five of the firms were newly established, one was relocated and three were the result of a merger between two firm establishments.

Table 1: Selection of firms subdivided on the basis of economic sectors according to the Chamber of Commerce

Branche of industry		Number of firms
Code	Description	
22	Publishing, printing and reproduction of recorded media	1
72	Computer service and related activities etc.	3
74	Other business activities	4
92	Culture, sports and recreational activities	1

Table 2 shows the number of employees of the participating firms. These numbers were acquired during the interviews and do not always correspond to the numbers from the database of the Chamber of Commerce.

Table 2: Number of employees of participating firms

Total number of employees	Number of firms
Less than 20	2
20 up to 40	2
40 up to 60	0
60 up to 80	1
80 up to 100	2
100 and more	2

Accessibility in general

For most firms the accessibility for employees is an important factor for the location decision. Firstly, account is taken with the employees that were already working for the firm before the relocation, by choosing a location that is not far from the former location. For example, one firm establishment that had resulted from a merger between two establishments from different cities, chose a location that is good accessible from both of these cities.

Secondly, some of the firms have taken account of the possibility to attract new employees. This is particularly the case for the firms with many employees: three out of the four largest firms were among the four firms that confirmed they had taken account of attracting new employees. Only among the larger firms there seemed to be difficulties with filling in vacancies. Firms with a separate Personnel & Organisation department involved this department in the location choice. Two firms contacted employment agencies for information. One of these firms had an external consultant

make a prognosis of the employment market; account was taken of the age and level of education of potential employees, but no account was taken of competition on the employment market. However, the firm had based the choice for the Netherlands as a suitable region on the relative scarcity of similar labour-intensive firms. Another firm based the location decision on the experiences of the personnel & organisation departments of different firm establishments; hereby it is more likely that account is taken of competition.

For most of the firms the accessibility for the employees in general has played a role; in most cases this is expressed in the choice for a location in the neighbourhood of a large station and with sufficient parking facilities. The importance of the proximity to a station is strongly related to the activities in the firm establishment. Employees who regularly visit customers or other business partners are usually provided with a lease car by their employer. These employees will use this car for commuting and thus have no need for public transport. In one firm the lower personnel who regularly visited business relations were provided with a public transport subscription, whereas the staff personnel were given a lease car. The proximity of a station becomes less important if a car is available for an extensive part of the personnel. In five out of six of the firms in the station areas the number of employees travelling by public transport was approximately equal or higher than the number of employees travelling by car. The employees of the firms further away from the station use the car for transport in most of the cases, despite that these locations all have frequent direct bus connections to the central station. For two of these the share of public transport was only marginal. It must be noted that the interviews do not give information about the causality of this relationship. However, theory and empiry support the reduced share of public transport and the increased share of the car in case of increasing distances to the railway station (Van Wee and Van der Hoorn, 1996).

The accessibility of/for customers or clients (henceforth customers) is often an reasonably important factor for the location decision. Some of the relocated firms have consciously chosen a location in the vicinity of their customers. Firm establishments that are part of a larger firm usually have a certain geographical market territory, in which they are also located. For certain types of firms the territory boundaries are determined by external factors; this is for example the case for firms in the legal sector who are bounded to national legislation.

However, as there is a large variety among the firms in the extent to which they have face-to-face contact with customers, the importance of this accessibility factor differs enormously. Obviously, for firms that frequently have face-to-face contacts with customers this is a very important accessibility factor, while for firms that do not or only occasionally have face-to-face contacts it might not play a role at all. In general a distinction can be made between firms that have most meetings at their own location and firms that have most contacts at the location of the customer. For the latter category accessibility is usually less important than for the former, because employees that regularly visit customers are often provided with a lease car by their employer.

For the accessibility of the location for visiting customers, the connectivity to the transport networks seems an important factor. Aspects such as having a (large) station within walking distance and having enough parking facilities are important. The relative importance of the different transport modes depends on the profile of the visitors. Customers form the public and non-profit sectors predominantly make use of public transport, while customers from other sectors usually come by car. However, not all firms take fully account of the transport mode that is used by the visitors. One of the firms that has a large majority of the visitors (including employees) come by car, had chosen a location with a good accessibility by rail but a poor accessibility by road. This choice was largely driven by idealistic motives; the firm also encouraged visitors to come by train.

The possibilities to attract new customers, in other words the size of the market that can be served from a location, has not been of importance for any of the firms. First contacts are often initiated by telephone or via other business partners; accessibility does not play a role in this process.

The location of competitors has played a role for the location choice of only two of the firms. One of the firms had chosen for a location in the vicinity of the three market leaders, because this was ‘the place to be’ for that type of firms (apart from the fact that the firm had split off from one of the larger firms). The other firm had chosen for a location in the city centre of Rotterdam, amongst others with the purpose to attain the image of a modern company from a large city; the firm’s two main competitors were located in smaller cities in more peripheral areas.

The accessibility of/for other establishments of the firm does hardly play a role in the location decision. Only one of the four firms with more than one establishment had

taken this into account. This firm had strong interactions between the two establishments; a merger had been considered but not implemented because of organisational reasons. The other firms had not taken account of journeys between establishments, because the number of these journeys was low compared to other journeys.

The accessibility of other business partners than customers or other business establishments has not or hardly been of importance for the firms' location choices. None of the firms did consider to minimize the travel times or travel costs to these business partners. Instead, account is taken of visitors in general by ensuring good connections to the transport networks (road and rail). However, the general impression is that accessibility is taken into account intuitively.

Accessibility by conventional rail and high-speed rail

Out of the six firms that were located within walking distance of a large station, five firms regarded the proximity of the station as the most important accessibility factor. Among these firms, the accessibility by rail seems more important than might be expected from the actual use of the train as a transport mode. Respondents pointed out that having to transfer to a local train or other form of local public transport takes much more effort than making a detour by car. Furthermore, the accessibility by train is valued relatively high in the location choice because employees and visitors without a car often have no alternative. Moreover, ideological reasons might play a role: one firm located near a large station to encourage employees and visitors to make use of public transport instead of the car.

All of the respondents to whom the station was of importance, indicated that the number of connections and the frequency of the connections were important. However, most firms assumed these factors to be optimal for the central station in a large city and did not study this aspect any further. On the other hand, one firm did check whether the station had direct connections with a sufficiently high frequency to all geographical parts of his labour market. A firm that relocated noticed that the connection to the city of his former location, where many employees were still living, was not as good as believed on forehand.

High-speed trains did not have a significant impact on the location choice of any of the firms. Several possible explanations for this finding emerged from the interviews:

1. The current high-speed train connections do hardly offer advantages over the conventional trains that operate on the same connections. Most of the firms have a national orientation; from both Rotterdam and Utrecht the intranational parts of the connections are too short for considerable time savings. Some respondents mentioned that the high-speed train would be a good alternative for trips to more peripheral cities in the Netherlands, such as Groningen or Maastricht. The employees of the firms that do have international connections do only ocasionaly travel abroad.
2. The number of connections is very small. For only a small part of the trips, the high-speed train could be used. This is the case for both the international as the intranational trips.
3. High-speed train was relatively unknown to the respondents. This is especially the case for the Amsterdam – Frankfurt connection. Only two of the respondents indicated that they had used the high-speed train before, both for international business trips.

An indication for the potential of high-speed trains for commuting and business travel can be derived from the current preferences for mode and route choice. For the longer trips high-speed trains might have a good potential, since most respondents indicated that for their mode and route choice travel times are more important than travel cost. Hereby, no large differences were found among trip purposes. Furthermore, most respondents also find travel comfort of reasonable importance.
An indirect effect of high-speed trains on the location choices of firms is through the image of station locations. For the majority of the respondents, the image of a location is reasonable to very important. Furthermore, most respondents are of the opinion that the image of a business location can be improved by the presence of a station with high-speed trains. This indicates that the accessibility effect alone is not enough to account for the possible changes in location choice when a new high-speed railway connection is accomplished.

Results of the scores

The Figures 3 to 5 below present the results of the scores that have been given by the respondents to the importance of several accessibility and non-accessibility factors in the location choice. These results correspond to the qualitative results that are described

above. However, we noted that the quantitative scores given by the respondents were less differentiated than the qualitative replies. Many of the scores seemed to be higher than might be expected from the qualitative information given in this section.

Figure 3 shows the importance of the different transport modes for the recent location choice. As expected, the car is moderately to very important to all firms. More variation exists in the importance of conventional trains and other local and regional forms of public transport. For the conventional trains this variation is consistent to a great extent with the distance to the central station. High-speed trains and air transport are not very important for the location choice of any of the firms; this is consistent with the fact that for none of the firms the number of international trips is substantially large.

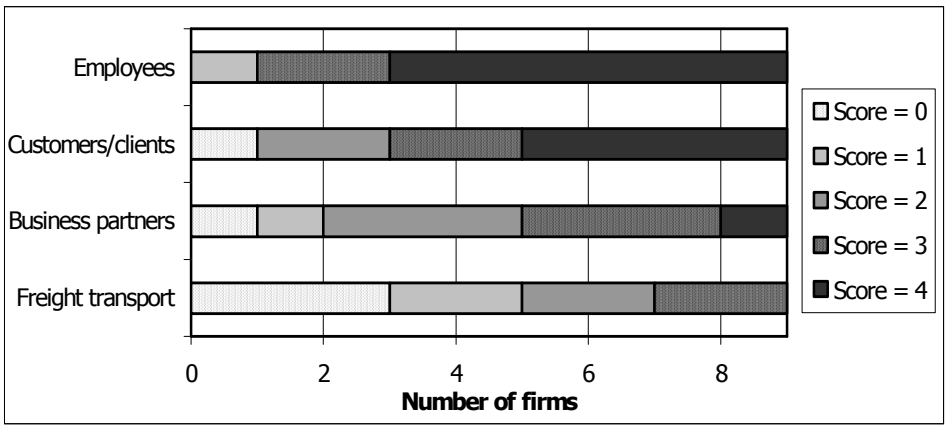


Figure 3: Scores on the importance of transport modes for the location decision of the participating firms.

Figure 4 shows the importance of the different travel motives for the location choice. The figure indicates that the accessibility for employees is very important for the majority of the respondents. The accessibility of/for customers seems a little less important on average; but we should remark that for just three of the firms the accessibility of/for customers is less important than the accessibility for employees, whereas the accessibility of/for customers is more important than the accessibility for employees for two other firms. The importance of the accessibility of/for other business partners varies among the firms; this can be explained by the heterogeneity of this group. The importance of freight transport facilities varies also, but is not very important to any of the respondents.

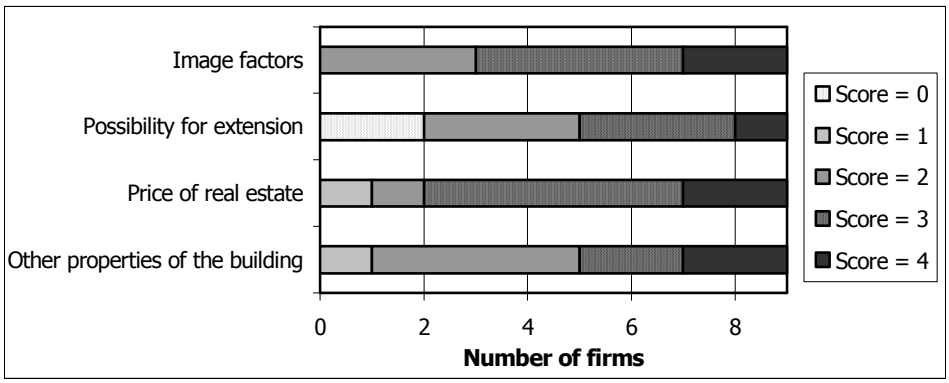


Figure 4: Scores on the importance of transport motives for the location decision of the participating firms.

Figure 5 shows the importance for the location choice of factors that are not directly related to accessibility (some could be indirectly related). These figures give an indication of the importance of the accessibility factors relative to other factors that play a role in the location decision. The image of a location and the price of real estate are factors that have a relationship with accessibility. Both factors are moderately to very important to the firms; this indicates that the factors should be considered in studies on the effects of accessibility on corporate location decisions.

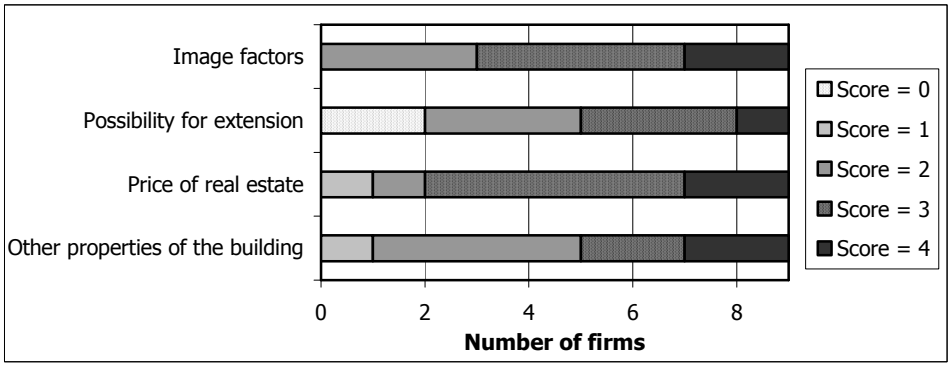


Figure 5: Scores on the importance of non-accessibility factors for the location decision of the participating firms.

Discussion

The methodology that is used in this research is based upon the assumption that the perception of high-speed railway accessibility is revealed most clearly in firms that are most sensitive to this aspect of accessibility. As these firms are most likely situated in the surroundings of a station that has high-speed railway connections, this type of location is taken as the study area. This demarcation of the study area has, however, the implication that the variety of firms is limited to the types of firms that is located in the

surroundings of large stations. As seen in Table 1, a small number of industries are overrepresented, while others are absent. However, the branch of industry and size of the responding firms were consistent with the total set of moved and newly established firms.

The interviews were carried out among nine firms; six of these firms are located within walking distance of a station, the other three are located further away from the station but have a frequent and direct bus connection to the station. The number of respondents seems large enough for the purpose of this research, because the results of the interviews showed a reasonable consistency among the firms and further interviews were not expected to reveal much additional information. After all, the purpose of this research is to gain insight into how firms perceive accessibility and how this perception differs among firms, rather than to gain a representative image.

Despite of this very focused study area, the sensitivity of the firms to the presence of high-speed rail connections seems to be low. However, the low sensitivity may be explained by the finding that a great deal of the respondents appeared to be unfamiliar with high-speed trains. The familiarity may very well be improved in the future when the current high-speed railway infrastructure developments will be finished. Furthermore, the low sensitivity can be explained by the scarcity of internationally oriented firms in the set of participating firms. Employees of the firms that do have an international orientation do not travel abroad enough to make international accessibility an important location factor. Firms with more international interactions may be more abundantly present in Amsterdam or the area around Schiphol airport.

The foregoing suggests that the characteristics of a firm are very important for how this firm perceives accessibility. On the basis of the interview results, several characteristics of firms can be distinguished that are determinative for the importance of the different accessibility factors to a firm:

1. Branch of industry,
2. Function of a firm establishment within a larger firm,
3. Number of employees,
4. Spatial orientation.

Ad 1: The branch of industry of a firm gives an indication of the importance of business trips by employees, customers as well as other business partners in the daily activities at a firm. Furthermore, the branch of industry can give an indication for the importance of

image in the location choice and for the profile of its business partners. The significance of the branch of industry is illustrated by the relatively high number of firms from the business service industry among the respondents. However, it seems that not for all firms the official registration is very well in line with the actual activities.

Ad 2: Although the branch of industry applies to the firm as a whole, within a large firm several establishments can have different functions, resulting in different activities and therefore also in a different perception of accessibility.

Ad 3: Firms with many employees seem to have more difficulties with finding new employees and therefore give more attention to the employment market at the intended location.

Ad 4: The spatial orientation of a firm refers to the size and shape of the area where the majority of its customers and other business partners is located. This is an important factor for the relative importance of the accessibility by different transport modes, first of all because of the accessibility itself, but also because the competitiveness of these transport modes differs among spatial scales. The accessibility by conventional rail is especially relevant for firms with a regional or national orientation, whereas the accessibility by high-speed rail plays (given the size of the Netherlands) only a role for international firms or, in the future, possibly for trips to/from peripheral areas of the Netherlands.

The interviews give some useful empirical information on what accessibility indicators are most suitable for describing corporate location choices. Firstly, the results of the interviews show that for the location choice all different transport modes and both commuting and business trips should be taken into account. However, in general there is a large variation among the perception of accessibility by firms. An explanation for this can be found in the different valuation of the trip purposes and transport modes among firms, in combination with a different representation of accessibility for these trip purposes and transport modes. This indicates that the perception of accessibility cannot be described by a single accessibility indicator. For example, the accessibility for employees might require a different distance decay function or a whole different type of indicator than the accessibility for customers. Instead, a set of distinct accessibility indicators should be used that are weighted differently for different types of firms.

Secondly, the locations of a firm's competitors are sometimes, but by far not always, taken into account for both the customers/clients market and the employment market.

This suggests that both accessibility indicators with and without competition should be regarded in the follow-up study. The same applies to taking account of the properties of demand and supply.

Thirdly, the relative importance of the different transport modes does not fully correspond to the actual use of these transport modes. The car is often less important for the location choice than it is for actually travelling, because of the high flexibility of the car Moreover, employees and visitors without a car often have no acceptable substitute for public transport, whereas car drivers could choose between coming by car or by public transport. Furthermore, local forms of public transport tend to be valued relatively low. These effects should be considered when comparing the accessibility of different transport modes.

Fourthly, the connectivity to the network seems to be very important to the firms. The presence of a station within walking distance was for most of the participating firms an important factor for the location decision. Thereby also the number of direct connections and the frequency of these connections were of importance. This should be expressed by the use of an accessibility indicator based on disclosure, or by applying penalty time/cost in accessibility indicators for having to change to local public transport.

Fifthly, regional and national boundaries play a role. Firm establishments often focus on predefined territories, while other firms may have other reasons (e.g. differences in the juridical system) to stick within certain boundaries. Therefore, accessibility indicators should be examined that take account of these boundaries.

Finally, accessibility appears to be dealt with in the location decision process in a largely intuitive way by many of the respondents. This has the consequence that a follow-up study should not exclude more complex accessibility indicators, such as indicators that incorporate transport networks.

Concluding remarks

The current paper focuses on the question how firms perceive the accessibility by rail in general and high-speed rail in particular when making location decisions. The results are described of an empirical survey among corporate decision makers and other employees involved in the relocation process.

The results of this largely qualitative empirical research point out that there is a large variation among firms in which accessibility factors are important for the location

decision. In general, the accessibility factors that are of importance follow logically from the activities that take place in the firm or firm establishment. For example, employees that travel much usually get a lease car; as a result, if a firm has many employees travelling the accessibility by public transport becomes less important. On the other hand public and non-profit institutions usually travel by public transport; for firms that have many business relations with these types of institutions the accessibility by train is more important. Furthermore, larger firms, give relatively much attention to the accessibility of employees.

The role of the accessibility by rail in the location choice tends to be larger than the role of the train in actual travel behaviour. One of the possible reasons for this is that some employees or visitors might not have an alternative for public transport. Another reason might be that having to use local public transport on the end of a journey is seen as a greater effort than making a detour by car. Finally, also ideological reasons might play a role.

A third conclusion is that because of the large variation among firms, the way accessibility is perceived when making location choices cannot be expressed in a single accessibility indicator. Instead, a combination is required of several indicators, each of which represents another accessibility factor. Further research is necessary to study what combination of accessibility indicators is most suitable. The research will be of a more quantitative nature and will also reveal the relative importance of the different accessibility indicators for different firm categories.

Finally, the effect of the high-speed train on location choices cannot be determined from the accessibility effect alone. Also the effect of high-speed rail on the image of business locations should be taken into account.

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Appendix: Quantitative results from recent economic-geographic surveys

Source	**Healey & Baker (1996; referred to by Rietveld and Bruinsma, 1998; Marlet and Van Woerkens, 1999)**		**Jansen and Hanemaayer (1991)**	
Study area	Large firms with an international orientation in European metropolitan areas.		Firms in the Randstad area; segmentation into 7 branches of industry.	
Measure	Percentage of firms considering the location factor as absolutely essential for their business' location.		Importance of factor for locations; scale of 0 (totally unimportant) to 10 (very important). Out of 25 factors we have selected the 10 most important and some factors relevant for the current research (indicated by *).	
Data	Easy access to markets	63	Accessibility by road	9.0
	Transport links with other cities	52	Car parking facilities	8.4
	Quality of telecommunications	46	Adequately educated personnel	8.1
	Cost and availability of staff	43	Availability of telecommunication	7.9
	Business climate	36	Representativeness of building	7.3
	Value for money of office space	26	Accessibility public transport	6.7
	Availability of office space	22	Rents or prices of real estate	6.7
	Ease of travelling around within city	22	Facilities of freight loading/offloading	6.1
	Languages spoken	18	Possibilities for expansion	5.8
	High quality of environment	11	Representativeness of surroundings	5.8
	Quality of life for employees	10	Proximity of airport *	3.1
			Proximity of education institutes *	3.0
			Presence of international companies *	2.9
			Presence of similar companies *	2.4
			Proximity of knowledge centres *	2.1
Source	**Pellenbarg (1985)**		**Sloterdijk and Van Steen (1994)**	
Study area	Firms in the Netherlands		Firms in the Netherlands; segmentation into 6 branches of industry.	
Measure	The number of times that the factor was mentioned by a firm representative as an important factor for a location choice; normalized to 100.		Percentage of firms considering the location factor as important or very important for a new business' location. Out of 36 factors we have selected the 10 most important factors and some factors that are relevant for the current research (indicated by *).	
Data	Availability of office space	23	Good working mentality	94.3
	Accessibility of the market	14	Positive attitude government	88.4
	Availability of personnel	11	Representativeness of the location	80.1
	Contacts with government	8	Long-term possibilities for expansion	74.7
	Productivity and attitude of labour	6	Connection to national motorway network	74.6
	Accessibility for suppliers	6	Sufficient lower/middle technically educated personnel	72.8
	Transport facilities	5	Low bare ground prices	72.7
	Local facilities / residential preference	5	Position towards customers	67.4
	Price of office space	4	Regional investment subsidies	60.8
	Willingness to move of personnel	4	Connection to internat. motorway network	54.7
	Level of education personnel	3	Presence internat. airport within 1 hour *	35.6
	Personal contacts	3	Position towards suppliers *	29.7
	Subsidies	3	Local presence of knowledge institutes *	26.0
	Organisation	3	Presence of similar firms *	21.6
	Wage level	1	Presence regional airport within 1 hour *	16.7
	Housing possibilities	1		