

THE INFLUENCE OF COLLECTIVE TRANSPORT ON THE DEVELOPMENT OF BUSINESS PARKS

ROTTERDAM-SCHIEVEEN COMPARED WITH
THREE OTHER BUSINESS PARKS



MASTER THESIS

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Preface

With this thesis I complete my master 'Urban, Port and Transport' economics. Studying has been an exciting period of my life!

This thesis is written as a result of my internship at the Development Corporation Rotterdam. They initiated the subject of this thesis within the context of the development of business park Schieveen and offered me a workplace to write my thesis. The subject of this thesis combines the favourite topics of my study namely urban and transport economics. The fact that the case study in this thesis, Schieveen, is located in my own city Rotterdam gave an extra dimension to writing it.

No thesis can be written by someone without any help. Therefore I'm grateful to many people. I want to show my appreciation to Bianca, Gerdine, Martijn, Hans and Willem for being my pleasant roommates during this time. Bianca and Peter, thank you for answering all my questions and for giving me advice and support. Strategist, thank you for accepting me at the team meetings and for never forgetting me for lunch. Reinhard, thank you for correcting the English in this thesis.

I owe gratitude for my supervisor, Jan van der Meer from the Erasmus University for his fast responds, guidance and advice. I would also like to thank Bart van de Velde for reading my thesis.

Thanks to my family and friends for their moral support. Thanks to God for giving me the opportunities and talents to study. Finally many thanks to Arian for his ongoing support, love and patience.

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Summary

When cities build new business parks they have to make decisions with regard to collective transport. Is collective transport necessary and what mode has to be used? These decisions also have to be made for business park Schieveen, the case study of this thesis. Increasing congestion, the rising attention for clean air together with the interest in sustainable mobility solutions, leads to growing interest in collective transport. That brings up the question how collective transport will influence the development of business parks. Does it lead to a different spatial economic structure i.e. changes in the location of business activities and changes in related travel patterns? This leads to the following research question:

What is the influence of the early realization of high grade collective transport on the development of business parks? With an application to the airport linked Business Park Schieveen.

The methodology used in this study consists of a theoretical exploration, leading to a conceptual framework which is used to analyse the chosen benchmarks. The benchmarks are the business parks Norra Älvstranden at Göteborg¹, Flight Forum at Eindhoven Airport and Amstelwijck at Dordrecht. The framework and the results from the benchmark study are used to analyse the planned development of business park Schieveen at Rotterdam. Schieveen is a former polder that Rotterdam wants to redevelop into a business park (90 ha.) combined with a nature reserve (200 ha.) and 28 new dwellings. It is a unique location as it good accessible by car, is in close proximity of Rotterdam Airport and very close to a nature reserve. The aim of the development is to strengthen the knowledge base of Rotterdam.

Creating collective transport to business parks that are only good accessible by car can turn these locations into a junction location which can make the area more interesting for companies. Although providing accessibility by collective transport makes the location more attractive, it does not appear as a decisive factor. Literature shows that availability of qualified staff, accessibility by car, amount of parking places and the quality of the environment are more important. Those factors are also most relevant when looking to airport linked business parks as the airport image makes the location more attractive but it is not a decisive factor.

The creation of new collective transport infrastructure can change the relative accessibility of an area or a business park and with that change the travel behaviour of people and influence their GTC². Whether the GTC really changes depends on the quality of the new system which can be determined by looking at the reliability, frequency, total travel time, comfort, real time information, availability and the cost. If the system is fast, reliable, has a high frequency, uses separate infrastructure and offers comfort it can be qualified as high grade and can compete with private car which is necessary to convince the choice rider.

Although for most people the private car is steadfast favourite, there are developments which increase the importance of collective transport for business parks. These are: rising congestion, environmental concerns, the attention for sustainability and the rising parking cost.

¹ The study of the Göteborg case has some limitations because it was not possible to actually visit the city.

² Generalised transport cost.

When the choice must be made for creating a new collective transport it is important to take into account the (expected) travel demand to and from the business park by employees, visitors and customers and how this demand is spread during the day and over the different modes. Based on this information and on the cost and the time a bus seems the most logical mode, at least for the first years.

The benchmark research brings about the following factors as most relevant for the success of collective transport to business parks:

- To make collective transport feasible it is necessary to have a critical mass. When travel demand at the business park is small this critical mass can be reached by connecting the collective transport line with other areas (airport/residential area) or by locating education facilities or public services at the business park.
- Making collective transport available from the start is important otherwise people get used to other ways of travelling.
- Collective transport is more attractive when it offers a fast and comfortable journey and drives with a high frequency.
- To increase the use of collective transport it must be combined with measures to discourage the use of the private car.

The literature study and the benchmark research provided suggestions with regard to Schieveen. Besides the above mentioned factors from the benchmark research the following suggestions can be made:

- In the Rotterdam region there is a rising demand for junction locations. That is why creating a collective transport connection to Schieveen can make the location more attractive as it already is connected by a highway.
- Do not only look at total travel time when choosing a collective transport system but take into account the GTC.
- Choose the bus as collective transport mode as it can serve the expected travel demand, is the most flexible and cheapest system and can be realised fast.
- Turn the bus into a high grade collective transport system by taking measures with regard to the frequency, total travel time, comfort, real time information and the capacity of the system.
- Include a part of the collective transport cost in the land price as it also provides a form of certainty for the developers. As companies already paid a part of the costs, governments have an obligation to actually realize the bus (or other collective transport) system.

To conclude, there is no evidence that the development of business parks that offer a high grade collective transport connection will be more successful. Although it does make the location more attractive, other factors are seen as decisive in the location decisions of companies. There is also no proof that collective transport makes the location more attractive for a certain kind of companies although offices and government institutions make more use of collective transport than for instance distribution centres. This thesis shows that if a collective transport connection is offered to a business park it can be a successful connection when travellers consider it as high grade and the above mentioned factors are taken into account.

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1 Introduction

1.1 Introduction

Business park development can not be studied separate from accessibility. Company accessibility is of economical and social importance, especially in urban regions. Accessibility is under enormous pressure. Growing congestion, the rising attention for clean air together with the interest in sustainable mobility solutions, leads to growing interest in collective transport³.

Business park development and collective transport programs seem to be two separate worlds, also at the management level. These two elements are managed by different government departments or companies. Common practice in the development of business parks is that construction is started without paying much attention to collective transport issues. When accessibility is discussed, the primary focus is on car accessibility. Development of collective transport infrastructure often only starts when the demand is high enough to enable commercial exploitation. It is questionable whether that is the best order. When collective transport infrastructure is realised at an earlier stage it might i.e. serve as catalyst.

Creating collective transport infrastructure can involve three effect types: direct, indirect and external effects. The direct effects are the costs and benefits for the builders, operators and users of the transport link. Indirect effects are the costs and benefits of actors in the economic system that do not use, operate or build the transport link themselves. The indirect effects of a new transport link are amongst others, changes in the level of economic activities at a site or effects on users at other parts of the transport system (Willigers, 2006). The latter arise due to the effect on the congestion level (decrease or increase). Finally, the external effects are the costs and benefits that do not have a direct economic value e.g. safety and environmental effects. Especially the indirect effects of collective transport infrastructure at business parks are relevant to this thesis. In this thesis it will further explored whether the creation of a new collective transport route to a business park influences its development. It is questioned if this leads to a different spatial-economic structure i.e. changes in the location of business activities and changes in the related travel patterns. Will the creation of a collective transport system to business parks have impact on the type of economic activities that it attracts? These questions lead to a further focus on the relation between accessibility by collective transport and the attractiveness of an area as office location.

1.2 Background and context

At the Schieveen polder a high-standard science and business park will be developed under the name Science Port Holland. Science Port Holland is a cooperation between the municipalities of Rotterdam and Delft and the Delft University of Technology (TUD). It involves the joint development of the Technopolis Innovation Park and Science Business Park Schieveen. The map in figure 1.1 shows the location of the Schieveen polder.

³ Although most collective transport is initiated by the government (public) it can also be a private initiative.

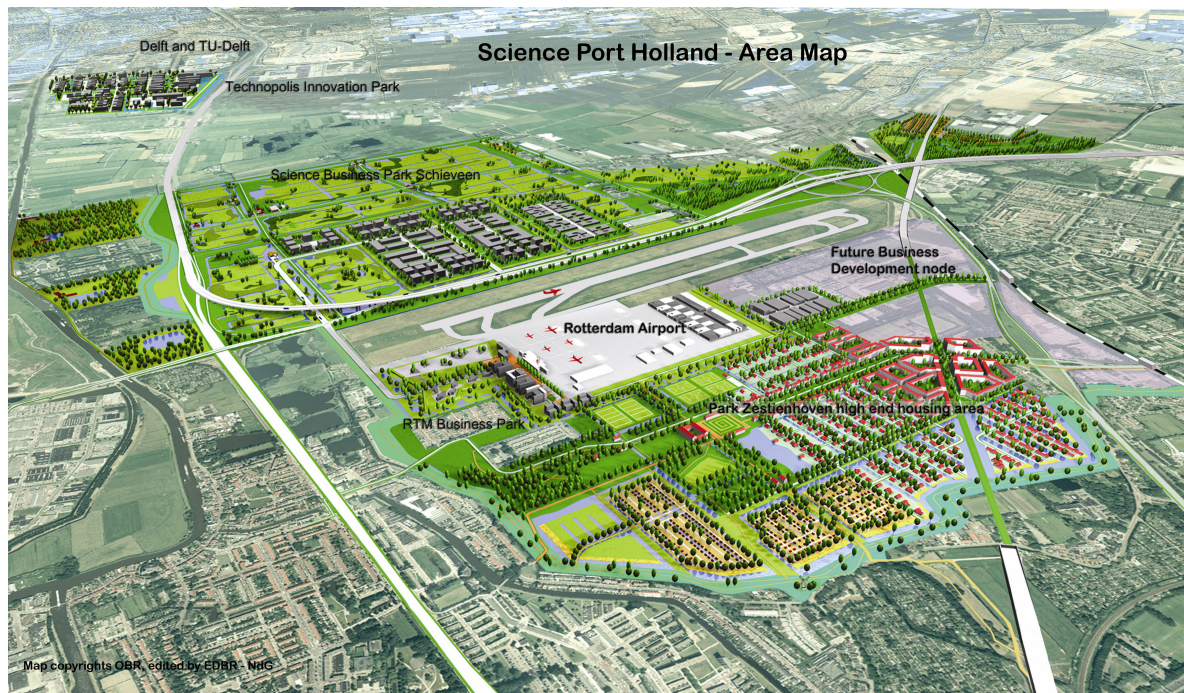


Figure 1.1 Business park Schieveen

Schieveen is situated near Rotterdam Airport, a regional airport of national importance, and is therefore connected by air transport. It is situated next to the highway A13. No concrete plans are developed with regard to a high grade collective transport connections. Therefore the city of Rotterdam wants to get more information about the effects of realising collective transport in an early stage on the development of business parks. They are especially interested in the possible effect of high-grade collective transport on the attraction of knowledge intensive businesses at Schieveen. Therefore business park Schieveen will be the case study of this thesis.

Although Schieveen is situated near a regional airport this thesis will not only focus on such kind of airport linked business parks, but take a broader view as the presence of a regional airport will probably be one of the many location factors of businesses. Therefore the theoretical part and the benchmark research described in this thesis, will also look at business parks in general.

The starting point of this thesis is the development of business parks. As business parks are developed one must think about how the accessibility of these business parks is organised. Accessibility can be organised by different modes, for instance by car and by collective transport. This thesis focuses on the latter as it wants to investigate the effects of the early realization of collective transport on the development of business parks. As Schieveen is the case study of this thesis, it will also be necessary to relate this to business park developments near regional airports. But this relation is only studied as part of the relation between business park development and collective transport. The same holds for the relation between collective transport and regional airports. Although many things can be said about this relation it will not be the primary interest of this thesis as the focus lies on the relationship between business parks and collective transport. This can be visualised as follows:

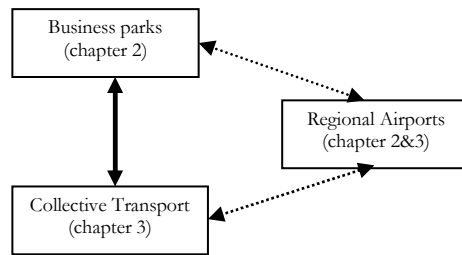


Figure 1.2 Visualization of relevant relationships

1.3 Objectives

The following objectives are stated for this thesis:

- To gain insight in the relation between high-grade collective transport and business park development in order to find out if it is helpful to provide a high grade collective transport connection to business parks at an early stage.
- To perform benchmark research in order to gather information on and learn from the experience of other business parks with regard to the role of high-grade collective transport in relation to business park development.
- Analyse the case ‘Business park Schieveen’ and provide suggestions for the accessibility of Schieveen by collective transport.

1.4 Research questions

Central research question

In order to conduct this study, the following central research question has been stated for this thesis:

What is the influence of the early realization of high grade collective transport on the development of business parks? With an application to the airport linked Business Park Schieveen.

Sub-questions

This central research question is split into the following sub questions:

1. What type of business parks can be distinguished?
2. What does existing literature tell about the location factors of knowledge intensive companies? And what is the role of collective transport?
3. What distinguishes business parks near regional airports from business parks elsewhere?
4. What features have to be taken into account when considering the role of collective transport for business park development?
5. What can be learned from the benchmark research?
6. What can be said about business park Schieveen from this research?

1.5 Structure and methodology

This report is the result of a literature study, benchmark research and a case study. In order to achieve the objectives as formulated above this thesis is divided into ten chapters.

Chapter one indicated the problem of this thesis by defining the **goal and the research questions** which need to be answered.

The subject of Chapter two is **business park development** and is the result of a literature study. Firstly this chapter will give a short description of the case of this thesis, Schieveen. Subsequently different types of business parks will be distinguished, which answers the first sub question. To study if the presence of collective transport can influence the development of business parks, the location factors of businesses are explored, which will answer sub question two. As business park Schieveen is situated near an airport special attention will be given to business park development at and near airports. This will answer sub question three.

Chapter three is about **collective transport to business parks**. As the central research question involves the term 'high grade collective transport' this chapter will discuss the different collective transport systems, their characteristics, what makes them high grade and what factors are relevant when looking to the future. With that an answer will be given to the fourth sub question.

The theoretical concepts will be translated into a **framework**, which is necessary for the benchmark research. This is done in chapter four. In chapter five, six and seven the chosen benchmarks will be analysed. The chosen benchmarks are: the case of **Norra Älvstranden** at Göteborg, **Flight Forum** at Eindhoven Airport and **Amstelwijck** at Dordrecht. In all of these projects a new business park was created and new collective transport routes had to be constructed since no connections were available or the existing ones could not fully satisfy the needs and wants of the passengers. Firstly the choice of these benchmarks will be justified. Then the benchmarks will be analysed with the theoretical framework presented in chapter four. To gather all necessary information some interviews are taken by e-mail, phone, or face to face. In answering sub question five, this chapter tries to clarify what can be learned from the chosen benchmarks. To gain some sense in the link between collective transport and business parks two key persons of every benchmark will be asked to rank some factors that explain the performance of the business park and the collective transport.

Chapter eight will **benchmark** the cases from chapter five, six and seven. The aim of this chapter is to find out the most important learning points by comparing the different cases and search for the best practices.

The subject of chapter nine is the description of the intended business park development at **Schieveen**. It describes how collective transport will be organised and what other plans are made. This case will be analyzed with the help of the theoretical framework from chapter four and the benchmark results from chapter eight. To gather all necessary information some face to face interviews are held with people that are involved in the development of Schieveen.

Chapter ten will complete this thesis with a number of **conclusions and recommendations** for the future work at Schieveen.

2 Business park development

2.1 Introduction

The primary focus of this thesis is the relation between the early realization of collective transport and the development of business parks. As the context of this case will have consequences for the different accents in the theoretical part of this thesis a short introduction on the case Schieveen is given in section 2.2. As at the Schieveen polder a business park is planned, the question arises what is meant with the term 'business park'. Therefore section 2.3 describes what type of business parks can be distinguished and how Schieveen can be qualified. This thesis concerns the relation between collective transport and business park development, so it is important to know how accessibility influences the attractiveness of a location for office establishments. That brings up the next question: why would knowledge intensive companies prefer to locate at Schieveen? To learn about the importance of collective transport to companies section 2.4 lists what factors are the most relevant in company location decision. As business park Schieveen is situated near a regional airport in section 2.5 some attention is paid to the role of a regional airport in the location choices of companies.

In this chapter the following sub questions will be addressed:

1. What type of business parks can be distinguished? (section 2.3)
2. What does existing literature tell about the location factors of knowledge intensive companies? And what is the role of collective transport? (section 2.4)
3. What distinguishes business parks near regional airports from business parks elsewhere? (section 2.5)

2.2 Context Business park Schieveen

Schieveen is situated just north of Rotterdam Airport. At the moment the area is used for rural matters. The municipality of Rotterdam wants to redevelop the Schieveen polder and therefore new plans are made. This redevelopment is made up out of the following projects: the development of a 90 hectare business park (600.000 m² gross floor area (GFA)), circa 200 hectare nature reserve and 28 new dwellings (dS+V, 2009). The business park will be concentrated at the southern part of the Schieveen polder to create a direct connection with the adjacent road network (A13) and to be in the proximity of Rotterdam Airport. Accessibility is an important factor for the development of Schieveen. Accessibility by road will be strengthened with the linking of highway A13 and A16 (planned for 2018). Besides that connection the Doenkade (the road between Rotterdam Airport and Schieveen) will be doubled (planned for 2010). Except for a bus connection to the nearby airport, the area is not yet connected by high grade collective transport and plans for doing so are not yet developed. The masterplan will pay special attention to disclose the business park by bike.

The municipality wants to turn business park Schieveen into a high grade office and business location to attract knowledge intensive companies to the city in order to strengthen their economic structure. The business park targets at fast growing knowledge intensive- and airport oriented national or international businesses (dS+V, 2009).

In the new development plan (dS+V, 2009) Rotterdam defined the following target groups:

Target groups Business- and Science Park Schieveen		
1. Knowledge intensive companies	2. Airport oriented companies	3. Remaining companies
above average expenditure on research & development	above average number of highly educated employees	Strong orientation on the airport
	Find presence of airport important	Other sectors are not directly rejected but group 1&2 are preferred

Figure 2.1 Target groups Schieveen

Important knowledge intensive sectors are for instance (OBR, 2008):

- sustainable energy
- environment/climate change/water
- infrastructure/mobility
- health/food
- creativity

Schieveen contains a lot of interesting location factors to attract businesses. It is in the proximity of Rotterdam Airport. Adjacent to the business park a nature park will be created. The location is well visible from the road. At last the location is already good accessible and this will be further optimised in the future.

2.3 Business park and location types

To determine the relation between collective transport and business park development it is necessary to make a distinction between the different kinds of business parks and to determine which type of business parks are relevant with regard to this thesis. Therefore this section describes what kind of business parks can be distinguished and what their relevance is to the subject of this thesis.

2.3.1 Types of business parks

The companies that choose to locate at a certain business park are often very different in terms of spatial usage, the number of visitors, the number of employees and their transportation demands. These factors differ per sector and per type of business park. Based on the IBIS-location types (Traa en Hamers, 2007) five different business park area types can be distinguished:

A *Heavy-industry area*

Areas, with extensive land use, where all kind of industries can locate their business including companies that cause environmental nuisance. Especially companies which cause a lot of pollution will locate at these areas.

B *Seaport areas*

Areas, with extensive land use, which have a wharf where vessels can unload their freight. These areas also have a lot of heavy-industry.

C *Mixed area*

Areas for companies with limited environmental nuisance which are not qualified as high-grade business park or distribution park. These areas have a varied supply of activities and can have an extensive as well as intensive land use.

D *High grade business park*

Areas that are specifically focused on high grade production and or research and development activities. Other activities are not allowed. The area has an intensive use of land.

E *Distribution park*

Areas with an extensive use of land, that are specifically determined as transport, distribution and wholesale businesses. Examples are companies that develop activities in the area of rail, air and road transport and inland navigation.

Examples of each type are shown in figure 2.2:



Type A Heavy Industry



Type B Seaport Area



Type C Mixed Area



Type D High grade business park



Type E Distribution park

Figure 2.2 Types of business parks

Not all of these types of business parks are relevant for this thesis. Besides that, this thesis takes a look at the role of collective transport and it can be concluded that not all types of business parks need sufficient collective transport. It seems plausible that type A, the heavy-industry area, type B, the seaport area and type E, the distribution park, do not need extended collective transport. The focus of these types of business parks is on cargo. Type A and B do not have a lot of employees. Besides that those business areas are in general not situated near airports which make them irrelevant for this report. In contrast with type A and B, distribution parks can be situated near airports. For example Schiphol Airport represents an important concentration of distribution centres. Distribution centres do not have a lot of employees who are at the office for the whole day but create all kinds of goods flows. They have a lot of employees who truck the cargo from the distribution centre to other places. Therefore distribution parks do not necessarily need extended collective transport and so type E can be left out of this thesis. That leaves type C and D, the mixed area and the high grade business park. They both are seen at or near airports and are types that focus on services. It seems plausible to conclude that they have a need of collective transport

because they accommodate companies and/or offices which have a lot of employees who need to go to their job every day. Type D is most relevant as it is the type of business park planned at Schieveen.

2.3.2 Types of office locations

The previous section described what type of business parks can be distinguished. As Schieveen is developed as a high grade business park which also will host offices it is also relevant to say something about the location of offices. Schieveen focuses on companies which pay a lot of attention to research and development (R&D). According to Buck Consultants (2008) it is an international trend that an increasing part of R&D activities takes place in an office environment. Stec (2006, p. 17) defines an office as “a building that as a whole or partly can be used for desk bounded activities and not for the fabrication and/or storage of goods”. According to Stec (2006) seven different location types of offices can be distinguished.

A. Metropolitan prime location

A metropolitan prime location is an urban area which is very attractive to both national and international companies and investors. The location is attractive because of a combination of aspects, such as international oriented business life, top class living environment and top services.

B. Urban centre locations

Urban centre locations are located at the centre of cities. These locations are often less accessible by car therefore the users of this kind of locations have a higher use of collective transport. At this type of locations parking is often difficult.

C. Collective-transport junction locations at the edge of cities

These are junction locations at the edge of cities around important collective transport infrastructure such as intercity stations. Because these locations are well accessible by collective transport mainly middle-sized regional and national oriented governments, non-profit organisations and institutes are interested in them. If these locations are also well accessible by car middle-sized business and financial service providers are also interested in them.

D. Regional collective-transport junction locations

Regional collective transport junctions are located around smaller collective transport junctions and stations. The accessibility by collective transport has a regional character and therefore it forms an attractive location for local and regional oriented office users.

E. Highway locations

Highway locations are office locations which are situated near or at highway exits. These locations most times only offer accessibility by road. Apart from accessibility by car another important location factor for these offices is that it has a big visual outreach.

F. Office locations at business parks

There are business parks which offer locations for offices next to for instance production or distribution activities. The spatial quality, the appearance of these locations and the accessibility by collective transport

is mostly sub optimal. That is why these locations suffer from competition from other locations which offer a higher quality.

G. Office locations in a residential area

There is a broad group of offices that focus on the local residential area. This group largely consists of small scale offices outside the city centre.

These seven types of office locations that Stec distinguished do not cover all possible options. For instance a greenfield location, an office location in a green area, is not included. Moreover, locations sometimes are a combination of the above mentioned types. For instance Schieveen is classified by Stec (2008) as type E, a highway location. It is true that Schieveen fits the description of that type as it is a sight location next to the highway, it is well accessible by car and collective transport to Schieveen is not yet planned. But it can be questioned if it is just a highway location. One must consider that it has more to offer as it is situated at the edge of the city near a regional airport. Therefore it is more a combination of type C, E and a greenfield location. It is a junction location at the edge of the city with important infrastructure namely the airport. Besides that it is well accessible by car. It also contains a special feature namely that it is located next to a huge nature park in a green area where no other businesses have been. The combination of nature and an airport makes the location unique.

With regard to accessibility type C and E have the following demands (Stec, 2006):

- Good accessibility by car
- Good accessibility by collective transport
- A high quality of collective transport

The missing part in Schieveen is a good connection by collective transport which also offers a high quality. To fully make Schieveen a junction location (type C) collective transport needs to be constructed.

The next section will elaborate on the current trends with regard to the preference of offices as it is possible that some of the seven mentioned types of office locations are more preferred than others.

2.4 Location factors

Why do firms locate where they do? There is no single answer to that question as different firms choose their locations for different reasons. Most research with regard to this question is focused on economic and spatial factors like labour market factors and infrastructure and less attention is paid to for instance environmental policies. This section summarizes findings from literature with regard to the main drivers for business to choose their locations and the relative importance of transport in that decision. The most well known study is the European Cities Monitor of Cushman & Wakefield which consults companies every year to find out what location factors are most relevant in their location decision. It also discusses some trends which influences the type of location companies' prefer.

2.4.1 Location demands

The ability of an area to attract companies depends on the level in which the characteristics of an area fulfil the location criteria of companies (Pen, 2002). Every type of company has its own wishes and interests. The degree in which the new location satisfies the demands of a company determines the choice

to locate in that area. Although the location factors differ per type of company some general location factors can be mentioned. The most important location factors are categorised as follows (Willigers, 2006):

- “Accessibility, including the proximity to actors or infrastructure, and the availability of personnel
- Price of real estate
- Properties of the building: availability, representativeness, possibilities for expansion
- Quality of the surroundings
- Regional factors: working mentality, quality of life”(p. 65).

It has to be noted that for the research described in this thesis the primary interest would be the role of accessibility by collective transport in the location choice of companies. “Accessibility is generally seen as having influence on the location choices, because it is a determinant for the economic potential and location quality of a site”(Willigers, 2006, p. 115). Unfortunately, in most research the concept of accessibility is not analysed in much detail.

As section 2.2 described Schieveen must become a high grade office and business location with knowledge intensive companies. Some general location factors for offices are shown in table 2.1. A distinction should be made between site and situation factors⁴. Site and situation work together in making a place attractive to companies. Site factors are the factors of an actual location and are composed of the physical characteristics and landscape of the location. Situation factors deal with the location of a place relative to its surroundings and other places. It is about the attractiveness of the region.

Location demands of office location	Site or situation factor
Quality/availability labour	Situation factor
Quality of life	Situation factor
Image	Situation factor
Accessibility by car	Site factor
Parking space	Site factor
Visible from highway	Site factor
Accessibility by collective transport	Site factor
Facilities	Site factor

Table 2.1 Location factors for offices⁵

As shown in table 2.1 the first three factors are situation factors and the remaining are site factors.

2.4.2 Push and pull factors

Within the location choice process a distinction can be made between different situations namely expansion at existing location, creation of a new settlement and relocation. In the context of this thesis, where the topic is the creation of a new business park, the focus will be on relocation of companies and the creation of new settlements. When a company considers relocation, it must weigh out staying at the current location. The last step will be made when the current place does no longer fulfil the needs of the company and when another location has more interesting location factors. A distinction can be made between pull and push factors. Pull factors are the reasons to relocate at a new location and push factors

⁴ <http://geography.about.com/od/urbaneconomicgeography/a/sitesituation.htm>

⁵ Based on Oostervegel, (2006); Stec (2005)

are reasons for a company to leave the current location. A combination of push and pull factors will lead to the final decision for companies to relocate or not (Meesters, 1999). The most important push factor for companies is the lack of space to expand which is also an important pull factor in the search for a new location. Other reasons are the image of a location and the cost level. When looking at pull factors, space availability is important. Besides that accessibility and the site of the location are also important pull factors (Ecorys, 2005). According to Willigers (2006) accessibility is mainly relevant for the choice of a new location and not as an incentive for companies to relocate. This is shown in figure 2.3 and 2.4.

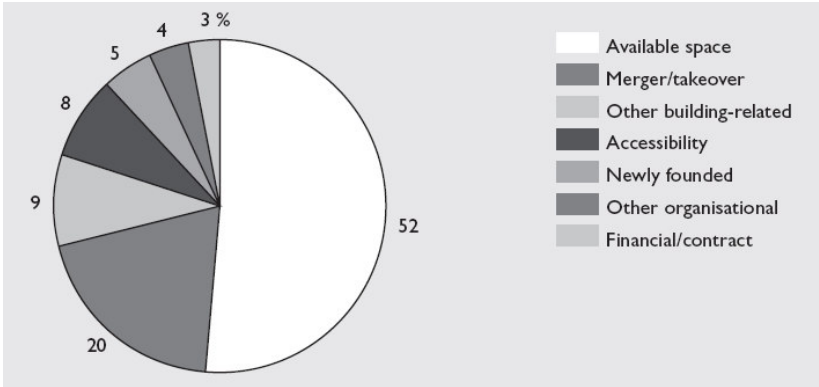


Figure 2.3 Motives to move for recently relocated respondents⁶

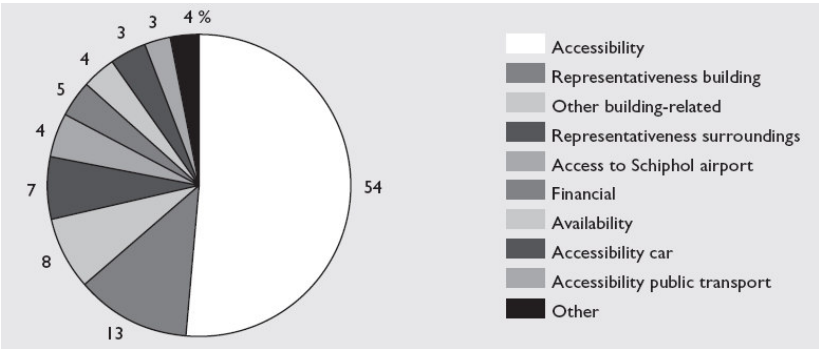


Figure 2.4 Dominant location factors as proclaimed by recently relocated respondents⁷

2.4.3 Agglomeration economies

Whether businesses decide to locate in a specific region not only depends on their demands on a single location and the availability of locations in that region. It also depends on the attractiveness of that region. The factors with regard to the attractiveness of the region are called the ‘situation factors’ as mentioned in the previous section. Companies are influenced by the presence of other companies, which could be the early locators. Warffemius (2007, p. 68) says “once a location gets a head-start, the process of cumulative causation starts working”. Firms are attracted by the benefits they can obtain from being in a location together with other firms. These benefits are called economies of agglomeration and have impact on the whole region. It is related to the idea of economies of scale. The more related firms are clustered together, the lower the production costs can be. Economies of agglomeration are crucial in the concentration of economic activities and are conceived as knowledge spill-overs. They may arise due to the existence of a

⁶ Willigers, 2006, p. 121 (based on 98 observations)
⁷ Willigers, 2006, p. 122 (based on 68 observations)

large specialized labour pool, the opportunities of communication, the presence of large local markets, a source of creativity and innovation and a high level of efficiency. Marshall (1920) classified four externalities to describe the sources of economic agglomeration.

1. Linkages

Backward and forward linkages are an important basis of agglomeration economies. Backward linkages are the connections firms have with their suppliers. Forward linkages are the interactions firms have with their customers. According to Warffemius (2007) the central idea of linkages is that firms can benefit from each other

2. Clustering of highly specialized labour force

The presence of a large agglomeration of economic activities offers a labour pool with a wider range of skilled labour. This makes it easier and cheaper for firms to find qualified workers. Firms also don't have to invest a lot of money in back-up capacity due to this easy access to the right people.

3. Knowledge spill-overs

Large agglomerations are seen as places that facilitate the exchange of knowledge due to the diversity of firms, competition and the face to face contacts between the different workers. This exchange of knowledge can result in innovation, creativity, learning and the creation of new knowledge (Storper and Venables, 2002). These knowledge spill-overs are an important source of agglomeration economies.

4. Existence of modern infrastructure

The firms located in the cluster can profit from the use of the same infrastructure facilities. They can share the cost of infrastructure. According to Warffemius (2007) schools, libraries, universities, banks etc. are also included when you look to it from a broader societal infrastructure perspective.

At some stage, diseconomies of agglomeration can arise if the benefits are offset. The large spatial concentration can attract diseconomies of agglomeration such as congestion between business parks and the airport or on the roads, congestion on the highways to the business parks, overcrowded business parks, pollution, crime, high price of land etc. These diseconomies of agglomeration promote dispersion as location conditions are worsening.

2.4.4 European cities monitor

Cushman & Wakefield conduct a survey every year (since 1990) to make a list with the best European cities to locate a business. It is called the European cities monitor and is based on telephone surveys with senior managers and board directors in charge of location of about 500 European companies from nine European countries. It represents the perceptions of the business sector with respect to location and it provides empirical evidence for the importance of factors that influence the location of businesses. Companies are for instance asked which factors they consider when deciding to locate their business and what the relative importance of those factors is. In 2008, the availability of qualified staff was considered as an absolute essential factor by 62% of the respondents. It overtook access to markets as the most important factor. The third factor is the quality of telecommunications followed by international and national transport links with other cities, which is seen as an essential factor by 52% of the respondents.

Business type	Industrial	Consumer retail & distribution	Professional services	Average
Location factor				
Availability of qualified staff	64	57	60	60
Easy access to markets, customers or clients	62	55	55	59
The quality of telecommunications	50	57	56	54
Transport links with other cities and internationally	55	53	51	53

Table 2.2: Most essential factors for locating a business (Cushman & Wakefield, 2008). The values represent the %age of companies that mark the listed Location factor as being essential.

The importance of factors varies little with business type which is shown in table 2.2. The availability of qualified staff is the most important factor across all sectors. The other factors differ a bit with business type.

The European City Monitor also asked companies which factors they think will have the biggest influence on business over the next 10 years. Table 2.3 shows the results of the five most influential factors. In view of the financial crisis this overview would now probably look different.

Factor	2008
Performance of European economy	22
Economic growth of Central and Eastern Europe	15
Growth of China as markets for your products or services	14
Climate change and Sustainability	10
Credit Crunch or availability of Corporate finance	8

Table 2.3: Most essential factors for the next ten years (Cushman & Wakefield, 2008). The values represent the %age of companies that mark the listed factors as being essential.

2.4.5 Relevant trends

This section will discuss the future demand on office space for the Netherlands, which is expected to face some changes.

Diminishing growth of office space

The coming years the Netherlands will have to deal with fact that a major part of the baby boomers will retire. This means that a large amount of employees will leave the labour market. Besides that less young people are coming at the labour market due to ageing. Both developments lead to a fall in the amount of available employees. According to the CBS the workforce of the Netherlands will shrink after 2020. For Rotterdam this will be after 2025 due to their relatively young workforce. The demand of office space will reduce as this partly follows the employment growth. This means that the replace demand will become more dominant. A development which amplifies the diminishing growth of the demand for new office space, is scale enlargement and mergers. Contradictory to these inhibitory factors on the need of new

office space it is still very possible that the demand of new office space will grow. Only according to Stec (2006, p. 32) this growth will be less strong than the last decades.

Competition

As there are many places for offices to locate there is a strong competition between cities. According to Stec (2006, p. 33) one of the consequences of this diminishing growth of office space is that there will be more competition between different location types. More attention must be given to quality. Especially for location aspects like car accessibility, high grade collective transport, parking, spatial quality and the multifunctional character. Stec (2008) performed a study on office strategies in the Rotterdam region. One of the conclusions for Rotterdam is that there are too many highway office locations and these locations do not meet the desires and demands of the current office users. They found that there is a rising demand to high grade office locations which offer an environment with high quality, good accessibility by collective transport, multi functionality and high spatial quality. As described in section 2.1 these conditions can not be met by highway locations. Stec (2008) advises to turn highway locations into more attractive locations by creating good accessibility by collective transport and also to turn them into multifunctional office locations. Then highway locations can better meet the current demands as it turns them into junction locations.

Multifunctional areas

Multifunctional areas are gaining interest. These areas combine different functions like living, education, shopping and working. Preferably these multifunctional areas are located at junctions where travellers can change between different routes and travel modes. An example of such a multifunctional area is Rotterdam Alexander. The multifunctional character of such an area forms an important supplement to the mono-functional locations around highways which are losing interest as described above. Offering different functions in one area can enlarge the liveliness and attractiveness of the area. It can also generate the necessary number of travellers for high grade collective transport systems.

2.5 Presence of an (regional) airport

Airports provide an ideal location for businesses in the knowledge sector because of their national and international connections and their strong infrastructure support (Yigitcanlar, T. et al., 2008). These are interesting location factors in this time of globalization.

2.5.1 Definition of regional airports

As described in chapter 1 this thesis primarily focuses on the relation between business park development and collective transport. Secondary to this focus is the relation between business park development and regional airports as the case study of this thesis, Schieveen, is situated near the regional airport of Rotterdam. Therefore this section tries to define 'regional airports'. According to BCG (2004) regional airports are one of the four different types of airports that can be distinguished: 1. international hubs; 2. airports with international origin and destination (O&D); 3. secondary hubs and 4. regional airports. According to the Relus note the Dutch Ministry of 'transport, collective works and water management' (1997, p. 13) defines regional airports as "a start and ending point for air traffic and air transport, which stems from serving regional needs, to a destination at short or medium distance. It has less than ten

million passengers per year, and has its own (unlike small airfields) air traffic control facilities and a paved runway”.

2.5.2 Attractiveness of airport location

Location factors stress the benefits a location can offer to a company. Section 2.4 already described location factors of business in general, the non airport factors. In this section some location factors which are specifically related to airports are mentioned:

- *Airside accessibility.* It seems logical to presume that different types of businesses also have different transport requirements/priorities. International companies for instance will attach more value to good air links than domestic firms as good connectivity by air is very important for operating their business. Those companies have to deal with employees and clients that use airports. The direct presence of an airport can advance the business process and can save valuable time. Airport locations can be attractive for businesses, but this also depends on the performance of the airport. The airport must be accessible and the service level of the airport must be good enough. This means that the frequency of flights must be high enough, boarding must not take too much time, walking distances must be short, and the departure times must be suitable. Businesses consider it important that they have opportunities for same day return flights. It is also important that the airport offers the destinations that are relevant to the businesses in the region (Warffemius, 2007). Due to their small scale especially regional airports can meet the specific demands businesses ask from airports (as long as the number of different destinations is limited) and support the catalytic effect from an airport.
- *Landside accessibility.* Airports are mostly located at the edge of cities. Most of the times the accessibility by car is much better than at a location in the city centre. Locating at such a location can therefore be attractive for companies.
- *Multi modal accessibility.* The presence of an airport can also enlarge the perceived accessibility of an area which has a positive impact for the whole airport region. Especially when airports function as intersection for collective transport on local, regional and national scale (Taal, 2004). This multi modal accessibility can be attractive. Another important factor related to accessibility is the availability of parking space.
- *Airport facilities.* According to Kramer (1990) the supply of facilities such as taxi's, parking places, shops, restaurants and medical services on airport locations can also be important as location factor. Office users attach much value to a high service level. Especially large airports offer a high service level with clock round opening hours and a high quality of the collective space. For regional airports this location factor is of much less relevance (Oosterwegel, 2006) as they do not offer 24 hour service due to their small scale.
- *Airport image.* The international ambiance of an airport contributes to transform an airport location into an exclusive and dynamic location. An airport can enhance to the representativity and the image of a company. This is confirmed by the fact that companies point out that they attach value to the unique image of a regional airport (Kramer, 1990).

The above showed that the presence of an airport can offer some factors that are attractive for companies and can influence their location decision. Companies that make intensive use of air transport will probably choose to locate at or near airports as the airside accessibility factor is very important to them.

Oosterwegel (2006) concludes that for most companies that are located in the airport region the presence of the airport is not the primary location factor but does have influence. In that case the location choice is a combination of airport related location factors and the location factors of section 2.3.

2.6 Conclusion

This chapter started with a distinction of different types of business parks which all have a different land use. In the context of this thesis type C, the mixed area and type D, the high grade business parks are of interest. Schieveen corresponds to type D as the target groups are knowledge intensive companies with a lot of research and development activities. As both types (C+D) accommodate companies and offices which have a lot of employees who need to go to their job every day, these types are also the most interesting with regard to collective transport. For offices, different types of location can be distinguished. According the qualification system of Stec, Schieveen is a high way location (type E) but it is more than that. It is also a junction location at the edge of the city with important infrastructure namely the airport. Besides that, Schieveen is well accessible by car and offers a special attractive factor as it is situated near a huge nature park (200 ha). The missing part is a connection by collective transport. To fully make Schieveen as a junction location, collective transport needs to be realised. This seems important as companies prefer junction locations over highway locations.

A distinction is made between site and situation (agglomeration) factors. Some relevant site factors are accessibility by car and collective transport, parking facilities and the quality of telecommunications. Important situation factors in the location choice of companies are the availability of qualified staff, quality of life, the image and economic structure of the region. So the success of Schieveen does not only depend on the site factors of the location but also on the attractiveness of the region for instance, the presence of companies in the same sector (cluster). If those companies are already present in the region it can make the location even more attractive. If a region does not have the companies the business park focuses on, it can be more difficult to interest does companies. As this thesis makes an application to airport linked business parks also some airport related location factors have been mentioned: airside accessibility, landside accessibility and the airport image. These factors can make a business park near an airport more attractive than other business parks but in most cases the reason why companies locate near airports will be a combination of airport related factors and other location factors.

3 Collective transport to business parks

3.1 Introduction

In the Netherlands, collective transports accounts for about 11 % of all travelled kilometres (Zwaneveld and Bakker, 2008). In rush hours this share is even 40 % of all transport longer than 10 kilometres. This study on collective transport systems to business parks focuses on mass transport systems, commercial or public, that use existing or new infrastructure. Collective transport is a system that comprises passenger transportation services that are available to the general collective. It is organized at local, regional and inter regional level and can be operated with road-based vehicles (e.g. buses), rail bound vehicles (e.g. light rail, metro and train), on water (e.g. ferries) and through air. Section 3.2 describes different collective transport systems and their associated costs. In order to attract people, collective transport systems must provide a certain quality. Therefore section 3.3 will further explore the quality characteristics of collective transport. Is it important to offer high grade collective transport in order to be competitive with regard to the private car? Section 3.4 will make some notes with regard to the collective transport demand of business parks, and section 3.5 explores what features have to be taken into account when considering the role of collective transport in business park development.

In this chapter the following sub question will be addressed:

5. What features have to be taken into account when considering the role of collective transport for business park development? (section 3.2, 3.3, 3.4 and 3.5)

3.2 Collective transport systems

For most business parks and regional airports, the private car is at the moment the most dominant mode of access (Humphreys, I. and S. Ison, 2004). Collective transport could play an important role in the transport system especially in urban areas where congestion problems are faced. In some cases collective transport allows people to move further and faster and therefore can increase the catchment area of a business park. The travel demand based on the settlement size is most critical for the choice of exploring a collective transport system. This is due to the fact that “a certain scale and density of demand is needed to make these services viable” (Goodbody, 2000, p. 23). Besides the size of the travel demand it is also important how the travel demand is spread throughout the day. There must be sufficient demand during the whole day to provide a reasonable balance between off-peak and peak-hours. In many cases offering collective transport is not viable from an economic point of view but from a political point of view de service is still offered because of for instance social and environmental reasons. The following kinds of collective transport systems are relevant to mention with regard to this thesis:

Bus

Bus services to airports can be arranged in different ways. Scheduled bus services operate on a fixed route with a predetermined flat fare per passenger or per zone. Two types of scheduled bus services can be distinguished (Mandle et al, 2000):

- Multi-stop transportation
These are scheduled bus services that are incorporated as part of the collective transportation system. Traditional bus services belong to this group.
- Express transportation
These are busses which are dedicated to a business park and/or airport. They transport people between the business park/airport and major destinations in the region such as the central stations. Sometimes the collective transport system does not stop exactly at a business park or airport. In that case a shuttle bus service is needed to connect the system to the airport or business park. How the operation of these busses is organised differs per situation. For business parks there must be different stops dependent on the size of the park.

Special attention must be given to the Bus Rapid Transit. It can be defined as a class of a “variety of high speed and/or high capacity service types provided by road-based collective transport modes” (Lord Mayor’s Taskforce, 2007, p. 37). It is valued as high grade collective transport (in contrast with a normal bus) because of the following factors. Journey times and reliability of the service is improved by special bus lanes and or signal priority. Apart from that the frequency is very important as a higher frequency influences the waiting time of people and with that the total travel time. All three factors are combined with luxurious, comfortable, stylised busses and vehicle modifications to improve carrying capacity.

The advantage of the bus rapid transit systems is that their flexibility allows stage development and a mix of operational environments. Especially when the travel demand of collective transport is low, the focus is inevitably on the bus system. This is because the capacity of the bus mode is more flexible than the rail systems (Goodbody, 2003) and because the bus system can use the existing road infrastructure and therefore does not always need high infrastructure capital costs.

Light rail

Light rail transit (an electric railway) is a form of collective transportation that has a lower speed and capacity than metro systems and trains. Light stands for light loads and fast movements compared to a bus system. There are different kinds of light rails and the classification differs per country. Two categories are distinguished:

- Traditional light rail
The tracks run along the streets. They share space with the road and stop very frequently.
- Modern light rail
Tracks have their own right-of-way and are most times separated from road traffic. The stops are also less frequent.

In the case of modern light rail it can be difficult to distinguish between light rail and metros. Many light rail systems offer a combination of the above described categories with both on-road and of-road tracks.

Metro

Metro systems are designed to transport a large number of passengers on short trips, mostly underground. They offer a high frequency and high capacity. Metros have their own track, separated from other traffic and use multiple electric units on rails. Some systems use magnetic levitations or monorails. The term metro is the most common name for this rapid transit system although some countries use the terms underground or subway. Most metro trips are less than 30 minutes. Because of these short trips metros

maximise the use of space by having more standing places. Metros are scheduled with a high frequency and have a fixed route. Passengers are charged by passenger or zone. The system is mostly used in metropolitan areas to transport a large number of passengers at a high frequency but the extent of the system varies. It mostly operates to the limit of the central city.

Train

Train systems can transport a very large number of passengers. They operate on a fixed-route at a scheduled basis. To offer a successful rail system attention must be paid to the following (Mandle et al, 2000):

- The availability of a direct service between the important places.
- Extensive regional coverage.
- Frequency of service.
- The ability to walk between station and destination.

In 1964 the High Speed Train (HST) became operational. Since then the HST network expanded all over Europe. The HST is able to drive at 350 km/h. Due to this fast speed and the few stops it competes with both car and air transport.

Ferry

Many waterside cities and islands also have collective transport across the water. A ferry is used to carry passengers and sometime their vehicles (car or bike) across the water. The speed the ferry can reach depends on the number of stops. A foot-passenger ferry with many stops is sometimes called a water bus. The service may be scheduled with multiple stops, operating in a manner similar to a bus.

To conclude, the viability of collective transport along a particular route and the choice of the system is according to Goodbody (2000) determined by a number of factors including:

- “Congestion on the route
- Profile of demand by time of day and seasonally
- The ease of movement along the route
- The extent of subsidy available
- The interests of the involved parties
- Population within the route catchments
- Distribution of trip destination
- Profile of the resident population” (p. 23)

As this thesis is about business parks the latter three factors are less relevant, especially when the business park is situated at the edge of the city. The most optimal routes from an economic point of view are those for which there is an all day and all year travel demand. Because not all routes can meet the perfect demand subsidies may be required to ensure viability, especially in the first years after the development of new establishment like business parks or VINEX locations.

Cost of different systems

It is logical that some of the above described collective transport systems are more preferable due to their characteristics but also bring along higher costs. The Centrum Vernieuwing Openbaar Vervoer (CVOV,

knowledge institute of the Dutch ministry of Transport, Collective works and Water management) published the report ‘Kostenkengetallen openbaar vervoer’ which offers an overview of the exploitation, management and investment costs of collective transport. Figure 3.1 (Koolen, et al., 2005) shows what the cost structure of collective transport is comprised of.

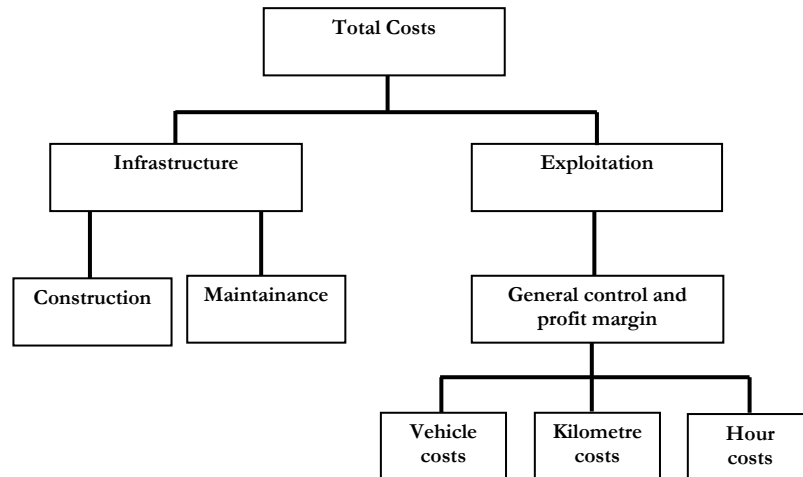


Figure 3.1 Cost structure of collective transport

Table 3.1 (CVOV, 2005) shows the different costs for the above discussed transport systems according to the mentioned CVOV report. The ratios can be used with the development and assessment of policy for collective transport projects. The numbers contain the cost for the construction of new infrastructure as well as the maintenance exploitation costs of this infrastructure. It are average values as costs differ per region and in time.

	Infrastructure		Exploitation		
	Construction Milj. € per km	Maintainance 1000 €/km/year (double tracks)	Vehicle 1000 €/year	Kilometre €/km	Hour €/hour
Bus: - simple	2	68 - 90	30 - 62	0,50 - 1,00	€700 - €1000 per service hour (includes lost hours like breaks, stop, reserve staff)
- complex	11				
Light rail (Tram)	11	450 - 550	145 - 238	1,50	
Metro	75	815	130 - 640	X	
Train	x	10 - 50	165 - 244	2,50 -3,00	

Table 3.1 Different cost per transport system

Buses are the cheapest solution when looking at the infrastructure as well as the exploitation costs. If a collective transport system has to attract the choice riders, those who can also choose a car, it is necessary to look beyond the costs. When choosing a transport system one must consider the costs, the demand and the required quality. With regard to a high grade collective transport system, the light rail, metro and the train can in general be called high grade. Whether this really the case is depends on the offered service. For buses it is more complicated to judge them as high grade. When the bus offers an extremely good

quality and also uses separate lanes it also can be seen as high grade. The bus then approaches the quality of a taxi. What is meant by good quality is discussed in the next section.

3.3 Characteristics of the collective transport system

First a distinction between different kinds of travellers has to be made. Travellers who use collective transport can be divided into collective transport captives and choice travellers. Captive trip makers are travellers who do not have the availability of a car. Choice travellers have the availability of a car and therefore have to make a choice between the use of their private car and the collective transport system. It has to be noticed that not all choice riders actual can choose to use collective transport for instance because they do not live in the proximity of collective transport or really need a car for their job.

In order to attract ridership, collective transport must provide such quality that it can compete with that of the private car. Quality exists of a wide range of attributes and the quality demands can differ per passenger type. According to Beirão (2007, p. 485) people want a “comfortable relaxed journey, preferably having a seat on the vehicle, a nice ambience free from unpleasant smells, a not too crowded space and a smooth ride”. Due to their lack of choice captive travellers are less sensitive to the quality of the collective transport system. Choice riders may chose for collective transport when the following three conditions are met:

1. The travel time by collective transport is the same as the travel time by car or even less.
2. The quality offered by the collective transport is so high that it offers an alternative for using the car.
3. The travel time by collective transport is reliable so it can compete with the car that is more and more unreliable due to congestion.

The comfort offered by private car is continually improving with amenities such as navigation systems, televisions and better seats. The comfort of the collective transport did not change much over time. In the Netherlands that is partly due to the big amount of captive travellers and the subsidies of the government which made it less necessary for collective transport companies to compete with the private car. Collective transport is often perceived as uncomfortable. To offer an alternative to private cars it is necessary to improve the quality offered by collective transport. Improving the quality can lead to the increased satisfaction of customers (Nilson et al. 2001; Simester et al. 2000).

Collective transport system must offer the following characteristics: reliability, frequency, comfort, real-time information, availability and costs (partly based on Majoor, 2008). It has to be noticed that in the literature there is no consensus about the most important characteristics.

Reliability

When considering the choice of transport mode, reliability is an important consideration (Bruinsma, F.R. et al., 1999). In this thesis reliability refers to the reliability of travel (or arrival) times. Today, congestion is a major problem in many large cities. It increases travel time, air pollution, number of accidents and travel time uncertainty. Several studies showed that the unreliability of travel time is a significant factor in the choice of transport mode (Bruinsma, et al. 1999, Baaijens et al. 1997). People try to reduce the chance of unreliable movement. Steg et al. (2006) points to the fact that a delay with the car is easier accepted by travellers than a delay with collective transport. That makes it even more important for collective transport systems to offer reliable services. Improving the reliability raises the attractiveness and increases the competitiveness of collective transport. When congestion keeps rising it becomes harder to predict the

travel time by car and therefore the travelling by car becomes less reliable. Collective transport by tram, metro, train and busses with separate lanes can offer more reliable travel times as they do not have to deal with congestion.

Frequency

Frequency is about the number of rides vehicles per hour. If there are only a few rides per hour travellers have to face waiting time at the stops. The frequency influences the total trip time which is the total time measured between departure and the arrival and vice versa. Due to congestions, slow vehicles, the number of transfers, waiting time for the vehicle to arrive and delays travel time increases. To compete with the car it is important that the total travel time for travellers by collective transport is the same or even less as the total travel time by car. Access improvements and an increase in the frequency can decrease the total trip time. Furthermore it is important to note that increasing frequencies is an important way of improving the reliability of collective transport. It leads to a smaller delay when a connection is missed and it leads to shorter waiting times for the next vehicle at interchange points. Providing high frequent departures is an important factor for increasing the number of collective transport users. A higher frequency increases the flexibility of travellers, because they have more opportunities to choose their time of travel. This way collective transport mimics the advantage of individual transport namely the ability to travel when you want. Another reason for providing a high frequency is that it reduces the waiting time of travellers. Various studies indicate that walking and waiting time costs are valued two to five times higher than in-vehicle transport time (Pratt, 1999, Litman, 2008). So that makes a big difference for travellers.

Comfort

Comfort can be defined as ease of travel associated with an access mode (Hoel and Schrinner, 1998). It is associated with satisfaction of passengers with regard to the number of stops, transfers, physical comfort, safety, cleanliness and the availability of luggage services. Also the image of the transport system is important. For instance a modern appearance and a high quality of the transport vehicle are important factors for the perceived comfort of travellers and for creating an attractive image.

Real-time information

To increase the convenience of use, travellers consider it important to have clear travel information. Information about collective transport is necessary for those who use it or plan to use it. Especially airports serve a lot of different passengers which all have their own nationality. Therefore it is important that the travel information is presented in different languages.

Real-time information systems are becoming more and more ubiquitous in collective transport (Yeung, 2004) and make the system more attractive. Investments are made on IT-based applications, such as real-time, at-stop displays. Monitors show the traveller when the next vehicle will arrive at a particular stop. Many studies have shown that customers appreciate such information (Dziekan and Kotterhoff, 2007; Coogan, 2003). Dziekan and Kotterhoff (2007) provided the overview of the possible effects of real time information systems that is shown in figure 3.2 (Dziekan and Kotterhoff, 2007, p. 492).

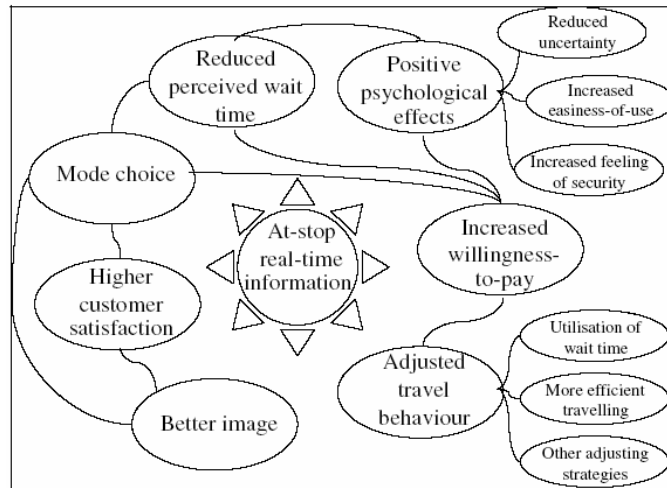


Figure 3.2 Mind map on possible effects of at-stop real-time information displays

According to Dziekan and Vermeulen (2006) the existence of such a system creates confidence in the whole collective transport system, which can lead to improvement of the image. The presence of a real-time system reduces waiting stress. Simply knowing the remaining time until departure increases the feeling of control, can reduce stress and it reduces the perceived waiting time (Dziekan and Kotterhoff, 2007). Passengers without real time information tend to overestimate actual waiting times. Waiting time holds a negative quality for the user of the collective transport. It is values two to five times higher ten in-vehicle transport time. Dziekan and Vermeulen (2006) evaluated the effects of real-time information on the perceived waiting time feelings, security, and use on tram passengers in The Hague. As shown in figure 3.3 (Dziekan and Kotterhoff, 2006, p. 77) the perceived waiting time after introducing the real-time system was, on average, reduced by 20% compared to the situation before the introduction of the system.

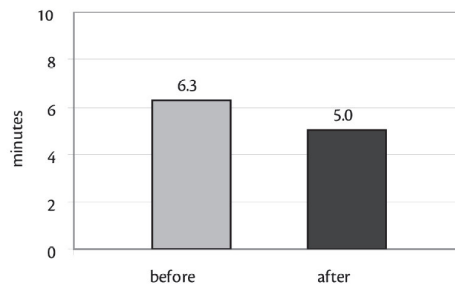


Figure 3.3 Average wait time before and after introduction of real-time information

The real time system also allows travellers to more effectively use their time and coordinate their activities. The provided information can be used to make travel decisions that lead to shorter travel times and to more efficient travelling. If travellers know when the next bus will arrive they can decide what to do in the mean time. Some examples are that the travellers can check if there is sufficient time to stop at a nearby store to make a quick purchase or the traveller can decide to use an alternative mode. A necessary precondition for any possible effect is of course that the provided system is reliable and correct.

Availability

Availability with regard to collective transport systems can be defined as the ease of use and the offered service of the collective transport system (Beirão and Cabral, 2007). This deals with flexibility and

accessibility of the collective transport systems. To be effective it is important that the system can be used easily (the availability of location stops which influence the before and after transport of travellers) and offers enough capacity to serve the number of passengers at different times of the day.

Cost

Cost can be associated with the fares of the transport tickets and gratuities (Hoel and Schrinner, 1998). Low cost options are generally preferred but if the transport system offers fast, comfortable and reliable transport people are probably more willing to pay a higher fare.

The competition with other means of transport must be seen as a challenge for the collective transport sector. To create a competitive advantage in performance it is necessary to be constantly innovative and upgrade the collective transport by taking into account the above mentioned quality characteristics. A way of creating more innovation in the collective transport sector could be a closer collaboration between the suppliers and the end-users of collective transport. According to van Dijk (2005) the collective transport sector can act earlier and be more innovative if there is “a closer working relationship between collective transport authorities, customers and the business environment” (p. 24). This creates the possibility for the collective transport sector to take a look into the future requirements and accessibility needs of a certain area. If the travel conditions of collective transport are good, travel time unit costs can be lower than driving. This is because travellers experience less stress, are able to rest, gain travel time or can use their time more productive. This is shown by Litman (2008).

Linking this section with section 3.2 leads to the following. Different collective transport systems bring along different cost and different qualities. The distinction between collective transport and high grade collective transport depends on the offered quality. As this section showed this quality is influenced by a lot of different factors. The most important factors in convincing the choice rider to use the collective transport system are reliability, frequency and comfort. For tram, metro and train it is the easiest to be a high grade collective transport system. But when the travel demand of collective transport is low, interest inevitably focuses on the bus system. This is partly because the capacity of the bus mode is more flexible than the rail systems (Goodbody, 2000). Additionally, the bus system can use the existing road infrastructure and therefore does not always lead to high infrastructure capital costs. If the bus system wants to compete with private transport it must offer fast, comfortable and frequent services. This can be possible when offering a complex bus system with separate bus lanes but this will lead to higher infrastructural costs compared to a normal bus system. An example of a successful high grade bus connection is the Zuidtangent in the Netherlands which is a bus service that connects Haarlem via Schiphol to Amsterdam Southeast. It is a very fast bus which (partly) uses separate lanes, offers high comfort and is seen as a high grade collective transport system.

3.4 Role collective transport in relation to business parks

If new collective transport infrastructure is created the accessibility of the concerning area is influenced. This section will discuss the role of accessibility and the consequences the change in accessibility has on the travel behaviour of individual people. The section is concluded by taking a look at the factors that influence the demand of collective transport to and from business parks.

3.4.1 Accessibility

Accessibility is an important concept in transport planning as well as urban planning. As seen in chapter 2 it can be one of the aspects that make a location attractive for firms. Good transport infrastructure and services can reduce the transportation cost of companies. Accessibility also plays a role in other location factors such as the ability to attract sufficient employees and the size of the market the company can serve from his location. Section 2.4 showed that these factors score high in location surveys such as the European Cities Monitor. On a whole accessibility thus is a relevant factor for the location choice of companies but one must realise that most studies show that accessibility only plays a role of small importance (Pen, 2002). This is also shown in section 2.4.2.

Accessibility can be defined in several ways and thus has a variety of meanings. It gives people the possibility to participate in activities at different locations. It refers to the ease of reaching services, goods, activities and in general, destinations. It is affected by the quality of the different transport systems, such as the quality of stations and terminals, parking conveniences and the ease of transferring. For this thesis not all of these influences and aspects of accessibility will be taken into account. The focus will be on place accessibility from the perspective of the development of a business park.

Accessibility by collective transport is not only important to companies because of the fact that employees want to use it to get to their work but also because of the possibility of making use of it. "The possibility of making use of a transport mode may lead to a higher valuation of the accessibility by a transport mode than would be expected on the basis of its actual use" (Willigers, 2006, p. 28). Two relevant concepts for this are the value of choice, which is the value of the existence of a choice option regardless of the actual use of this option, and the option value, the ability to use the system at unforeseen circumstance (Geurs, and van Wee, 2004). Of course the transport system then must offer reasonable access and some comfort but if so, the presence of for instance a train stop near an office can offer a value of choice to the employees of that office and offers an alternative in case of for instance a car breakdown.

Although good collective transport is not mentioned as most important factor it should not be underestimated. Accessibility of an area by collective transport can support the attractiveness of an area both for companies as well as employees. The presence of good accessibility can also provide the ability to connect qualified employees with companies. Optimally collective transport should function as supportive to the development of business parks. It enables transport of employees which on their turn offer the labour and knowledge that companies need to perform and create productivity. Investments in transport can play an obvious role in reducing travel time and increasing the labour pool from which firms can draw their employees. According to McQuaid et al. (2004) the accessibility to the workplace can increase the size of the labour market.

3.4.2 Generalised transportation costs

The creation of new collective transport infrastructure can change the relative accessibility of an area or business park. This does not necessarily happen but it depends on factors like the willingness of people to change their transportation behaviour. Whether people do so depends on how the new infrastructure will influence their travel behaviour. According to Rietveld (1994) the creation of transport infrastructure influences the generalised transport cost (GTC). The GTC includes the total of monetary transport costs, time (travel and waiting) and effort (discomfort, risk of delays etc.) (Pol, 2002). The creation of new

(collective) transport infrastructure can influence all three elements. For instance it can lower the cost of time as distance will be shorter or speed will be higher. Such changes can in their turn have impacts on the movements of travellers, on mode choice, choice of time of day, route choice and the attraction of trips per zone (Rietveld, 1994). The value of travel time and effort can differ per individual. For instance, a business traveller will, compared to a tourist, attach higher values to relatively fast and comfortable transport. The value also depends on prosperity (Pol, 2002). As prosperity rises, the economic value of time increases and an individual will attach more value to relatively comfortable transport. When choices must be made with regard to the quality of the new collective transport one must realize that high grade (discussed in section 3.3) collective transport probably will have another influence on the GTC of travellers' then general collective transport. With high grade collective transport a traveller will for instance give a lower value to effort then with general collective transport.

Rietveld (1994) distinguishes several other effects of the creation of new transport infrastructure in combination with the changes in transport behaviour of both households and firms. It can lead to an increase in productivity in the region concerned, although it has to be noticed that this effect will be smaller when dealing with collective transport instead of transport as Rietveld (1994) does. Further new infrastructure can lead to more reliable transport. It can improve the labour market as it extends the area from where people can be recruited. It can also change the relative accessibility as already mentioned above. The increase in productivity and the change in accessibility may induce "expansion or relocation of economic activity or population" (Rietveld, 1994, p. 331). Section 2.4 already discussed the role accessibility can play in the (re)location choice of companies. Figure 3.4 (Rietveld, 1994) summarizes the analysis of this section.

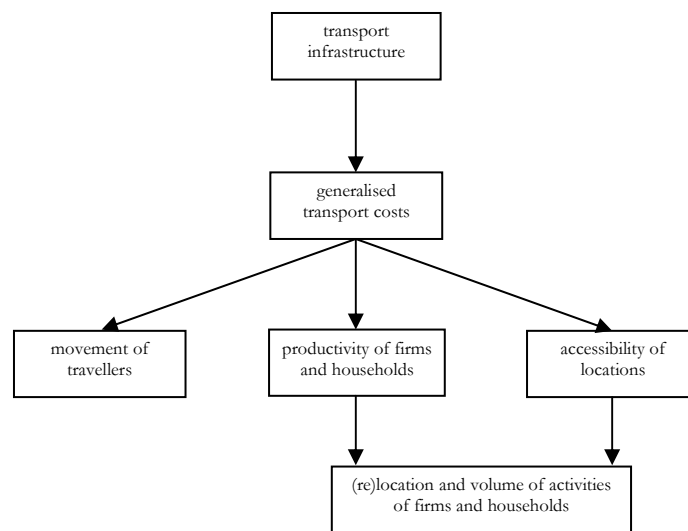


Figure 3.4 Transport infrastructure effects

It has to be noticed that figure 3.4 is a simplified presentation of reality as more effects and relations can be found.

3.4.3 Collective transport demand of business parks

The development of new business parks will lead to a certain demand of traffic. For this thesis it is important to know what the consequences are for the demand of collective transport. How much demand

for collective transport will be generated by the new business parks? It is important to answer these questions because after knowing the future demand it is necessary to think about the requested infrastructure and question if the current infrastructure suffices or if new infrastructure is needed. In the first place the demand of collective transport by business parks depends on two factors:

1. The size of the companies at the business park.

How many employees and visitors can be expected? The more employees and visitors, the higher the demand of transport.

2. The type of companies which will establish at the business park.

Not every type of company has the same travel demand and also not the same modal split.

Based on the size and the type of the companies an estimation of the travel demand can be made. To make a good estimation of the travel demand it is necessary to determine the following information:

- the travel demand to and from the business park by employees, visitors and customers
- how is the travel demand spread during the day?
- how is the travel demand divided over the different modes (car, collective transport, bike, remaining)?

If this information can be estimated for every company on the business park then it is possible to estimate the future travel demand for the whole business park.

3.4.4 Get used from the start

When trying to persuade the choice rider to use the collective transport system the moment from when the system is available can also be important besides the aspects mentioned in section 3.3. When a new business park is developed the demand on collective transport will be mostly small in the beginning as not all sites are developed at the same time. The discussion about the moment of offering collective transport is a familiar discussion between traffic engineers and urban planners. Traffic engineers argue that the revenues of the exploitation of the collective transport system are very low at the beginning and are far from profitable. Urban planners want to offer good collective transport from the beginning so everybody can get used to it. It seems that traffic engineers mostly win this discussion (Zijlstra, 2005). According to van der Bijl (2008) collective transport must be realised from the beginning because of two important reasons:

1. If one wants to persuade people to use the collective transport system it must be there from the beginning otherwise people already have found another way of travelling. It is proven that when people are already used to travel by car it is even harder to persuade them to do otherwise van der Bijl (2008).
2. Developers want to be sure that collective transport infrastructure is available and that it will be so in the future. When infrastructure is created at the beginning it gives a kind of guarantee that it will be there for the next 30 years, especially with rail. It creates stability as for instance a shift in political power will not change the system as the infrastructure already is created.

With some collective transport system it might be possible to let the system grow along with the demand. For instance with busses one can choose to use smaller busses. When one wants to offer a high quality it is important not to play with the frequency. When the frequency is low at the beginning it can not be judged as high quality and then it still doesn't attract the choice rider. A disadvantage of the bus system is that it does not guarantee the stability developers would like as it does not need high infrastructure costs.

3.5 Relevant features

For most people the private car is steadfast favourite, and will be so in the (near) future, *ceteris paribus* (SCP, 2005; Steg, 1996). According to Brookhuis (2007, p. 271) “there is no ground to embrace the view that without particular, drastic changes a dramatic ‘modal shift’ from car to collective transport will occur”. But there can be some developments which can have some influence on the meaning of collective transport at the short and the long run.

3.5.1 Congestion

Urban transportation is still characterized by an increasing preference for, and use of, private cars. Cars have provided people with all of positive points like freedom, increasing mobility and status. The number of cars increased and cars are also used more extensively. A consequence of this growth in mobility and in the number of cars is traffic congestion. Congestion does not seem to end on the short as well as the long run. It is accepted as a major constraint on individuals’ quality of life but also on the efficiency of business (Banister, 2008).

With the ongoing congestion the door to door convenience of cars, compared to collective transport, starts to erode. Private car use is getting less reliable as travel time is more uncertain. As stated in section 3.3 people try to reduce the chance of an unreliable movement. That is why the rise of congestion might offer chances for collective transport to compete with the private car and convince some travellers to switch mode.

3.5.2 Environmental concerns

Over the past 25 years the movement of passengers increased by 110%⁸. The growth of mobility is strongly related with economic growth as growth of mobility contributes to economic growth and vice versa. Along with this mobility growth and economic developments, negative impacts with regard to the environment and the well-being of people are identifiable. Although the pollution per kilometre has decreased, the number of cars increased and cars are also used more extensively. This growth causes a rise in air and noise pollution. If the current mobility trends will continue, social, economic and environmental cost worldwide would be unacceptably high (T&E and Stichting natuur en milieu, 2004). To alter these developments an immediate cut in carbon emissions and CO₂ emission is necessary.

A long time this decline of the environment was not an important issue but nowadays there is an increased awareness for environmental problems. According to Mingardo et al. (2008, p. 11) people in a knowledge-based economy pay more attention to issues like quality of life, health and the environment. As a consequence politicians world wide are more and more considering environmental issues as one of the top priorities in their agenda. This is confirmed with world wide initiatives such as the C40 cities within the Clinton Climate Initiative⁹.

⁸ <http://europe.eu.int/comm/research/growth/gcc/ka02.html#top> (Accessed on November 2008)

⁹ Climate change does not exist merely on paper. The European Environment Agency (EEA, 2004) provides a worrying overview of some 20 concrete climate impacts in Europe. Climate change is also known as global warming or the enhanced greenhouse effect. It is caused by the rise of the average global temperature due to increasing levels of greenhouse gases in the earth’s atmosphere. This in turn lead to rising sea-levels and more extreme and unpredictable weather conditions all over the world. If nothing is done, these changes will radically alter our environment (Greater London Authority, 2007).

The transport sector is a very significant contributor to global warming. The total contribution of the transport sector (including aviation and shipping) currently accounts for about one third of overall greenhouse gas emissions and it is to be expected that this will further rise if no additional measures are taken (T&E and Stichting Natuur en milieu, 2004).

Nowadays most of the economic activities are generated in urban areas and also most people live in and around cities. A major consequence is that urban areas are the biggest contributors to global warming. According to Mingardo et al. (2008) approximately 80% of all CO₂ emission is generated in cities. Therefore environmental issues must be recognized as urban issues.

Especially in large cities air pollution is a major concern. Urban pollution is caused by the big amounts of (commuter) traffic of people who want to get in and out of the city every day. Their vehicles are a major cause of urban smog (Kahn, 2008). World wide several cities have to deal with smog alerts on sunny days. The most well known recent example is the smog problem of Beijing at times of the Olympic Games, which lead to drastic measures like prohibiting drivers the use of their car at certain days. According to Kahn (2008) polluted cities may get trouble in attracting and retaining firms and skilled people which seems inline with the fact that people in a knowledge-based economy pay more attention to issues like quality of life, health and the environment.

The above described environmental concerns must be translated into transport policies. It is necessary to design policies that enhance sustainable transport. The next section is about sustainability. It will also discuss how sustainable collective transport really is compared to the private car.

3.5.3 Sustainability

Sustainable development is defined in the Brundtland Report (1987) as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. Sustainable transport development can then be defined as the use of transport and other factors in helping to meet present transport needs without jeopardising future generations.

As stated above the preference for and the use of private cars still rise along with the rise in mobility and economic growth. The problem is that car use contributes little to sustainability, they often have a low occupancy and they are inefficient in their use of road space, they use fossil fuels and roads are overcrowded which lead to unsafe situations and to congestion. As sustainable transport development is becoming more important due to the climate change it can have consequences to the interest in and the need of collective transport. In contrast with car use, collective transport modes are usually considered as supportive to sustainability due to their better use of road space and their higher occupancies. It is clear that walking and cycling contribute the most to sustainability objectives because they do not use (fossil) fuel. Opportunities to reduce CO₂ emission from transport are necessary to be pursued in most cities. There are three broad measures which can be taken to reduce CO₂ emission from transport (Greater London Authority, 2007, p.138):

- Change the way of travelling

A part of the current transport trips must be substituted by trips by other transport modes with lower carbon en CO₂ emissions (Greater London Authority, 2007). This can be realised by

continuing investment in collective transport to improve its attractiveness. Collective transport also has to be promoted, together with walking and cycling.

It is also possible to make use of pricing mechanisms to encourage other travel behaviour.

Another issue is to reduce the need for travel by using land use planning and other policies.

- Operate vehicles more efficiently

Without changing their existing vehicle drivers can operate their vehicles by minimising unnecessary fuel consumption. Other options are using ISA (Intelligent Speed Adaption). ISA systems can limit the speed of vehicles, provides road safety benefits and can reduce fuel usage.

- Use improved vehicle and fuel types

The sale of lighter and more fuel efficient vehicles can be promoted for instance by tax policies. It is also possible to focus at new types of engine technologies such as hybrid or electric vehicles or use lower carbon energy sources such as bio fuels, which has as lower CO₂ impact.

With regard to collective transport the conclusion is that it is a mode with lower carbon emission and therefore it might serve as substitute as an environmentally friendly alternative for the high carbon modes such as private cars. At first this seems plausible as CO₂ emission per traveller kilometre in 2003 was 60 gram for the train, an average of 87 gram for the bus, light rail and metro and for private car on average 126 gram (Zwaneveld and Bakker, 2008). Using collective transport can be better for the environment than using private car. But it has to be noticed that it only will be better for the environment as private car users substitute their car for collective transport because more collective transport means more trains or buses which leads to more pollution. If this is not the case CO₂emission can even increase instead of decrease. Moreover, in order to make collective transport attractive for choice riders they have to offer a high quality which also means a high frequency as shown in section 3.3. The consequence can be that collective transport become less efficient due to lower occupancy rates. To conclude, the gain at environmental level does not necessary have to be high but also can be small or even negative. Besides that one must consider that more and/or better collective transport will also attract people who used to travel by bike or who were walking.

In the context of sustainability companies are more willing to pay attention to mobility. More and more companies show respect for values such as the protection of the environment and human rights. This is also called corporate social responsibility. Corporate social responsibility (CRS) can be defined as a concept whereby companies consider the interest of society by taking responsibility for the impact of their activities on the involved stakeholders (such as employees, customer's shareholders and communities) as well as the environment. This concept goes beyond the obligation of companies. It is a voluntary step and it can be an essential contribution to improve the society and the environment. Companies start to collectively communicate their economic, environmental and social performance. They draw up a sustainability report¹⁰.

It seems like companies are really affected by environmental issues but most companies do so because it brings them advantages. According to Mingardo et. al. (2008) there are basically three main drivers behind

¹⁰ Corporate social responsibility has almost become a license to operate. To define their CSR a lot of companies use the triple-P concept which stands for people (Social and ethical), planet (environment) en profit. This growing interest for CRS will affect the choices companies make with regard to the three p's. Sustainability and climate change are mentioned as key issues in many CSR-strategies. Nowadays companies are more willing to contribute to a more sustainable city.

this environmental concern of companies: “first sustainable mobility makes companies save lots of money; second it might be a very effective marketing instrument to build a positive image among customers and the collective; finally it makes companies more attractive as employers” (p. 24).

3.5.4 Parking policy

Parking facilities bring along high costs to companies and other stakeholders. In the Netherlands there is a 60% rise in parking cost over the last ten year¹¹. Parking conflicts are among the common problems faced by designers, planners, operators and other officials (Litman, 2008). Those problems can be related to the supply of parking places or in terms of management of parking places. The first has to do with the availability of parking places and the latter with the inefficient use of the available spaces which should be better managed. Generous parking supply will lead to increased automobile dependency which can lead to more traffic, extra congestion and more emission which does not fit into the sustainability ambitions of governments (Litman, 2008).

Litman (2008) describes a parking paradigm shift. The old paradigm strives to maximize supply and minimize price. It assumes that every destination should satisfy its own parking needs and that parking should be free at most destinations. Parking lots should almost never be filled. Nowadays more and more cities are trying to discourage people to enter the city by car although it does not yet seem to work. This new paradigm strives to provide optimal parking supply and price. “It considers too much supply as harmful as too little, and prices that are too low as harmful as those that are too high” (Litman, 2008, p. 7). Full parking lots are acceptable. Both in city centres as well as at business parks policies are implemented to limit the use of parking and the number of parking spaces. The new paradigm favours to charge users the cost of their parking facility in order to provide incentives for people to leave their car out of the city centre. It is also possible to provide financial rewards to people who reduce their parking demand in the city centre. Another important development is that parked cars are getting off the street to create a better looking street. In change, parking places are created underground. Although this only looks a cosmetic policy the consequences are felt in terms of costs. According to Litman the high cost of underground parking results in the development and implementation of cheap alternatives to on-street parking.

The same goes for business parks. In the past parking at business parks was no issue. Companies mostly got what they want with regard to the amount of parking space. Nowadays the new parking paradigm also affects parking at business parks. By offering limited parking places at business parks employees can be persuaded to travel to work by collective transport. The parking limits of course can not be zero but one must try to find a balance which companies can accept. Litman (2008, p. 4) stated that “the goal is to provide an incentive for companies to actively get involved in the mobility of their employees and start with mobility management”. This can lead to involvement and price agreements with the ‘company’ who offers the collective transport connection. It has to be noticed that one must be careful with those parking limits as for a lot of companies parking places are an important location factor (section 2.4).

According to Litman (2008) parking management strategies can help to reduce vehicle traffic, create more accessible land use patterns or support other mobility management objectives like for instance the use of collective transport.

¹¹ www.cbs.nl (Accessed on April 2009)

3.5.5 Development patterns

The location of jobs is very important for the way people travel to their work. Nowadays the trend is to create mixed areas, where jobs are combined with a residential function and services. By doing so an attractive work environment is created. Mixed use settlement, where jobs are combined with a residential function, promote sustainable transport and contribute to the appreciation of the walking environment/area. In contrast, “settlement that are low density and do not have mixed use promote trip generation and longer trip lengths. Longer trip lengths and dispersed settlement pattern in turn encourage car use” (Goodbody, 2000, p. 12). For collective transport it is necessary to create sufficient demand all day long and not only at peak hours. Mixed use contributes to the viability of collective transport as it leads to higher densities and compact settlements.

Accessibility by collective transport is better organised in centre locations than at locations around highways. Space in centre locations is mostly scarce and expensive. Therefore some companies decide to locate at the edges of cities, especially around highways. The consequence of these spatial development patterns is a weaker position of the collective transport.

3.6 Conclusion

In order to attract ridership, collective transport must provide such a quality that it can compete with that of the private car. Captive travellers are less sensitive to changes in quality in transit service as they have no other choice. To attract the choice rider it is necessary to offer a high quality. To offer such a quality the chosen system must be reliable, have a high frequency, offers comfort, provide clear information and must be close to travellers.

The creation of new collective transport infrastructure can change the relative accessibility of an area or a business park and with that change the transportation behaviour of people and influence their GTC. The value of travel time and effort can differ per individual. When choices must be made with regard to the quality of the new collective transport one must realize that high grade collective transport probably will have another influence on the GTC of travellers' than general collective transport. For light rail, metro and train it is easier to offer a high quality than for buses. Sometimes buses can be seen as high grade but this requires special measures. Especially when the travel demand of collective transport is low it seems logical to choose for buses as this is the cheapest system to offer. As described it is important to offer a high quality in order to attract the choice traveller. For buses to do so they must be fast, reliable, have a high frequency and offer comfort. To accomplish that it is necessary to create separate bus lanes. Only then the system can be seen as high grade and compete with the private car.

Although for most people the private car is steadfast favourite, there are some developments which can have influence on the meaning of collective transport at the short and the long run. Rising congestion, environmental concerns, the attention for sustainability and the rising parking cost can have impact on the role of collective transport.

4 Conceptual Framework

4.1 Introduction

The key question of this study concerns the influence of the early realization of high grade collective transport on the development of business parks. To address this issue this chapter draws a conceptual framework for the analysis of the benchmark and the Schieveen case. Therefore in this chapter the findings from the literature reviewed in chapter two and three will be combined in a conceptual model.

Section two of this chapter shows the framework and will work out the various factors. The framework of this chapter will be used to analyse the chosen benchmarks in chapter five, six and seven. Chapter eight will perform the benchmark by comparing the results of the analysis and find out the most important learning points by comparing them. The framework of this chapter will also be used to analyse Schieveen in chapter eight. Section three will link the topics business park and collective transport.

4.2 Framework

The framework contains two elements namely a business park and (high grade) collective transport by which the chosen benchmarks and the case study will be analysed. Before anything can be said about a business park and (high grade) collective transport it is necessary to look to the context where everything takes places. That is why the big circle of figure 4.1 refers to the situation. Both elements have to do with situation factors and have their own place inside the big circle. Business park as well as collective transport can on their turn be divided into a number of relevant features that can be aggregated into three factors.

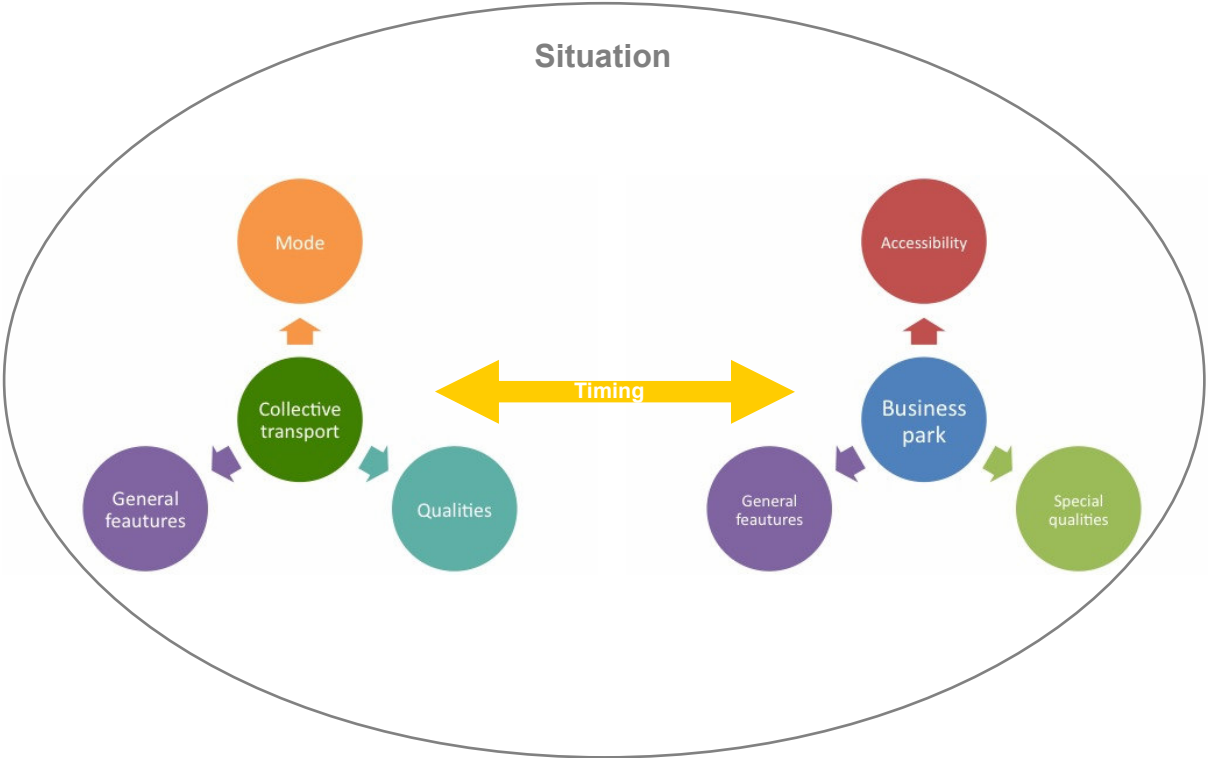


Figure 4.1 Framework for the analysis

To make a comparison or an evaluation, the factors of the framework need to be measurable. At the end of this chapter table 4.1 shows the factors of the framework together with some indicators that help to define the factors and which on their turn are made ready for use by defining how it can be measured. It is beyond this thesis to gather all necessary information but the table shows some indicators by which the factors can be made comprehensible.

4.2.1 Situation

As shown in chapter two the situation is the location of a place relative to its surroundings and other places. This is an important factor in the choice of companies whether or not to locate in an area. Some important situation factors are the quality of labour, the quality of life, the economic performance of a region and the image. If the new business park lies in an attractive area companies are more interested to locate in such an area.

4.2.2 Business park

The factors decisive for the development of the business park will now be explained.

General features

There are some general features that are important to know as they can play a role in the demand for collective transport and the sort of companies that want to locate at the business park. Some important factors are the size of the business park, and the size of the (expected) working population. Knowing these two factors is important in making a choice for the construction of collective transport and the choice of the system. Besides that it is necessary to know the land price and the target groups the business park focuses on. The target group will bring along some demands that companies set to the area and the price level will leave some companies out. Other indicators are the type of business park, type of office location and the liveability of the area.

Accessibility

Accessibility can be one of the aspects that make a location attractive to firms. It gives people the possibility to participate in activities at the business park. To determine the accessibility of the business park one has to take into account the accessibility by different modes namely car, collective transport and by plane. By doing so the (inter)national accessibility of a location can be judged.

Special qualities

Some locations offer special qualities that distinguish them from other locations and makes them attractive. When business parks target at knowledge intensive companies it can be very helpful if knowledge institutions are present (or planned) at the business park like for instance a university. Other specialties are for instance the proximity of an airport, the liveability (multi functionality) of an area or the presence of nature or cultural facilities. It is important to know if the business park offers such special qualities because they can overshadow other factors like the presence of collective transport. As the indicators differ per location (because the special qualities also differ) they are not included in table 4.1.

4.2.3 Collective transport

The factors decisive for the collective transport system to the business park will now be explained.

Mode

Five different systems are distinguished that can connect the business park namely the bus, light rail, metro, train and ferry.

General features

It is important to know who is responsible for the organization of the collective transport and how it is financed. This can influence the basis the system has. For instance if companies already paid for the collective transport system (in terms of service costs or negotiated in the surface price) they might have another attitude towards the system or have some influence on how the system is organised.

Quality

To find the influence of collective transport one must take a look at the role of collective transport for the choice riders as captive traveller do not have a choice. As the collective transport system can compete with the car there is a possibility that the choice rider will use the collective transport. To know if the collective transport can compete with the car the quality must be determined by taking into account the quality characteristics mentioned in chapter three such as reliability, frequency and comfort. By gathering information about those factors the quality of the collective transport system can be judged. Other indicators are travel time, real time information, availability, travel cost and if the system is part of a network.

4.2.4 Timing

As this thesis wants to determine the influence of the early realization of collective transport on business parks it is important to know when the system became available at the chosen benchmarks. As shown in chapter three the momentum of exploitation also is a factor that can influence the choice rider. It is proven that when people already are used to travel by car it is even harder to persuade them to travel otherwise. Therefore it is important to know when the system became operational.

4.3 Linking collective transport with business park

The above section provided for both elements, collective transport and business park, a research framework. When following the framework, information must be found about the role of the two elements. Unfortunately it does not provide insight in the link between those elements. Therefore other information is necessary. For instance by looking at the role collective transport plays in the decisions of companies to locate at the business park. This can play a role, but other factors such as good accessibility by car or the amount of parking places might be more important. This research does not provide insight in the weight of these factors and how they contribute to the performance of the business park.

To gain some sense in the link between the elements two key persons of every benchmark will be asked to make a ranking¹². They will be asked to judge the influence (strong, weak or no influence) of the following factors that according to them determine the performance of the business park:

- Presence of qualified labour pool
- Image of the area
- Quality of life in the area
- Nearby presence of an airport

¹² See appendix

- Amount of parking space
- Accessibility by public transport
- Presence of special facilities at the business park namely
- Accessibility by car
- Presence of a catalyst function
- Visibility from the highway

It has to be noticed that this list of factors is not exhaustive.

Besides that the key persons will be asked to rank the importance of the following factors to the current collective transport system serving the business park in order of their positive contribution:

- frequency
- travel demand
- comfort of stops and vehicles
- the fact that it was present from day one
- total travel time by public transport can compete with the car

This list of factors also is not exhaustive.

In the next five chapters the conceptual framework will be used to evaluate the case studies and to perform a benchmark.

Situation	Economic performance	gdp
		number of inhabitants
		unemployment rate
		city ranking Datar
		Huggins & Davies competitiveness monitor
	Quality of labour	economic activity rate
		percentage of high educated people in the region/city
	Quality of life	atlas van de Nederlandse gemeente
Business Park		
General Features	Size	netto ha.
		number of expected establishments
		number of present establishments
	Land price	price per m ² gross floor area
	Type of business park	five types of section 2.3.1
	Type of office location	seven types of section 2.3.2
	Target groups	specific sectors (appendix A)
		number of competing business parks within 20 km
	Size of working population	number of employees at business park
	Size of working population	number of expected employees at business park
	Liveability	mono or multi functional
Accessibility	By car	degree of daily congestion
		distance to highway (km)
		number of parking places per m ² GFA
	By collective transport	average distance to stop (m)
		distance to city centre (km)
		travel time from central station to business park
	By plane	distance to airport (km)
Special qualities	The indicators depend on the special qualities which differ per location	
Collective Transport		
Mode	Bus, Light rail, Metro, Train, Ferry	
General Features	Organization	who is responsible for the organization?
	Financing	how is the system being financed?
Quality	Reliability	information on delays
		percentage on time
	Frequency	number of vehicles per hour
		time spent waiting at rush hour
	Travel time	average speed (km/hour)
		number of stops to central station
	Comfort	comfort in transport system (in vehicle and on stops)
	Real time information	travel information at stops (yes or no)
		travel information in vehicles
		travel information at companies on the business park
	Availability	number of seats per vehicle
		occupancy rate (supply versus amount of use)
	Travel cost	costs in Euros for a day return CS to Business Park
	Part of network	hub or spoke
Timing	momentum of exploitation	day one or later

Table 4.2 How to measure the different factors

5 Benchmark Göteborg: Norra Älvstranden

5.1 Introduction

This chapter focuses on Norra Älvstranden, a former port and shipbuilding area in Göteborg, which was founded in 1621. Up until the 1970s Norra Älvstranden (NÄ) was the home of Göteborg's three world famous shipyards, and also contained cargo handling and port facilities. The 1973 oil crisis not only caused a recession but also spelled the beginning of the end for shipbuilding in Göteborg. This left the area with withdrawn economic activities which led to a high unemployment, and empty buildings. Due to massive redevelopment projects initiated by the local government, the northern area, especially the Älvstranden became more attractive.

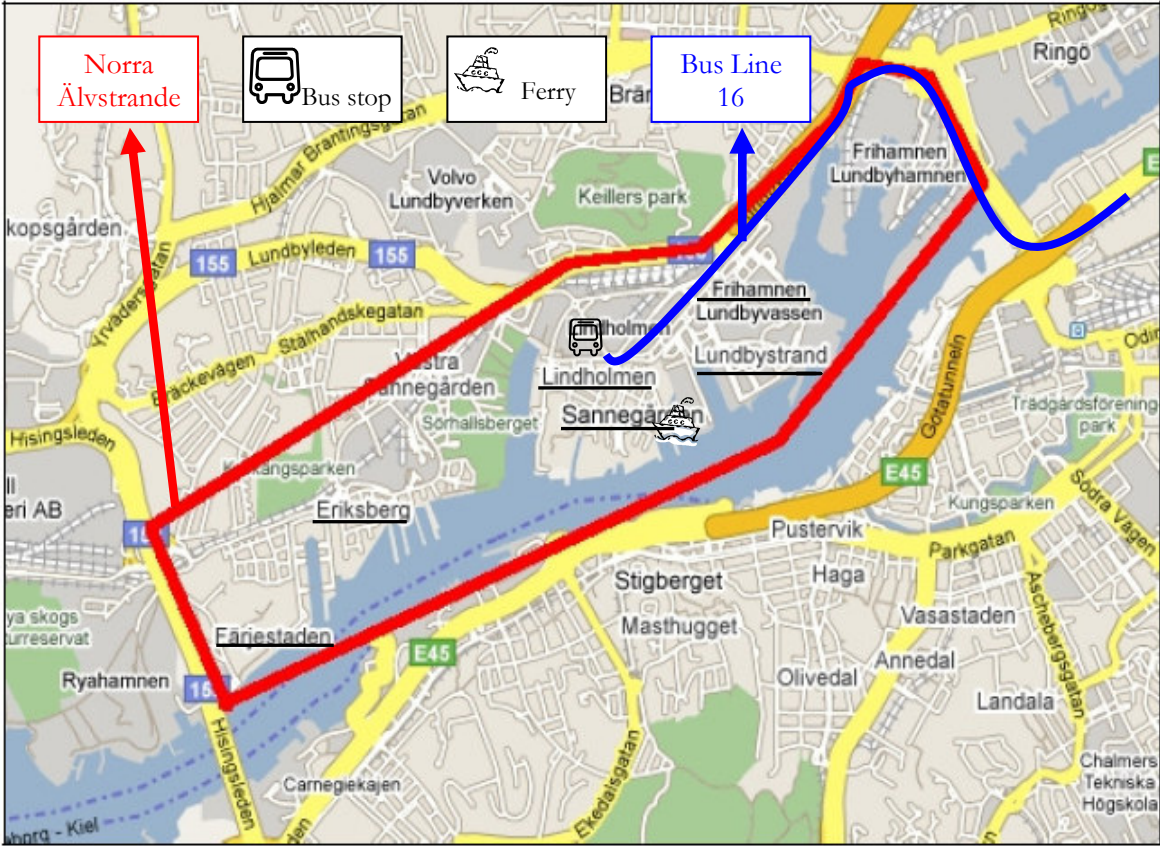


Figure 5.1 Norra Älvstranden area Göteborg¹³

In 1996 the government set up a special redevelopment corporation, the Norra Älvstranden Utveckling AB (NAUB) with the goal to redevelop NÄ in such a way that it does not cost the City any money. The corporation is fully owned by the government but has its own board of directors, is market-led and must operate like a private company. The NAUB is the owner of the land and is able to borrow money commercially in order to finance their projects. Besides that they are free to reinvest all their profits in the area itself. They do not operate with a rigid overall master plan but with a set of overall guidelines set by the Planning Authority (PA). The NAUB and the PA work closely together with (potential) developers and (potential) end users. In this way it has been possible to move forward the development step by step,

¹³ www.maps.google.nl (Accessed on February 2009)

quickly responding to changing market conditions, but keeping in mind the overall aims for Göteborg as a whole (Cadel et al, 2008).

NÄ lies between the Älvsbrog Bridge (west side) and the Göta Älv Bridge (north side) and covers about 250 ha of land and 40 ha of water. The area can roughly be divided into six districts: Färjenäs, Eriksberge, Sannegården, Lindholmen, Lundbystrand and Frihamn as shown in figure 5.1. For all these districts, many plans have been constructed. This thesis will focus on the Lindholmen district.

The first plans for NÄ aimed to revive the employment in the area by creating industrial jobs similar to the lost one. This did not turn out successfully as new markets did not appear. The next plans (early 1980's) focused on housing. However, these plans were rejected by the City planners as there already was a housing surplus in Göteborg. During the second half of the 1980's new plans for the area were made. One of the problems NÄ had to cope with was that the area had a poor reputation. Therefore a campaign was launched to tackle the bad image of the area. During the early 1990's large scale events were organised in order to attract many people to the area. Pop concerts, exhibitions and sport events like the Volvo Ocean race were organised to show people the area could be quite enjoyable. Gradually the negative image disappeared and NÄ became a more familiar and accepted place.

One of the crucial factors in the development of NÄ was the decision to locate educational and training facilities in the area. This already started in 1978. The set up of NÄ was based on the triple helix approach. According to Mingardo et al. (2008, p. 92) "the triple helix approach is a coordination approach combining the strong points of society, university and industry and it is a key issue in the knowledge economy". The combination of industry and university is already since the 1980s recognised as source of economic growth.

In 1998 the planning for a Knowledge centre in the Lindholmen area began. The motives behind this plan were to strengthen the development and competitive potential of Göteborg as a knowledge intensive city. In 1994 Chalmers University of Technology decided to open a second campus in Lindholmen, The Lindholmen Science Parks. This was realized in 1999. More recently (2001) Chalmers and the Göteborg University jointly set up an IT University in the Lindholmen area in direct connection to the business cluster. Nowadays the area has about 3.000 students.

The redevelopment by NAUB focused on three key elements: "1. political consensus; 2. reinvesting profits into the area and 3. first attract investors, then build" (Mingardo et al. 2008, p. 92). The third element was very important for the transport policy at NÄ. Because first investors were attracted, substantial starting capital was available before the building started. This made it possible to construct the necessary infrastructure from the beginning.

NÄ is chosen as benchmark because of the following reasons. First NÄ focuses partly on the same target group as Schieveen namely knowledge intensive companies. Second NÄ as well as Schieveen are good accessible by car. It both are large areas with a lot of space for new developments. Besides good accessibility by car NÄ is also well accessible by collective transport. Schieveen does not have a collective transport connection yet. A whole new connection is necessary. The aim of choosing NÄ is to learn about the role of collective transport in the development of the business park.

The main difference with Schieveen is that NÄ is much closer to the city centre where Schieveen is located at the edge of the city.

5.2 Situation

Göteborg is the second largest city of Sweden with about 485,000 inhabitants. The 300 meter wide Göta Älv River divides the city into two parts. The city centre is situated at the area south of the river. The northern area has traditionally been less prosperous compared to the southern part.

Economic performance

Historically the most important economic sectors at Göteborg were trade and shipbuilding. After the oil crisis in 1973 this changed. Nowadays Göteborg has a differentiated business community with an increasing high proportion of people that work in the service-sector. Commerce, transport and communications are the largest sectors closely followed by the manufacturing industry and financial services¹⁴. The regional economy has improved strongly since the 1973 crisis. A mix of high-tech companies such as Volvo, SKF and Ericsson strongly contribute to employment and the economic growth of the region.

Göteborg has a GDP per capita of € 34,130 and an unemployment rate of 5.6 % which both is above average compared to cities within the same size in the EU 15¹⁵. The city is not treated in the Cushman and Wakefield European city monitor report. It is only mentioned by six out of 500 companies as important business location and with that qualified as 'other European city'. The Datar ranking (Rozenblat and Cialle, 2003), a French ranking of European cities which ranks cities based on 15 indicators, puts Göteborg at the 46th place. Another interesting monitor is the Huggins & Davies (2006) European Competitiveness Monitor. The west-Sweden region (larger area around Göteborg) is ranked 22nd out of 118 regions in terms of competitiveness. For comparison, the Randstad area is ranked 18th. The region of Göteborg spends 6.3 % of its GDP on research and development. From the 118 regions this is the highest. The Randstad is not ranked as only the 14 regions that meet the Lissabon target of 3 % are mentioned (Huggins and Davies, 2006).

Quality of labour

Sweden has a strong work ethic and is committed to full employment. The economic activity rate of Göteborg was 72 % in 2001¹⁶ which is high compared to other European cities. Education is held in high regard which leads to a relatively well educated population. The share of high educated people in the city of Göteborg is about 40% in 2007¹⁷ which is quite high compared to the Dutch average of 28%¹⁸.

The Göteborg University is among the largest in Northern Europe with more than 50,000 students. The Chalmers University is specialized in technical disciplines and has about 10,000 students.

Quality of life

Göteborg is seen as a place where people want to live. In general, the quality of life is well appreciated by the residents. Some of the reasons for the are the attractive city centre, the quality of the public space, the

¹⁴ www.urbanaudit.org (Accessed on February 2009)

¹⁵ www.urbanaudit.org , based on 2004 (Accessed on February 2009)

¹⁶ www.urbanaudit.org (Accessed on February 2009)

¹⁷ www.ssd.scb.se (Accessed on March 2009)

¹⁸ www.cbs.nl (Accessed on March 2009)

surrounding nature and parks, the cultural activities that are organised and the presence of one of the biggest universities of Northern Europe.

Göteborg offers attractive environmental conditions. The superb landscape around Göteborg is a unique selling point and also the environmental standard seems to be good. Göteborg has a lot of green space compared to Eu15¹⁹.

The city also offers a rich cultural life with 17 museums, 25 theatre stages and 38 cinema screens. Besides that the city has a reputation of organising major sporting, entertainment and cultural events. This started at the early 1990 when events such as the Volvo Ocean Race were organised to improve the image of NÄ. In 2008 events like ISU World Figure Skating Championships, the Göteborg Cultural Festival and the International Science Festival were organised.

5.3. Business Park

5.3.1 General features

The Lindholmen district is also known as Lindholmen Science Park and can be characterized as a high grade business park. The park was founded in 1999 and comprises about 300.000 m². Its purpose was to afford expanding companies in the mobile internet, telematic and modern media industries development opportunities in the Lindholmen area with trade & industry, universities and research facilities at hand. Following the decision of a Ericson division to move to Lindholmen the area became very attractive. Several other major companies followed Ericsson to the area. Today the Science Park is owned by the Chalmers University of Technology, the Göteborg University and development-intensive business²⁰. About 16.000 people are working or studying at Lindholmen Science Park. Some of the larger companies located in the park are: Volvo Technology, Volvo Cars, Ericsson and IBM. At the moment about 150 companies are located at Lindholmen but there is still space available for new developments. The aim of the park is to create increased innovation, international competitiveness and growth for the entire area. Lindholmen is a cluster in commerce, institutes and academies and is located at a metropolitan prime location. Key players within intelligent vehicles and transport systems, mobile internet and modern media and design were brought together. The overlap between all these players is their interest regarding the advanced use of information and communication technology in collaboration with higher education facilities.

For the whole NÄ area 15,000 inhabitants, 40,000 employees and 15,000 students are planned to come to the area.

5.3.2 Accessibility

The city of Göteborg is well accessible by road, rail, air and water. It has good road and rail connections with surrounding economic regions as Oslo (254 km) and Malmö (254 km).

Car

¹⁹ www.urbaudit.org (Accessed on February 2009)

²⁰ Ericsson, Volvo Group, Volvo Cars, Saab Group, TeliaSonera, Swedish Road Administration, Caran, Semcon, Sigma, Epsilon, Cypercom Group, IBM, Norconsult, Aktivete, Aggero, Valca, Vehiculum.

Just as any other European city Göteborg too has to deal with congestion problems. According to Mingardo et al. (2008) the majority of traffic congestion is caused by commuting people from neighbouring municipalities. In the last years investments have been made to diminish the congestion. There are two bridges connecting NÄ with the city centre, the Älvsbrog Bridge at the west side and the Göta Älv Bridge at the north side. A bit more eastward the Lundby tunnel also provides this connection. According to Pol et al. (2007), the NÄ area is now relatively well accessible but clearer road networks are needed if the area is to achieve its full potential. Lindholmen lays close to the highways E6 (3.5 km) and E20 (5 km). Without congestion it takes about 10 minutes (6.5 km) to get from the city centre to Lindholmen by car.

To discourage car use, the local authority restricted car use at NÄ. The parking norm is 0.7 parking places per dwelling which is quite low compared to other countries. Environmental cars are permitted to park free of charge for two hours in areas that are otherwise subject to a charge. Besides that, parking places at NÄ can only be rented at a rate of 100 euro's per month which is not very cheap. This is only possible because the government guaranteed that the area would be well connected by collective transport. Another car discouraging policy measure is that the parking places of businesses are pushed further away from the companies for which they are meant to be. A consequence of this measure is that in some cases the collective transport stop is closer then the parking place.

Collective transport

The area is well accessible by collective transport. The high grade bus connection number 16, offers a fast connection to the city centre and has a number of stops at NÄ (also at the centre of Lindholmen). It takes less then 10 minutes to get from the city centre to Lindholmen. Besides this high grade bus line, the area is also connected by normal bus connections (lines 31, 99, 130, 158) to other parts of the city. The water ferry also has as stop at Lindholmen and at other places in NÄ.

Airplane

The region has two international airports which make the region accessible with fast international connections. Göteborg Landvetter Airport with 4.4 million passengers the annual is the largest one. The distance to Göteborg is 25 km and it takes about 25 minutes to get to Lindholmen. The smaller airport, Göteborg City Airport has more then half a million passengers a year, lays 15 km from the city centre and is mostly served by low cost carriers. It takes about 15 minutes to get from the airport to Lindholmen.

5.3.3 Special qualities

The Lindholmen Science Park offers some special qualities with regard to knowledge and liveability which gives the area some unique characteristics.

Knowledge Institution

As already mentioned one of the crucial factors in the development of NÄ was the decision to locate many educational and training facilities in the area. This started already in 1978. The area now harbors the second campus of the Chalmers University and the IT University. The IT cluster in Lindholmen is growing which shows that the knowledge centre concept is paying of for NÄ and with that for Göteborg. The fact that technical education has always been important in Göteborg and that there is a large pool of

highly qualified IT employees in the area, was a key reason for the division of Ericsson to move to Lindholmen. It outgrew its existing premises in eastern Göteborg. Since then many companies followed. Another important supporter of the IT cluster has been Volvo, who has his headquarter in Göteborg.

Liveability

The residential areas in NÄ are specially designed to attract knowledge workers. Some original buildings have been extensively refurbished and sensitively designed modern flats have been added. The area also offers homes that face the water, where ships and smaller boats sail by. The cultural heritage is used to give the area its own, specific identity. A lot of art is integrated in the area. The Lindholmen area offers housing although most housing is at the site next to Lindholmen, the Eriksberg area which is also part of NÄ. Currently about 220 new homes are built at Lindholmen, both for rent and co-operative ownership. The area offers a mix of living, working and leisure. Facilities like restaurants, a hotel, bar, theatre, event hall, artist studios, sports centre, golf courses and more are available.

Community building centre

Right in the middle of Lindholmen lays the main building of the Lindholmen Science Park called Navet. Its central location, right between Campus Lindholmen and the technology companies, makes the building the natural meeting place for the area. It has offices, training facilities and a wide range of services like a travel agency, bank, flower shop, newsstand, optician, book shop, copy shop and a car rental. Besides that the building contains a conference centre for 150 people. It also contains a Learning Centre, 500 m² of computer halls and project rooms with good technology to facilitate company training courses. Finally, there also is a restaurant in the building with 400 seats.

5.4 Collective Transport

5.4.1 Mode

When the shipyards abandon NÄ and hardly any activity was left over, the accessibility of the area diminished. With the redevelopment of the area all sort of new activities made the area liveable again. As there where educational facilities at NÄ students where drawn into the area. Those students created a collective transport demand, not only at rush hours but through the whole day. Besides employees of the companies that established at NÄ also the facilities in the area attracted people and thus created a travel demand for collective transport. All these activities provided the critical mass for collective transport. In the beginning only an ordinary bus line connected NÄ with the city.

At that time it was believed that the areas on NÄ had higher demands with respect to the quality and the capacity then offered by the bus system (two ordinary bus lines). The passengers' prognoses indicated a significant growth within only a few years. A new collective transport system was needed. Before the development started, a master plan was produced which included good access to collective transport. The light rail (tram) was already seen as a high grade mode and had positive features that attract passengers. Busses had a low quality image and passengers tend to favour light rail above the bus. Despite that the bus was chosen for a number of reasons. First the bus was already operating on the routes where this new bus line would be implemented. A second reason was the fact that infrastructure costs of this new bus are low

compared to a rail system. The capital cost of owning the buses would be taken care of by the operator and not the city. Third, a very important reason was the lack of time. As Lindholmen and the rest of NÄ expanded very rapidly a quick solution was needed. Although the future travel demand would be high enough to operate light rail, there was not enough time available to build it. As modern articulated buses would run in five-minute intervals they could mirror the required capacity. At last the advantage of a bus system is that it offers flexibility and freedom as light rail is an irreversible investment.

One of the most successful connections nowadays is the bus line to the Göteborg Central Station, bus line 16. As 60 % of the travel in collective transport is done by tram and people have a favourable attitude according to trams it is remarkable that this bus line is so successful. The bus line was introduced in 2003 and was a success from the start. The first year there were 2.7 million passengers (2003), in 2004 there were 5.3 million passengers and in 2008 6.5 million passengers used the line. More details about this line will be discussed in the next sections.

In the early 1990's a water transport network was established to ensure a direct connection to the city centre which was one of the important conditions for the redevelopment. The project developers made an agreement with the regional transport company to contribute to the exploitation costs during the first eight years. They started with full cost coverage (100% of the operational cost which decreased by 25% every two years. Today the network consists of two lines with seven stops. The boats can travel at a speed of 20 km/h and have a capacity of 20 bicycles and 450 passengers. The ferries carry about 30.000 passengers a year.

5.4.2 General features

By offering a fast bus connection with a high quality, a modern look and higher priorities, an alternative is created that can better compete with cars. An addition goal is to reduce emissions and reducing the amount of time spent in the collective transport system.

In Sweden collective transport is organised as follow. There is one regional Public Transport Authority who is responsible for all collective transport in Göteborg and the rest of the municipalities in the Västra Götaland. Public transport is always subsidized, in Göteborg by approximately 35-40 % with money that comes from the municipality. At Norra Älvstranden the cost of collective transport are partly included in the land price. Because of the popularity of bus line 16, which is operated by Göteborgs Spårvägar, it is one of the world's few public transport routes that covers costs without tax contributions.

5.4.3 Quality

Although the above showed that more types of collective transport are offered to the Lindholmen Science Park this thesis will only further explore the bus line number 16. The consequence of this restriction is that a possible influence of the quality of the ferry and the other bus lines on the success of bus line number 16 will not be taken into account.

Reliability

No information available.

Frequency and travel time

Line 16 operates between the Central Station and NÄ. Modern articulated busses operate at the line. The buses have the capability of several entry and exits points to facilitate faster stops. Most stops are inline with the bus route, which means that the buses will not have to travel sideways when stopping. These features increase the average speed of the bus. The fourth stop is Lindholmen and it takes 6-8 minutes to get there. The bus drives every five minutes at rush hour so the frequency is 12 buses per hour.

Comfort

The city used the good image of light rail while still using the bus as means of collective transport. It used the philosophy 'think tram, drive bus'. This can be translated into bigger distance between the bus stops to increase the average speed, stability through bus lanes and other priority measures.

Real time information

At each bus stop of line 16 real time information displays are available.

Availability

As line 16 became very popular the buses were overcrowded despite their frequent departures. That is why in 2006 the operator, Göteborgs Spårvägar, decided to invest in four new Volvo buses, each with a length of 24 meter. They have a capacity of 165 passengers per bus and are used as an extra resource to cover the rush-hour periods. Occupancy rates are not available but according to Göteborg the bus line is very successful and has a high occupancy rate.

Travel cost

The price of a return ticket between the Central Station of Göteborg and Lindholmen is € 1.70. People who travel more often better can buy the Maxirabatt 100 prepaid card. This reduces the costs of a day return to € 1.38²¹.

Part of network

Bus line 16 is a single line that connects Lindholmen to the City centre and the Central Station. At the Central Station passengers can transfer to other bus lines, to the light rail (12 km tram lines through the city) or to the train. The Central Station offers connections by train to for instance Oslo and Copenhagen.

5.5 Synthesis

The city of Göteborg has a proactive policy when transport and environment are concerned. At Lindholmen the city established in 2003 a very frequent bus service, line 16. Based on the future travel demand a light rail system would also be an option. However, the bus was chosen for a number of reasons: 1. the bus was already operating on the same route; 2. infrastructure costs of a bus are lower; 3. there was no time left for constructing a rail system.

The success of the bus can be explained by a number of reasons. First, there was enough travel demand (critical mass), even from the start, to exploit the bus line because of the presence of education facilities. The travel demand has grown due to development of the residential and work areas along the line and the establishment of the new university. Second, the bus connection was available from the start so the people

²¹ www.vasttrafik.se (Accessed on March 2009)

did not need to take the car first and get used to that already. This was possible because money was available as investors were attracted before the building started and the infrastructural costs of the collective transport was partly paid by companies as it was included in the land price. Third, the bus drives with a very high frequency which makes the waiting time of passengers really short and that makes the collective transport more attractive as seen in chapter three. Finally, the government encouraged the bus use by creating longer walking distances to parking places than to the bus stop and by only giving companies the possibility to hire their parking places. That is why nowadays more people are using the bus at Lindholmen. This can be seen in the fact that companies are hiring less parking places than at the start. If they would have been the owner of the parking space they probably would have encouraged their employees of using the car as they already paid for the space but now it is also possible to hire less parking places. According to the ranking filled in by the two key person from Göteborg frequency was the most import factor for the success of the bus line.

As the Lindholmen area offers many attractive factors to companies it is hard to isolate the role of collective transport. It seems that the area is very successful due to the fact that right from the start educational facilities were already located in the area. Besides that a qualified labour pool is present, the establishment of Ericsson functioned as a catalyst, the area has a community centre to facilitate knowledge spillovers and the environment is very attractive due to the multi functional character. The ranking also underlines that these are strong factors of Lindholmen together with the accessibility by collective transport. Of course the fast collective transport made the area more attractive but if it would not have been available at this level, the area would have many other attractive factors that could be decisive in the decision whether or not to locate at Lindholmen.

6 Benchmark Eindhoven: Flight Forum

6.1 Introduction

This section is about Flight Forum, a business park near Eindhoven. The development of Flight Forum, an expansion of business park Eindhoven Airport, started at 1999. The area is developed by Flight Forum CV, a cooperation between Eindhoven and Schiphol Real Estate. Flight Forum wants to offer a high quality area and is available for both aviation-related and non-aviation related businesses. At least 50 % of the located companies must be airport related although since the beginning this demand is used very flexible. Eindhoven commissioned NV Rede (the economic development company of the Eindhoven Region) to test this criteria. According to Rede the 50 % demand is already fulfilled, so new companies do not have to be aviation-related anymore.

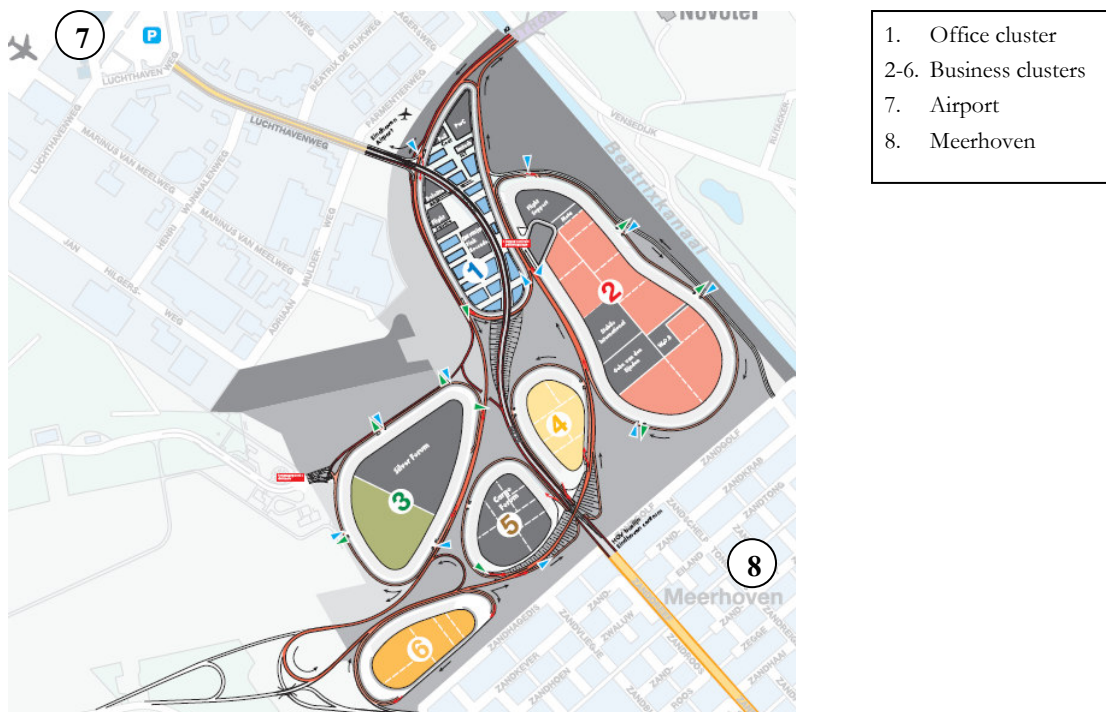


Figure 6.1 Flight Forum area at Eindhoven²²

This case is chosen as it can be compared with Schieveen because it both are (partly) office business parks nearby an airport, at the edge of the city and near a highway. Besides that the development of a high grade collective transport connection to Flight Forum was an important aspect in the development of the area. Schieveen can learn from the experience and the role of the high grade collective transport connection. The main differences between Schieveen and Flight Forum are that Schieveen is much bigger and wants to focus on knowledge intensive companies whereas Flight Forum does not have a particular target group. Schieveen also planned more offices at the business park as most space at Flight Forum is for businesses and only a small part for offices.

²² www.flightforum.nl (Accessed on February 2009)

6.2 Situation

Eindhoven is located in the Noord-Brabant province and has a population of more than 210,000 inhabitants (January 2008). It is the largest city in southern Netherlands and the fifth largest city in the country and lays some 100 km south-east of the Randstad. The city is the centre of the Eindhoven Region or the Greater Eindhoven Area which is about 1,460 square km and includes 21 municipalities with a total population of about 724,000 inhabitants.

At the beginning of the 20th century the city of Eindhoven was hardly more than a small town, with some 5,000 inhabitants. And the end of the 19th century Phillips established its lamp factory in Eindhoven which marked the beginning of the rapid development of the city²³. This led to a new stream of workers and at the same time residents of the city. The Eindhoven region transformed since the late 1980^{ies} from a mainly rural area to an industrial one. Due to the presence of Phillips new technology has long been its trademark. The Eindhoven region contributes about 40 % of the national industrial value (Van den Borg and Russo, 2005).

The declining manufacturing pushed Eindhoven to diversify their economic base. The city tries to do this by sticking to that what made the city big, by enhancing the central role of technology and design. Eindhoven wants to be an important player in the knowledge economy, but also tries to foster cultural developments. Their strategy bears the title: 'Eindhoven Innovative City of Culture'.

This strategy led to the set up of new developments at different locations in the city, each with a different profile. With the High Tech Campus, Eindhoven wants to be an engine for technology and innovation. Strijp S focuses on creative entrepreneurs. At Flight Forum big buildings are (being) developed to attract (inter)national companies. Together with business park Eindhoven Airport, Flight Forum is located next to the Eindhoven Airport. The city of Eindhoven started the development of business park Eindhoven airport (57 ha. gross floor area) in 1987. It is a modern, high grade area which offers space to a number of European headquarters, business enterprises and (air-freight) shipping agents. Eindhoven wrote in the development plan that every company that wanted to locate in this area must be able to prove that it is airport related. Although this is not achieved Eindhoven wants to keep it this way.

Economic Performance

During the Industrial Revolution, Eindhoven started to grow as textile and cigar industries flourished. The real growth of the city started when Phillips founded the first light bulb factory in its region. Since then Eindhoven and the surrounding region transformed from a mainly rural area to an industrial region with special attention for new technology. The city wants to distinguish and profile itself as a strong innovative city. The key industrial clusters include automotive, mechatronics, ICT, medical technology (Life Tech), design and food. The latter two are an emerging presence. This is a necessary development as the economic base of Eindhoven was strong but specialized which makes it vulnerable.

Research and development activities are particularly prevalent in the region. Some of the most important public and private research institutes established in the region. According to Van Winden and Van den Berg (2004) the Eindhoven region has a gravitational pull on (technical) knowledge workers. The Eindhoven region has a good knowledge base. It has a strong technological profile. The city is the home

²³ www.eindhoven.nl (Accessed on February 2009)

of a Technical University, a Design Academy and well-known knowledge institutes as well as research institutions like TNO. Eindhoven also hosts leading high-tech firms such as Phillips and ASML. More than 40 % of the total Dutch R&D expenditure is made in the Eindhoven Region.

There are concerns about the attractiveness of technical education for new students which is seen in the whole country. Action to change this must be taken at national and/or regional level. A positive thing is the attractive image of education in design which is one of the key clusters in Eindhoven. Eindhoven has two design icons: The Design Academy and Phillips Design. Also the Technical University is into design with their industrial design faculty.

Eindhoven has a GDP per capita of € 39,770²⁴ which is high compared to other cities. The unemployment rate of 2.1 % is quite low compared to cities within the same size in the EU15. The city has no place in the Cushman and Wakefield European city monitor. In the Datar ranking Eindhoven takes the 85th place of the 180 agglomerations. Huggins & Davies (2006) European Competitiveness Monitor puts the South of the Netherlands of which the Eindhoven region is a part of, at the 31st place out of 118 regions. The businesses in the South of the Netherlands spend € 241.90 per capita on research and development which ranks it at the 16th place out of the 118 regions. In comparison the West-Sweden region was ranked first place.

Quality of labour

The economic activity rate of Eindhoven was 74 %²⁵ (2004) which is rather high compared to other European cities. The knowledge base of the Eindhoven region is rather good with the presence of the Technical University of Eindhoven and TNO-industry. The share of highly educated people in the city of Eindhoven is about 32 %²⁶. About 83 % of the labour force is under the age of 44²⁷ and about one fifth of the working population is from foreign descent. More than half of them are from western countries. Most of them are assumed to be knowledge workers (Van Winden and Van den Berg, 2004).

The Technical University of Eindhoven is an important knowledge partner for industry and government in the field of advanced technology. The university has more than 7,000 students and nine faculties. The cooperation of the university with two other Dutch technical universities might strengthen their international knowledge-creating role (van Winden and Van den Berg, 2004).

Quality of life

As already mentioned the strategy of Eindhoven in offering an attractive city bears the title: 'Eindhoven Innovative City of Culture'. According to Van der Borg and Russo (2005) the strategy seems to work out "as Eindhoven has conquered, almost from scratch, a place on the map of culturally interesting places" (p. 194). Knowledge and creativity characterise the Eindhoven Region which can be seen in the atmosphere and culture of the city although it still misses some facilities for young knowledge workers. The city has 7 museums, 3 theatre stages and 15 cinema screens²⁸. The city made events their priority by organising for instance the Ice Sculpture Festival, the Dutch Design Week and the European Championships Swimming. Besides the cultural aspects the city also is a green city with attractive surroundings.

²⁴ www.urbanaudit.org, based on 2001 (Accessed on March 2009)

²⁵ www.urbanaudit.org (Accessed on March 2009)

²⁶ Inwonersenquête 2007

²⁷ www.rede.nl (Accessed on March 2009)

²⁸ <http://pon.databank.nl> (Accessed on March 2009)

Marlet and van Woerkens (2008) compose every year an 'Atlas voor gemeenten' in which they compare 50 communities on more than 40 different indicators. They defined a 'woonaantrekkelijkheidsindex', an index that ranks the communities on attractiveness of the living environment based on different indicators. Eindhoven is ranked at the 15th position which is rather high.

To conclude, the quality of life can be valued as moderate. On the one hand there is a lack of facilities for (young) knowledge workers and the city does not have an international atmosphere. On the other hand many new urban facilities have been added in the last decade and the city also possesses attractive (natural) surroundings (van Winden and Van den Berg, 2004).

Image

Eindhoven does not have the diversity and multi-cultural aspects of the other major Dutch cities, it is peripheral by Dutch standards. There is a discrepancy between the image and the perception. Some might think of Eindhoven as a city with strong potential, home of the laboratories of Philips and the presence of the Technical University Eindhoven, combined with a large population of students and knowledge workers (Van der Borg and Russo, 2005). Once people get to know the place better, they experience a more than average cultural life.

6.3 Business park

6.3.1 General Features

Flight Forum is located at a collective-transport junction at the edge of the city. The first buildings at Flight Forum were constructed in 2000. Flight Forum wants to be a high-quality, innovative business park located close to Eindhoven Airport. The park is divided into six clusters, five for businesses and one for offices (See figure 6.1). Due to the mix of businesses and offices, Flight Forum can be typified as a mixed area. The five business clusters are meant for the development of commercial properties. The area is 175,000 m² in size of which almost everything is already sold. The office cluster offers space for 15 to 20 office buildings with a total surface of more than 100,000 m² of usable floor space. There is still 50,000 m² available.

The office cluster is surrounded by a ring road. There are no roads in the cluster. The cluster is cut by a high grade collective transport route which lies in the middle of the office area on a level of 4 meters. This height has been chosen to guarantee a free flow of traffic. At crossing points the car can drive under the bus route.

At the moment 1,473 people are working at Flight Forum and 52 companies have located themselves at the area. Most people are working at the business service sector.

Based on the 2008 price level the costs per m² GFA is between €265 and €275. On top of that a one time service cost of € 20 per m² GFA will be charged. According to Oosterwegel (2006) the rental price at Flight Forum is not significantly higher than at the regional office market. The prices are between € 120 and € 150 euro per m² a year and can for Eindhoven be compared with an office location in the city centre.

Flight Forum does not have to deal with a lot of competition. The business clusters of Flight Forum are almost covered. At the office cluster about 50,000 m² GFA is still available. The area competes with the station area and Strijp S.

In 2005 RSP Brokers investigated what target groups feel attracted to business park Flight Forum. With regard to offices the following target groups were found (RSP Makelaars, 2005):

- a. Secondary location of foreign companies: They make to some extent use of the airport and attach a high value to the image of an airport
- b. Larger business services providers (international organised / international operative). Service providers that are international oriented but to some extent functionally related to an airport. These companies are sensitive to the dynamic image offered by the airport. This image must also be visible in the office in which they locate. The building must be a part of their corporate identity.
- c. Head and/or sale offices of internationally oriented companies from the Eindhoven Region. This target group is already strongly represented in the region Eindhoven (Philips, DAF, VDL) but did not yet locate at Flight Forum. This kind of companies is looking for a location with a dynamic image
- d. Small, independent business oriented service operators. They can locate in the business centre at Flight Forum as they give preference to a representative office space against flexible rental terms.

Flight Forum is a mono functional area as at the moment only offices and business are located at the area. No houses are planned. Next to Flight Forum lays a residential area, Meerhoven, which is also shown in figure 6.1. The development of Meerhoven started at 1997 and has now over 7,000 residents.

In the master plan Flight Forum is more than just an office and business location. A day nursery, sports and workout facilities, meeting facilities, cash dispensers and food service establishments should become available. This was promised to the companies when the developments of the area started. Despite the promise those facilities are not yet realised due the missing critical mass. According to the latest report in September the construction of a hotel will be started and with that some facilities will be realized.

6.3.2 Accessibility

The city of Eindhoven is well accessible by road, rail and air. It has good road connections with the rest of the Netherlands and further inland to Germany and Belgium.

Car

Just as any other European city Eindhoven has to deal with congestion but the government is working to improve the situation at Eindhoven by broadening the highway from two to four lanes. Flight Forum is situated next to the motorway A2 (Amsterdam - Eindhoven - Maastricht) and near the motorways A58 (Eindhoven - Rotterdam) and the A67 (Ruhrgebied - Eindhoven - Antwerpen). It takes about 15 minutes (8.3 km) to get from the city centre to Flight Forum. At rush hour it takes longer.

The parking norm at Flight Forum was minimal one place per 125 m² GFA. During the development and granting of the area Flight Forum CV found that lack of parking space was a reason not to locate in the area. That is why new parking places were created at the edge of the area and under the collective transport route. In the new zoning plan the parking norm is changed to a maximum of one place per 60 m² GFA.

Collective transport

Flight Forum is connected by the Phileas, a high grade bus connection (line 401) that offers a fast and frequent connection to the city centre and stops at Flight Forum. It takes about 15 minutes to get from the central station to Flight Forum. The bus stops at the centre of the area. A new stop is created at the border of the area.

Airplane

Eindhoven Airport gives direct and indirect access to destinations across Europe. Flight Forum offers a front row seat as it is located directly near the airport. Eindhoven Airport is served by several carriers including KLM, Transavia and Ryanair. More information is given in the next section.

6.3.3 Special quality

Flight Forum location offers some special qualities with regard to the airport ambiance and the quality appearance plan.

Airport ambiance

In number of passengers Eindhoven Airport is the second largest airport of the Netherlands, with about 1.6 million passengers in 2008²⁹. The Schiphol Group is a 51 % owner of the airport. The city of Eindhoven and the Province of Noord-Brabant each own a share of 24.5 %. Eindhoven Airport operates on fifteen destinations.

The accessibility of the airport is the same as the nearby Flight Forum. The airport is also accessible by the air express, a commercial collective transport system. The Air Express bus offers commercial collective transport services from the airport every hour. The bus makes stops at Utrecht and Amsterdam and the costs are comparable to the costs for travelling by collective transport means.

The nearby presence of an airport makes the location unique. It contributes to the representativity and the image of the area. This is confirmed by the research of Oosterwegel (2006) where offices mention that the unique radiance of the area was an important reason to locate at Flight Forum and that this uniqueness lays in the presence of the airport. Oosterwegel (2006) concludes however that for companies at Flight Forum the presence of the airport was not the primary reason to locate there. It even seems that the employees of those companies just incidentally travel via Eindhoven Airport. An important reason why employees travel via other airports is that the flights at Eindhoven Airport do not meet the demands of the employees. Offices at Flight Forum also hardly use the facilities at the Eindhoven airport (Oosterwegel, 2006).

Quality appearance plan

At Flight Forum special attention is paid to the appearance of the buildings. A special quality appearance plan is developed for Flight Forum by urban architect MVRDV and developers. 'Buildings should stand like sculptures' is the philosophy behind the plan. In this quality appearance plan preconditions are dictated to guarantee the collective quality of the area. An important element is the efficient use of space due to close constructions and the parking facilities which are realised in the buildings and under the slope of the bus connection. The plan also dictates that buildings may be no higher than 10 storeys (20 metres).

²⁹ www.eindhovenairport.com (Accessed on February 2009)

Furthermore the buildings in the park are aligned in clusters, which is already shown in figure 6.1. The building line forms the basis for all clusters. The parcel must be build till the building line. In that way all fronts form a flowing range at the street which results in a single, continuous whole. Cycle sheds and boxes from the utility company must be integrated in the buildings and may not be next to the buildings. As part of the quality appearance plan, Flight Forum offers companies the possibility to choose their own architect and builder. By doing so all companies have the opportunity to prominently display their own logo and identity. According to Oosterwegel (2006) the quality appearance plan is encountered as something positive.

Despite the intensive use of space the quality of the area is high. Between the different clusters open space is available which is filled up as a green area to give the clusters an exclusive green look. The modern design and architecture are also important qualities of the area. In 2006 Flight Forum won the 'Ruimte- en Mobiliteitsprijs'³⁰ a price for the most successful business location with respect to the innovatory way Flight Forum handled the spatial appearance, mobility and infrastructure.

6.4 Collective Transport

6.4.1 Mode

As already mentioned above, Flight Forum is served by the Phileas, bus line 401. The Phileas is an advanced collective transport connection and can be seen as a tram on tyres. APTS (Advanced Public Transport System) is developed the Phileas. The mission of the Phileas is to provide quick, high frequent and comfortable collective transport on dedicated bus lanes in urban areas with large volumes of travellers³¹. It can be controlled fully automatic, semi automatic or manual by a driver. More information about the Phileas will be given in the next section.

6.4.2 General Features

One of the aims of Eindhoven with the introduction of high grade collective transport was to influence the modal split in favour of the collective transport. The government hoped that travellers would use the collective transport more often instead of the car. But the modal split did not really change much over time. In 2007 47 % used the car and 10 % the collective transport (Gemeente Eindhoven, 2007).

In comparison with a tram system the required investments of the infrastructure of the Phileas are low because overhead wires, rails or other equipment are not necessary. A completely new Phileas infrastructure is about 4.3 million per km versus 11 million (section 3.3) per km for a tram system. It is also possible to use the Phileas on existing roads and in that case infrastructure costs are about 0.7 million per km. The operational costs for the vehicles are 20 % lower then for trams despite of a depreciation of a Phileas vehicle in 20 years compared to 30 years for a tram. The investments cost in the Phileas vehicle are about 25 % lower then for a comparable tram vehicle with the same capacity. Finally the Phileas system is flexible and the time for realization is much shorter then for a tram or metro system.

³⁰ This price is granted by KpVV (Knowledge Platform for Traffic and Transport), a company that supports local and regional authorities in their efforts to develop and implement traffic and transport policy by providing practical know-how, arranging meetings, and setting up networks (www.kpvv.nl accessed on March 2009).

³¹ www.aps-phileas.com (Accessed on March 2009)

The realisation and development of Phileas is partially funded with the financial help of the European Commission, the Dutch national government³², the local governments of Eindhoven & Veldhoven and a cooperation of regional companies. As the Phileas operates on separate lanes special infrastructure is needed. Parts of the infrastructure are bounded with the head-infrastructure of Flight Forum. Flight Forum CV was responsible for those costs. To cover those costs they are partly involved in the exploitation of Flight Forum. Afterwards the municipality granted a subsidy of 30 % of the infrastructural costs of the bus lane and stops to Flight Forum.

The buses are operated by Hermes who are responsible for all collective transport in the Eindhoven region commissioned by SRE (Cooperation Region Eindhoven).

6.4.3 Quality

The Phileas claims to be a high grade collective transport mode. This section will look to the quality this system offers.

Reliability

The Phileas project consists of two parts: 1. the realisation of a separate bus lane between Eindhoven Central Station and Eindhoven airport and 2. driving at the new infrastructure with new innovative vehicles. The new infrastructure was realised in the beginning of 2004. The Phileas became operational in October 2004. As the Phileas was a completely new system it had to deal with a number of start-up problems. After three years of testing the system it is still common that not all buses are operational. Standard motorbuses provided the rest of the service. This uncertain bus availability made the system quite unreliable. As on December 2007 the Phileas still suffered from technical problems nine buses were withdrawn for rebuilding. The LPG engines were replaced with diesel engines, the system was made more reliable and the buses became a bit longer. Eight buses returned in February 2009. Up till now they have been operational for one month only so it is hard to draw any conclusions yet. As this section discusses the quality of the system it is about the quality of the Phileas buses and not of the standard buses.

Frequency and travel time

Bus line 401 operates between the Central Station and the airport and has 15 (possible) stops. The fourteenth stop is at Flight Forum. It takes about 15 minutes from the Central Station to get there. Since December 2008 the bus drives every 10 minutes at rush hour so the frequency is six buses per hour. Before December the frequency was only four times an hour. Depending on the size of the Phileas it has a capacity of 103-185 passengers.

The speed during peak hours can be higher than with a private car in city traffic due to short stopping times and dedicated bus lanes. The top speed of the Phileas can be 96 km/h. At the current route of the Phileas the top speed is 56 km per hour.

Comfort

Although buses do not have a very positive image compared to tram or metro Eindhoven decided in the late 1990th to implement a new high grade bus connection from the central station to the Eindhoven Airport. By doing so the city wanted to improve the image of the bus and it succeeded. Line 401 was the

³² The ministry of Economic Affairs, the ministry of 'Transport, Public Works and Water Management' and the ministry of 'Housing, Spatial Planning and the Environment'

first high grade bus route in Eindhoven. From the introduction of the Phileas until 2007 the image of the bus improved (Gemeente Eindhoven, 2007). The image of the bus in the area where the Phileas is used is even a bit better than elsewhere in the city. Some of the reasons people mention are that the Phileas buses drive more often and faster.

The Phileas wants to offer a passenger and environmental friendly appearance. The fuel consumption of Phileas is 20 % less than with conventional diesel buses³³. Due to hybrid propulsion combined with light-weight design the Phileas offers lower emission, lower noise and lower fuel consumption than normal buses. The electric motor enables Phileas to accelerate and brake gradually so passengers can have a smooth ride. The wide doors and low, continuous flat floors allow fast and easy boarding. By using soft, smooth lines and curves a shape is created that shows solidity and reliability. Inside the vehicle the Phileas has wide pathways, large windows, air-condition, high quality seats and a nice design.

Real time information

On the Phileas routes a dynamic passenger information system is used. At the stops passengers can see how long they need to wait. The Phileas is standard equipped with information displays.

Availability

As the last stop of the bus is the airport a lot of air passengers use this connection. The disadvantage for the daily user of the bus line, employees at for instance the Flight Forum and inhabitants that use the bus line for travelling from/to the city centre is that during rush hour, the buses can not cope with the peaks for travel demand of travellers from the airport which decrease the level of comfort for non-air passengers during rush hours. Eindhoven tried to solve this problem as since December 2008 the frequency went up from four to six times an hour and also the new buses can handle more passengers. Occupancy rates are not available but according to Eindhoven the bus line is very successful despite the unreliability. This is mainly due to the strong growth of Eindhoven airport and not due to the travel demand of Flight Forum.

Cost

From the Central Station of Eindhoven to Flight Forum costs € 1.95³⁴. It is also possible to buy a Phileas card for the whole day. The costs of that ticket are € 3.00.

Part of network

Bus line 401 is a single line that connects Flight Forum with the Central Station. At the Central Station passengers can transfer to another bus lines (city or regional lines) or to the train. The Central Station of Eindhoven is an intercity station which is easy to reach from Maastricht, Venlo, Breda and Utrecht. Few rail connections are offered to international hubs (airports and HST-stations).

6.5 Synthesis

One of the starting points from the plans for Flight Forum was the integration of a high grade collective transport connection in the office cluster of Flight Forum. This was in line with the mobility policy of

³³ www.apts-phileas.com (Accessed on March 2009)

³⁴ 4 strippen op een strippenkaart op basis van vol tarief

Eindhoven to create a whole new high grade collective transport network in the city. The bus line to Flight Forum and the airport would be the first to realise. It was no option to choose a rail system as the travel demand is too low. Eindhoven received money from the national government and also a subsidy of the European commission to finance this new high grade collective transport line.

The free bus lanes were realised in 2004. The Phileas, which was a whole new system, became operational in October 2004. Although the first companies moved to Flight Forum as early as 2000 the Phileas was not realised from the start. From the start normal line buses served the area but companies were aware that a high grade collective transport connection would be realised. The exploitation of those buses was possible due to the presence of the nearby airport which lies on the same bus route and ensures enough travel demand.

Due to the fact that it was a whole new system, the Phileas had to deal with a number of problems. This did not make the system reliable which also will have an impact on the attractiveness of the bus line. Old buses were used at times that the new Phileas buses did not work. This unreliability could have influenced the use of the system by employees of Flight Forum. Despite the collective transport services a lot of employees of Flight Forum travel by car.

Although the Phileas turns out to be successful there are no reasons to believe that it was one of the most important factors for companies to locate at Flight Forum. The success of the Phileas has mostly to do with the high travel demand of the airport, the presence of the system from day one and the fact that total travel time by bus from the central station to Flight Forum competes with that of private car. The key persons from Eindhoven have no consensus about what factors had the most positive contribution. According to Oosterwegel (2006) the following reasons make Flight Forum to an attractive location:

- It is a location with a unique character due to the nearby presence of the airport
- Good accessible by car
- Presence of parking space
- High quality of the area (due to the quality appearance plan)

Above these factors from the ranking also the following factor is mentioned:

- Accessibility by collective transport

Oosterwegel (2006) does mention this factor but only qualifies it as of small interest. Of course the fast high grade bus connection to the city centre made the area more attractive but as described above the area also has other attractive factors that seem more obviously decisive in the decision whether or not to locate at Flight Forum.

7 Benchmark Dordrecht: Amstelwijck

7.1 Introduction

This section is about Amstelwijck, a business park at Dordrecht. The development of business park Amstelwijck characterize a long history. At 1989 the first plans were made. Until then the lands was used as sport field and kitchen gardens. The location had to become a high grade office location with good facilities and a nice landscape and architecture. Such a location was not yet available at Dordrecht or elsewhere in the Drehtcities. Kolpron, a consultancy agent, made a development plan and performed an exploitation research. The development plan states that Dordrecht needs to find a connection to the demand of high grade office locations. Kolpron estimated that the whole development of the area would take 15 years. After the exploitation study which investigated the financial feasibility the city council approved the realisation of a new high grade office location called Amstelwijck. Together with some private parties, the municipality set up a development corporation. In 1992 consultancy company Aukett developed a masterplan for Amstelwijck. The plan comprised an office park of 200,000 m² GFA for offices and high grade industrial companies. Besides that there also was space for the development of an NS train station and 265 houses.

At the first development phase it went wrong as a long delay arose due to problems with the fact that some private landowners of the area did not want to cooperate with the sale of their land. This has partly to do with mismanagement of the municipality (Rekenkamer Dordrecht, 2006). It took years before the land was available and ready for building. When in 2001 the land was available the office demand just started to stabilize after years of high demands. Dordrecht made an agreement with Heijmans BV and Multi Vastgoed to jointly develop Amstelwijck. Until the beginning of 2006 only two companies located at Amstelwijck.



Figure 7.1 Dordrecht Amstelwijck Masterplan 2007

In 2007 a new masterplan was created by Van Proosdij and Koster (see figure 7.1). A complicated factor was the fact that already two buildings were realised in the area and that the municipality already had some agreements with new developers.

The model of the new plan is based on a flower with a heart and leaves. The leaves are available for offices and business buildings with corresponding parking places. Every leaf has its own characteristics. The heart is only available for offices. Parking in the heart is fit in at such a way that it is not visible.

This case is chosen due to a number of reasons. First it has some similarities with Schieveen. It has partly the same target group as Schieveen as it also focus on office development. Further Amstelwijck is situated next to the highway which will also be the future of Schieveen and besides that both locations are rather well accessible by car. Second it is interesting to look to the role of the planned NS railway station at Amstelwijck which would make the location well accessible by collective transport. Unfortunately the railway station was not realised and that is why it is interesting to look if that had any consequences for the development of Amstelwijck.

7.2 Situation

Dordrecht is located in South Holland just beneath Rotterdam and has a population of 118,187³⁵ inhabitants. The city lays at a sight were the Merwede splits in the North and de Old Maas. The city is the centre of what is called the Drechtcities which is a cooperation between seven municipalities in this region and which have a total population of about 281,000 inhabitants. The region is the most southern part of the Randstad.

In the Middle Ages Dordrecht grew to be the most important city of Holland. Although it had to give up this position long ago, footsteps from this period are still visible in the streets. At the hub of roads, waterways and railways Dordrecht had a good position as logistic centre for land and water. In recent years the service provision sector has grown significantly in Dordrecht.

Economic performance

Dordrecht was one of the first cities in the Netherlands. During the Middle Ages Dordrecht was an important trading town which is still visible in the number of old warehouses. Industry, commerce, shipping and service providers traditionally drive the economy. Nowadays the most employment in Dordrecht can be find in the service sector. About 40 % of all employment can be find at remaining services. Commerce is responsible for 18 % of total employment followed by industry as well as business services with 14 %. The latter is less then what is average in the Netherlands. Furthermore transport is important with 7 % of total employment (Onderzoekscentrum Drechtsteden, 2008). Although the economy of Dordrecht is rather diversified, it does not possess one or more sectors that compete at the (inter) national top.

The economic advisory board of Dordrecht chose the following four themes to strengthen the local and regional economy: maritime & water, care & health, knowledge & innovation and culture & city centre. The aim of the board is to create a better economic image of the region and to create new impulses for the economy.

Dordrecht has a GDP per head of € 30,454 which is less then the Dutch average of € 33,031³⁶ (both numbers are based on 2005). The unemployment rate of 3.7%³⁷ is quite low compared to the dutch

³⁵ www.digitalealmanakken.nl (Accessed on March 2009)

³⁶ www.cbs.nl (Accessed on March 2009)

³⁷ www.digitalealmanakke.nl , based on January 2009 (Accessed on March 2009)

average of 4.1%³⁸ in the same period. The city has no place in the Cushman and Wakefield European city monitor which is logical as Dordrecht is a small regional city. In the Datar ranking Dordrecht has no separate place as it is counted as agglomeration of Rotterdam so it does not provide any useful information. Huggins & Davies (2006) puts the South West of Netherland of which Dordrecht is only a small part, at the 18th place out of 118 regions.

Amstelwijck has little competition with other business parks at a regional level as it is a unique concept at the Drehtcities. It only has some competition with the city centre of Dordrecht. Besides that it competes with business parks like Prins Willem-Alexander Kade in Breda or some business parks in Rotterdam like Rivium.

Quality of labour

The economic activity rate of Dordrecht was 70.7%. The knowledge base of Dordrecht is rather weak. There is no university in the city but there are two universities of applied science namely InHolland and the Rotterdam University³⁹. The number of full-time students at these schools is still rising. In 2004/2005 there were 894⁴⁰ full-time students.

The share of high educated people in Dordrecht is about 33%⁴¹. More than one quart of the population is from foreign descent. About 10 % is from western countries⁴².

Quality of life

A strong quality of Dordrecht is that it has an attractive historical inner city which lies concealed between busy navigated rivers. Together with the many historical warehouses, mansions and almshouses Dordrecht offers an attractive environment for visitors and for their own citizens. It has more than 1,000 monuments. Important monuments like 't Hof, the Groothoofdspoort, the Stadhuis (Town Hall) and the Grote Kerk (Church) are worth visiting. The city has seven museums and two theatre stages. At the theatre there also is a cinema screen. Besides that the city organises a lot of events like the Dorst Steam event (The biggest of Europe), the Book fare (one of the biggest book fares of the Netherlands) and their famous Christmas fare (more than 300,000 visitors).

A part of one of the largest green attractions of the Netherlands, National Park De Biesbosch, lies within the territory of Dordrecht. It is an attractive area with lots of water and beautiful nature which offers a lot of recreation possibilities.

All mentioned elements can offer an attractive environment and can, when used in city marketing, attract high employed people. In the 'Atlas voor gemeenten' the attractiveness of living in Dordrecht is ranked at the 23rd position which is above average (Marlet and van Woerkens, 2008). Since 2005 their position is rising what might be due to the fact that Dordrecht pays more attention to the quality of the living environment. The city for instance developed luxury apartments along the river.

³⁸ www.cbs.nl (Accessed on March 2009)

³⁹ Hogeschool Rotterdam

⁴⁰ www.digitalealmanakken.nl (Accessed on March 2009)

⁴¹ www.digitalealmanakken.nl, based on 2005 (Accessed on March 2009)

⁴² www.digitalealmanakken.nl (Accessed on March 2009)

To conclude Dordrecht has a lot of potential to become an attractive city to live in. It does have to improve the cultural base as there for instance are no cinemas. One of the problems is that due to the nearby presence of Rotterdam Dordrecht will partly be depended on the facilities over there as Rotterdam offers much more critical mass.

Image of city

Dordrecht does not possess the diversity aspects as major Dutch cities. In 2004 Dordrecht performed an image research. It shows that there is a huge difference between what the citizen of Dordrecht think of their city and what outsiders think. First the image that the citizens have of Dordrecht improved a lot compared to 1999. Citizens find the city more attractive, especially the inner city. According to 86 % there are nice city walks in the inner city and a lot of interesting sites. About 71 % find the museums attractive and 55 % thinks there are a lot of cultural possibilities.

People outside of Dordrecht or the Drechtsteden do think that Dordrecht has an attractive inner city (82 %) with a lot of sights but they are not really aware of cultural possibilities, the presence of nice museums or interesting events (SGB, 2004). They do not see Dordrecht as a city with an attractive urban diversity. This image possible forms a barrier in the attraction of some specific segments of inhabitants (for instance knowledge workers) and business.

7.3 Business park

7.3.1 General features

In 2001 Amstelwijck at last could dispose the territory. The area can be typified as a high way location and has a size of 213,383 m². About 70,000 m² offices, 43,000 m² business units and 15,000 m² remaining space (hotel function) must be realised. Today 30,547 m² GFA is already used or in construction. The first buildings were yielded in 2002. Until 2006 only two buildings were realised which offered jobs for 185 employees. Nowadays seven companies established themselves at Amstelwijck. Also a Van der Valk hotel will be realised. It wants to locate at Amstelwijck due to the good accessibility and the (planned) office development which is inline with their target group namely the business market.

The aim of the business park is to create an attractive business ambiance for offices which is not yet available at other places in Dordrecht. As it both target at businesses and offices Amstelwijck is a mixed business park.

7.3.2 Accessibility

Dordrecht is well accessible by road, rail and water. It has good connections with the rest of the Netherlands. Locations such as Rotterdam (22 km), Antwerp (82 km) and Germany (100 km) are within easy reach.

Car

Amstelwijck is situated between Rotterdam and Breda. The area is well accessible by car due to the fact that it is situated right next to the highway A16 (20 m) and has a fast connection to the A15 via de N3 (15 km). The distance from Amstelwijck to the city centre and the central station is 7 km. It takes about 12 minutes (outside rush hour) to get from the city centre to Amstelwijck.

The original development plan presumed a parking norm of one place per 90 m² GFA. In the new zoning plan this was changed in one place per 50 m² GFA to suffice the current parking demand and by that offer a more attractive place for companies to locate. According to the municipality the stagnation of the developments at Amstelwijck had, beside some other reasons, to do with the parking norm.

Collective transport

The central station of Dordrecht is a NS intercity station which lays at the Rotterdam – Antwerpen line. It has no connection to the High Speed Train network. Arriva is responsible for the bus lines at Dordrecht and the surrounding municipalities. The city is well accessible by water. It takes 25 minutes to get by ferry to Rotterdam and the ferry also offers a connection to the other 'Drechtcities'.

The first plans for Amstelwijck contained a good accessibility of the area by collective transport. A new train station would be realised to make the area more attractive. It would turn to location into a junction location next to the highway in stead of an ordinary high way location. After the area was opened NS station Dordrecht Zuid, would be closed and instead the station at Amstelwijck would be opened. The station would be part of Stedenbaan, a new regional metro look like collective transport connection with a high frequency and more stops at existing tracks. The municipality made the agreement with the Ministry of Transport, Public Works and Water Management, that before creating a station at Amstelwijck 1850 employees must be located in a radius of 500 meter from the station. The fact that there was not enough critical mass was the most important reason that there is not yet a NS train station at Amstelwijck. According to Pol et al. (2006) it can be questioned if Dordrecht tried hard enough to reach such a critical mass. The city for instance could have replaced some (semi) public organisations to the area. Anyway in 2005 Dordrecht decided to choose another location for the new NS station as according to them a station at Amstelwijck is not feasible. Nowadays there is no regular bus line to Amstelwijck. To get there by collective transport one has to take bus line 4 and transfer to a shuttle bus.

Airplane

Amstelwijck is not situated next to an airport and also Dordrecht does not have an airport. There are three international airports that can be reached in one and a half hour namely Rotterdam Airport (34 km), Eindhoven Airport (86 km) and Schiphol Airport (90 km). The first two airports are regional airports and the latter is an international hub.

7.3.3 Special qualities

Accessibility

As already described above Amstelwijck is well accessible by car which makes the location very attractive. As a lot of business parks are situated next to highways Amstelwijck needed to offer something that could distinguish the place from other locations. The combination of good accessibility by car and good accessibility by high grade collective transport would make the location more unique as companies like to have the choice to use collective transport (option value). With good accessibility by collective transport the location would turn into a junction location instead of a highway location. As already mentioned Amstelwijck is at the moment only good accessible by car.

Spatial Quality

Amstelwijck has the ambition to become a high grade office location by offering good facilities, beautiful landscape and nice architecture. More than 17 % of the area is reserved for green space. According to Pol et al (2006) this ambition of Amstelwijck with regard to spatial quality is very high. If it can live up to this ambition it can distinguish them from other business parks like for instance Rivium. However Amstelwijck still has to show that it can live up to the expectations.

Liveability

Amstelwijck does not offer a mixed use as at the moment only some offices are located in the area. No houses are planned although in the early plans also housing would be realised at Amstelwijck. The ambition of Amstelwijck is to also realize facilities like a conference centre, sport facilities and a day care centre but despite the ambition it is not yet realised due to the missing critical mass. At December the construction of a Van der Valk hotel with 148 hotel rooms will be started. In the hotel some facilities will be available for instance a modern restaurant and a conference centre. When the hotel is realised this can be a unique selling point for Amstelwijck.

7.4 Collective Transport

7.4.1 Mode

As already described above, Amstelwijck is served by a shuttle bus. To get to the shuttle bus people first have to take line 4, a standard motorbus and then transfer to the shuttle bus at the bus stop Hospital Amstelwijck.

7.4.2 General features

The realisation of a NS station was held up to the future users of business park Amstelwijck. Besides that a temporary bus connection to the business park was promised until the railway station would be realised. The municipality failed to live up both expectations which had to do with the fact that until 2006 only two companies established at Amstelwijck. According to the municipality the travel demand was too small to organise a connection at the normal bus lines. The municipality realised it had to offer an alternative. That is why it organised a shuttle bus connection from Hospital Amstelwijck to the business park Amstelwijck. The fully finance this connection.

Companies do complain about the bad collective transport connection. The director of Cegelec, a technology service company that established at Amstelwijck at January 2009, wants a normal bus stop at the business park to offer their employees the possibility to travel by collective transport. This is also necessary as there are not enough parking places for all employees.

At the moment the municipality is negotiating with Arriva to realise a normal bus connection. Arriva is responsible for all bus transport in the region of the Drehtcities. The outcome of this negotiation is not available.

7.4.3 Quality

The shuttle bus is just a small taxi van. This section will look to the quality that this shuttle bus in combination with bus line 4 offers.

Reliability

No information is available about the reliability of the shuttle bus in combination with bus line 4.

Frequency and travel time

The shuttle bus commutes between the Hospital Amstelwijck bus stop and the Amstelwijck business park. From the central station one must take bus line 4 which offers a frequency of four times an hour. The thirteenth stop is Hospital Amstelwijck. It takes 16 minutes to get there. At Hospital Amstelwijck one must transfer to a shuttle bus which commutes between the stop and business park Amstelwijck at working days between 7.00-9.00 and 16.00-18.00 o'clock. It takes about three minutes to get from the bus stop to business park Amstelwijck.

Comfort

The planned NS station would have offered a high grade collective transport connection to the business park. The current connection is not a comfortable connection as people have to transfer a lot and have to use a small taxi van (shuttle bus). Although the shuttle bus offers a straight connection to the business park bus line 4 is a connection with a lot of stops which makes the journey less comfortable.

Real time information

No real time information is available

Availability

The use of the shuttle bus expands over the last years. First only employees of Trust used the shuttle bus but nowadays also employees of the other companies at business park Amstelwijck use the connection. One of the biggest drawbacks of the shuttle bus is that the connection is only available during rush hours. Another drawback is that the employees have to transfer at the station to the bus line and at the bus stop to the shuttle bus. This takes a lot of time and is probably a barrier for employees to travel by collective transport.

Cost

From the Central Station to the bus stop Hospital Amstelwijck is one zone and costs € 0.97⁴³ and € 1.94 for a day return. The shuttle bus trip is for free.

Part of network

Bus line 4 and the shuttle bus are single lines. Bus line 4 connects Hospital Amstelwijck to the Central Station. At the Central Station passengers can transfer to other bus lines or to the train.

7.5 Synthesis

One of the starting points of the development of Amstelwijck was good accessibility by car and collective transport. The latter would be realised with the NS station at the park. To create such a combination the presence of a critical mass is very important. The municipality could have played a more active role in creating such a critical mass by replacing some public facilities to the area but due to various reasons Dordrecht failed to realise such a critical mass. That is why the plans of the NS station did not turn out to

⁴³ 2 strippen op een strippenkaart op basis van vol tarief

be feasible. It can be questioned if the NS station would have been feasible when the whole business park already was developed as total amount of travellers would not be very high.

To offer an alternative to the train station the municipality offered a shuttle connection which was available right from the moment that the first company (Trust) established at Amstelwijck. This connection is not an attractive factor for companies to locate at Amstelwijck as the quality is very low due to the extra transfer, the long travel time and the fact that the connection is only available during rush hour. Also companies complain about the bad collective transport connection.

The first years of the 20th century the development of Amstelwijck stagnated. Until 2006 only two companies were located in the business park. From 2007 the development goes a lot faster as now already seven companies are located at Amstelwijck. It is expected that the construction of a van der Valk hotel will make the area more attractive. According to the key persons from Dordrecht the following factors make Amstelwijck a strong location:

- Image of the area
- Amount of parking space
- Accessibility by car
- The establishment of a hotel with a restaurant and meeting facilities
- Visibility from the high way

The fact that the NS station was not realised was not the main reason of the stagnation but companies do like to have the option to use collective transport (option value). Due to long term procedures at a favourable economic period Amstelwijck lost potential companies who otherwise would have wanted to locate in the area.

8 Benchmarking

8.1 Introduction

As benchmarking is the process of comparing different factors, processes or methods to one another this chapter compares the cases that have been described in chapter 5, 6 and 7. The aim of this chapter is to find out the most important learning points from the different cases by comparing them. The result can be applied in the next chapter about Schieveen.

To compare the different cases it is necessary to use indicators to measure the performance. Figure 4.1 presented the framework that is used for the analyses of the former three chapters as table 4.1 showed the factors of the framework together with some indicators that are used to analyse the performance of the different cases. The results of this analysis are summarised in table 8.1 which will be presented at the end of this chapter and the most important outcomes will be discussed in this chapter.

8.2 Situation

It is difficult to compare the situation (economic performance, quality of labour and quality of life) of the different cases as they are very different for instance due to their size. Göteborg has more than twice as many inhabitants as Eindhoven and Eindhoven almost twice as many as Dordrecht. That is why it makes no sense to couple the situation of the three cases.

8.3 Business Park

8.3.1 General features

The size of the three areas is comparable although Amstelveen is the smallest. Lindholmen is already very far in the development of the area. Flight Forum still has some space left especially at the office cluster. At Amstelveen still a lot of space is available.

Lindholmen can be qualified as a high grade business park with a focus on IT companies. Flight Forum and Amstelveen are mixed areas. Flight Forum focuses on offices and business but did not define specific target sectors. Amstelveen wants to offer an attractive business ambience for offices but also did not define what kind of offices. The types of the locations also differ. Lindholmen can be qualified as a metropolitan prime location, Flight Forum as a collective-transport junction location and Amstelveen as a highway location.

About 16,000 students and employees are working or studying at Lindholmen. This creates an enormous travel demand which partly explains the success of the bus line to Lindholmen. The area is a multi functional area and offers a lot of facilities which brings liveability in to the area and creates opportunities for companies to meet each other. Compared to Lindholmen, Flight Forum and Amstelveen are mono functional areas. They both are trying to change that a little bit by establishing a hotel which also will offer some other facilities like conference rooms and a restaurant. The travel demand at Flight Forum is much lower as at the moment only 1,473 persons are working in the area. For Amstelveen no numbers are available but there only work a small amount of employees as only seven buildings have been realised in the area.

8.3.2 Accessibility

Flight Forum and Amstelwijck are close to the highway which makes the areas good accessible by car although at Flight Forum there is a lot of congestion. As Lindholmen is not situated at the edge of the city it is less accessible by car than the other two cases.

With regard to parking Amstelwijck has the lowest parking norm. Lindholmen and Flight Forum have the same parking norm of 1 per 60 m². Both locations have taken some measures to discourage car use. Lindholmen and to some extent Flight Forum tried to put the parking places further away, at the edge of the area so that the bus stop is closer than the parking places. Both at Lindholmen and Flight Forum the bus stop is located in the middle of the business park. Lindholmen also took another measure, namely making parking expensive and only give companies the possibility to rent parking places.

At Amstelwijck and Flight Forum the only collective transport mode is a bus. At Lindholmen travellers can also choose to take other buses or the ferry.

Flight Forum is located in close proximity of Eindhoven Airport. Amstelwijck is not really close to an airport. The closest airport is Rotterdam Airport (34 km). Lindholmen is also not located in close proximity to an airport although the nearest airport is only 15 km away.

8.3.3 Special qualities

As special qualities differ per case it is not really useful to compare them that is why this section only will mention them. Lindholmen is a special location because of the presence of knowledge institutions, the liveability of the area and especially the community building that services as meeting place in the centre of the area.

Flight Forum can profit from the nearby presence of the airport which gives the location an airport ambiance. Besides that the area offers a high quality due to the quality appearance plan.

Amstelwijck is good accessible by car, wants to offer a high spatial quality and tries to create some liveability by the development of a hotel. It is not yet possible to say if the latter two really work out the way Dordrecht wants.

The parallel between all three locations is that they all want to offer a high quality. At Lindholmen and Flight Forum they succeed to do so. Amstelwijck still has to prove if it can make up its promises.

8.4 Collective Transport

8.4.1 Mode

Both Lindholmen and Flight Forum are served by bus. Flight Forum chose the bus as it was inline with the plans of the municipality to create at Eindhoven a high grade bus network in the whole city. Besides that when taken into account the (future) travel demand it seems logical to choose for buses as the number of employees at Flight Forum is not so high that other modes are necessary. Although the (future) travel demand at Lindholmen is high enough to choose for instance a light rail system the city chose to use buses because a number of reasons. The most important reasons were lower infrastructure cost compared to a rail system, the flexibility of the system and the availability of time. The city did made a reservation to choose another system in the future.

At Amstelwijck a new train station would be realised to make the area more attractive. This did not work because there was not enough critical mass. Dordrecht wants to realize a normal bus connection to

Amstelwijck but did not yet reach an agreement with the bus operator. Now the area is temporary served by a shuttle bus that is connected to a normal bus line so travellers have to transfer from bus to bus.

8.4.2 General features

At Lindholmen as well as Flight Forum the local governments are responsible for the organization of collective transport. The operation of the line is in hands of a private operator. At both locations the infrastructure is financed by a subsidy of the local government and a part of the costs is included in the land price. As companies partly paid for the infrastructure of the collective transport system, both Lindholmen and Flight Forum had the obligation to realise the bus connection from the start. Eindhoven also received a subsidy from the European Commission for the development of the Phileas bus system. Dordrecht is responsible for the organization and finance of the shuttle connection. At the moment the city is negotiating with Arriva (operator) to offer a normal bus connection to Amstelwijck.

8.4.3 Quality

Reliability

Not much information is available about reliability. This makes a comparison between the cases difficult.

Frequency and travel time

At Lindholmen the frequency of the bus is very high compared to Flight Forum and Amstelwijck. According to the key persons at Göteborg this is the most important reason for the success of the bus line especially as it lowers the waiting time of travellers.

Although the bus trip distance from CS Göteborg to Lindholmen is comparable with that of the CS Dordrecht to Amstelwijck the latter takes more than twice as long. The bus trip from CS Eindhoven to Flight Forum takes, when converted, also longer than to Lindholmen. One of the main reasons is the huge number of bus stops on the Flight Forum route. From Lindholmen and Flight Forum can be learned that travel time can be shorter when:

- priority at road crossing is realised
- dedicated bus lanes are constructed
- stops are inline with bus routes to increase the average speed
- the bus has several entry and exits points
- the number of stops is limited (only at Lindholmen)

Comfort

Most collective transport at Göteborg is offered by light rail. It has a good image compared to the bus. The municipality decided to use this image by using the philosophy 'think tram, drive bus' and make the bus at least as comfortable as the tram. This is translated by greater lengths between stops, increased average speed, priority measures and high comfortable new buses with several entry and exits points. When looking at the use of the bus one can conclude that the system is used very well. By introducing high grade bus connections Eindhoven wanted to improve the image of the bus and it succeeded. As already shown in the literature buses mostly are not experienced as high grade but both Eindhoven and Lindholmen show that it is possible to create an attractive high grade bus connection.

Real time information

The bus stops in Lindholmen as well as at Flight Forum offer real time information.

Availability

Both at Lindholmen and Flight Forum huge buses are used (capacity of 165 and 185 passengers). An advantage of the bus system in relation to business parks is that at the start of the development, when the demand is low, smaller buses can be used then at the end, when the demand is high.

Cost

The travel cost from CS Eindhoven to Flight Forum is more than two times higher than from CS Göteborg to Lindholmen. This partly can be explained by the fact that the bus trip also takes twice as long. From CS Dordrecht to Amstelwijck is rather cheap when looking at the total travel time.

Part of network

At all locations the bus routes are single lines (spoke).

8.5 Learning points

To summarize, the following points are most relevant for the development of Schieveen:

Göteborg

- Locating education facilities and/or public facilities at the business park can act as catalyst for the area. Besides that, it contributes to the use of collective transport and the liveability of the area.
- Liveability makes the area more attractive. This can be reached by making the area multi-functional and for instance by creating a community building to serve as meeting place.
- Attract a reputed (inter)national firm from the start that can function as puller. This can be done by acquisition in combination with offering such companies some advantages.
- The bus can be experienced as high grade when frequency, comfort and speed are high. The latter can be realised by taking measures to increase average speed (for instance bus lanes, several entry/exit points, priority measures, limit the number of stops).
- To stimulate the use of collective transport the government can combine the constructions of the collective transport system with parking measures. The bus stop can be located in the middle of the area combined with putting parking places at the edge of the area. Besides that the government can make parking expensive and only give the possibility to rent parking places.
- To finance the needed infrastructure governments can include a part of the costs in the land price. Especially when investors are attracted first, substantial starting capital will be available before the building starts.

Eindhoven

- Attract a reputed (inter)national firm from the start that can function as puller. This can be done by acquisition in combination with offering such companies some advantages.
- If the parking norm is set too high companies will not locate at the business park. Creating enough parking places makes the business park more attractive for companies.

- The bus can be experienced as high grade when frequency, comfort and speed are high. The latter can be realised by taking measures to increase average speed (for instance bus lanes, several entry/exit points, priority measures, limit the number of stops).
- To stimulate the use of collective transport the government can locate the bus stops in the middle of the area and combine that with putting parking places at the edge of the area.
- To finance the needed infrastructure governments can include a part of the costs in the land price. This does bring along the obligation of actually realizing the connection. Another option is to look at the possibility of subsidy from the European Commission.

Amstelwijck

- If the parking norm is set too high companies will not locate at the business park. Creating enough parking places makes the business park more attractive for companies.

All cases showed that it is important to offer a high quality at the business park. Besides that it is important to create a critical mass for realising a collective transport connection for instance by also connecting the system to other areas.

See for the digital version table 8.1 at the end of this thesis.

9.1 Introduction

This chapter will follow the same structure as in the benchmark descriptions in chapter five, six and seven. The results of the former chapters allow Schieveen to develop plans, make improvements or adapt best practices with the aim of increasing the performance of the future business park. The benchmark suggestions for Schieveen are shown in separate text boxes.

Rotterdam has to deal with the fact that there is a strong decline of employment in the industry and logistic business sectors. The national government, the province of Zuid-Holland and the municipality of Rotterdam all agree that extra ambition is needed to transform Rotterdam from working city to knowledge city (dS+V, 2009). This is one of the reasons for the Ministry of Economic Affairs (2006) to position the area between Rotterdam and Delft (Science Port Holland) as one of the three economic core areas in the Netherlands. The province of Zuid-Holland underlines the value of Science Port Holland by considering it as a development of which the economy of the whole Southwing can profit of (Programmacommissie Zuidvleugel, 2007). As already mentioned in chapter one, Science Port Holland is a cooperation project between the municipalities of Rotterdam and Delft and the Delft University of Technology (TUD). It involves the development of Technopolis Innovation Park and Science Business Park Schieveen. Science Port Holland wants to facilitate the development of new economic sectors and utilize the economic growth potentials. The involved parties cooperate in Science Port Holland for to the following reasons (OBR, 2008):

- Strengthening the economic growth of the Southwing (as antithesis of the Zuidas in Amsterdam).
- Creating a stronger lobby with regard to infrastructure developments like the A4 and A13/A16 towards the national government.
- More power in the approach of knowledge intensive companies and a more efficient plan organisation.

The parties collaborate in a joint development association while leaving the land development of the sites to the concerning landowners. The following tasks are important for Science Port Holland: concept development, marketing, branding, acquisition and integral procedures and implementation (Science Port Holland, 2008).

Schieveen is the name of a polder and a former water board in the Overschie municipality at the North border of Rotterdam, enclosed by Rotterdam, Berkel en Rodenrijs (Lansingerland) and Delft. The water board was responsible for the reclamation and water management in the polder. At the moment the biggest part of the area has an agrarian zoning. In 1999 the municipality of Rotterdam and de Vereniging Natuurmonumenten (Society for preservation of nature monuments in the Netherlands) signed a declaration of intent for a joint feasibility study on the development of polder Schieveen. The aim of the development was to fulfil the need of a high grade business location and reduce as little high quality nature and recreation as possible. This study resulted in a shared vision to develop Schieveen as an area for knowledge intensive companies in combination with high grade nature. Schieveen was seen as a very interesting location for knowledge intensive activities as it is near Rotterdam Airport, has a good connection to the infrastructure network of the Randstad and is close to knowledge institutions (TNO

and the Universities of Rotterdam and Delft). In 2001 the city council decided to develop Schieveen as combined development of nature and business park.

The first zoning plan was rejected by the Raad van State (Council of state). The main reason was the fact that the development period was longer than the standard plan period of 10 years. Rotterdam then chose for phased realisation of Schieveen in three planning periods of 10 years.

9.2 Situation

Rotterdam is situated in the southern part of the Dutch province South Holland. It is the core of the Rijnmond region which is part of the Randstad conurbation, one of the largest urban areas in Europe. Rotterdam has a population of 582,949⁴⁴ inhabitants, 46 % of which non-indigenous. It is the second largest city of the Netherlands.

Economic performance

Traditionally Rotterdam has predominantly been a working class community. Thanks to its seaport (the largest of Europe) Rotterdam serves as an important international logistic node and a centre of trade. From Rotterdam goods are transported by ship, river barge, train and road. The aim of Rotterdam is to become an important port city with regard to knowledge and innovation as stated in the Stadsvisie (Gemeente Rotterdam, 2007). The port's main activities are petrochemical industries, general cargo handling and transshipment. Almost half of the total volume of transshipment consists of wet bulk (46.07%), a quarter is container traffic (25.41%) and the rest consist of dry bulk (22.54%) and general cargo (5.98%)⁴⁵.

Until the sixties the rapid economic expansion of Rotterdam attracted many low-skilled immigrants. In the seventies, industrial activities such as shipbuilding and the food industry lost their dominant position as the industrial development stagnated. This led to social and economic problems in the early eighties as Rotterdam suffered of high levels of unemployment. At the beginning of the nineties there was progressive tertiarisation of the city. According to van den Berg and Russo (2005) the city is slowly changed from a grey industrial city towards a world class commercial centre. The city managed to create more diversity, be less port-dependent and more oriented to the service sector. Nowadays the most important sectors are business service, health care, trading, transport and communication and industry (Ontwikkelingsbedrijf Rotterdam, 2008).

Rotterdam has a GDP per capita of € 38,014⁴⁶ which is higher than the Dutch average. The unemployment rate is 8%⁴⁷ which is rather high compared to the other big cities in the Netherlands. The city has no place in the Cushman and Wakefield European city ranking. It is only mentioned by 12 out of 500 companies as important business location and with that qualified as 'other European city'. In the

⁴⁴ www.cos.rotterdam.nl (Assessed on March 2009)

⁴⁵ www.portofrotterdam.nl (Accessed on March 2009)

⁴⁶ www.cbs.nl , based on 2006 for the Rijnmond region (Accessed on March 2009)

⁴⁷ www.cbs.nl (Accessed on March 2009)

Datar ranking Rotterdam has the 29th place. Huggins & Davies Competitiveness monitor (2006) put the Randstad area of which Rotterdam is part of, at the 18th place out of 118 regions.

Quality of labour

The economic activity rate of Rotterdam was 60.3 % which is a bit low compared to the other big cities in the Netherlands (G4: Amsterdam, Utrecht and Den Haag). The share of highly educated people in the city of Rotterdam is 30.8 % which is also low compared to the G4.

Compared to Göteborg (40%), Eindhoven (32%) and Dordrecht (33%)¹ the number of highly educated people in Rotterdam is rather low. Chapter two already mentioned that the presence of a qualified labour pool is a very important location factor for companies. Knowledge intensive companies need highly educated people. That could be a problem at Rotterdam. When asking the key persons at Göteborg to rank the most important factors for the success of business park Lindholmen the presence of qualified labour was mentioned together with some other factors as a very important factor.

Rotterdam has one major university, the Erasmus University which has approximately 18000 students⁴⁸. The Woudestein campus houses amongst others the Rotterdam school of Management which was in 2005 ranked as 7th of Europe by the Financial Times. The Hoboken campus houses the Dijkzigt hospital, the Sophia Hospital and the Medical Department of the University. These are known as the Erasmus Medical Centre which is ranked third worldwide for medical research. Besides the Erasmus University there are also some lower level universities (Hogescholen) like the Rotterdam University, INHolland and the uni for music and dance. There are about 60,000 students in Rotterdam and that makes it the third student city of the Netherlands.

Quality of life

Rotterdam has an impressive skyline and offers the opportunity to see a completely different view while walking just a few yards. The city is changing constantly, so streets may look different within a year. Nowadays the mixed population and cultural diversity of Rotterdam is regarded as an asset. The city managed to increase the quality of life. It is a distinctively young and diverse city with a high multi-cultural level. It created its own culture by integrating ethnic, quasi-tribal cultural elements in a post-modern cityscape (Van der Borg and Russo, 2005). Rotterdam enhanced the housing quality and increased the safety. The 'Atlas voor gemeenten' puts Rotterdam at the 11th place with regard to attractiveness of living. The city offers a combination of innovative architecture and housing and diverse culture facilities. Another way of improving the quality was to try position Rotterdam as a city of events. Events like the International Film Festival, Dunya Festival, Dance Parade, Summer Carnaval, ABN AMRO World Tennis Tournament and the Marathon of Rotterdam are organised. The city has a wide selection of museums (43) of which some prominent museums like the Museum Boijmans van Beuningen, the Kunsthal and the Netherlands Architecture Institute. On top of that, there are 32 theatres and 34 cinema screens. Some important attractions of the city are the shops, the Blijdorp Zoo, the Spido and the Euromast.

⁴⁸ www.eur.nl , based on 2008 (Accessed on March 2009)

To conclude, the quality of life can be valued as attractive. There are a lot of facilities and the city has an international atmosphere. On the other hand the city has to deal with insecurity and exclusion which is according to Van der Borg and Russo (2005) a reflection of the fact that two thirds of the city residents are of no-white descent.

Image of city

For decades the image of Rotterdam has been that of an industrial port city with lack of safety, declining social conditions and a high unemployment. From the late eighties Rotterdam is trying to reshape the image of the city and change it in an attractive city for culture, sociality and leisure. The city managed to create more diversity. The image of the city is improving amongst local inhabitants. About 64 % of the citizens say that they are proud of Rotterdam which is 7 % more then in 2007⁴⁹. People outside of Rotterdam seem to appreciate Rotterdam a bit more then a couple of years ago (TNS NIPO, 2006).

9.3 Business park

9.3.1 General features

Schieveen lies at the north of Rotterdam Airport and has a surface of 454 hectare. During the first phase 100,000 m² gross floor area business park (at 20 hectare) and 73 hectare nature area will be developed. This part will be realised at the southwest corner of the area. At this side of the area the relation with the Airport and the highway A13 is the strongest. The first phase forms a step to the intended end result which contains 90 ha. of business park (600,000 m² GFA), about 200 ha. nature reserve and 28 new houses at the edge of the area (dS+V, 2009). The expectation is that at the end (2030) Schieveen will offer place to 8,000 employees.

While the footprints of the buildings belong to businesses, all remaining ground will be managed by the Vereniging van Eigenaren⁵⁰ (VVE). That makes that all public space in the business park area is common property and the VVE is responsible for retaining the quality level on the long run.

According to Rotterdam, businesses demand a new type of working environment that offers them optimal facilities to focus on their core business and maximizes the interaction with other companies. A (re)creative environment is aimed to maximize the creativity of employees (Gemeente Rotterdam, 2006). That is why Schieveen must become a location which offers maximal possibilities for interaction between entrepreneurs and employees and combine work with recreation. To attract knowledge workers it is important to create an attractive working environment with a high quality. During the first phase some facilities will already be realised. At the end of the development of Schieveen the following facilities for employees and companies are planned: supporting services, sport facilities, a day care centre, restaurant, meeting facilities, bio-imaging training centre, incubator building, an expo centre and video conferencing facilities. Only a small amount of houses will be realised at Schieveen but it lies close to existing residential districts like Park Zestienhoven (about 2,500 new houses will be realised) and Hillegersberg.

<p>From Eindhoven can be learned that it is important to create facilities from the start. At the Flight Forum some facilities were promised but now, eight years later, they still are not realised despite the promise. Creating facilities contributes to the attractiveness and the liveliness of the area. This is also shown at Lindholmen. The community building in the middle of Lindholmen accommodates all sorts of facilities which contribute to the interaction between people and companies. With regard to multi functionality Lindholmen shows that creating more houses in the area itself contributes to the liveliness of the area and to the collective transport travel demand.</p>

Business park Schieveen focuses on fast growing knowledge intensive companies that attach value to the appearance of the area and also want to invest in it. As already described in section 2.2 (see figure 2.1) the government defined three target groups prior to Schieveen:

1. Knowledge intensive companies (with a preference for international oriented business)
2. Airport oriented companies.
3. Remaining companies

This definition is still rather broad. Rotterdam finds it difficult to mark out their target groups. At first, Rotterdam wanted to use Schieveen to stimulate the medical cluster. Buck Consultants International (2008) concluded that medical companies would not be interested in locating at Schieveen as it lies too far from the Erasmus Medical Centre. For Technopolis, it is rather easy as it is linked to the Delft University of Technology. Schieveen is too far away to have a good connection with the Erasmus University. There are also no very important clusters in Rotterdam that make it clear where to put the focus. Maybe one can think of the port but there are already new plans developed for the old port areas, project Stadshavens, which makes it more logical that that area will focus on the port related knowledge activities.

For Göteborg it was rather easy to choose a focus as technical education already was important in the city and a large pool of qualified IT employees are located in the area. Besides that the city accommodates import international companies in their IT cluster namely Ericsson and Volvo. Two of the most important success factors of Lindholmen are:

1. From the start educational facilities located in the area. The advantage of having education facilities is that the moments that schools start and finish have become increasingly varied which results in high passenger pressure over a larger part of the day.
2. Ericsson moved a division to the area. The presence of a representative (inter)national firm can function as a catalyst. This also happened at Flight Forum with the establishment of PWC.

Rotterdam must try to attract a representative (inter) national firm right from the start to function as catalyst. It must consider if it is possible to locate educational facilities at Schieveen as this could also function as catalyst and contribute to the collective transport demand as a high percentage of the students use collective transport.

Schieveen also has to deal with competing business parks for instance with the nearby business park at Rotterdam Airport. The master plan of Rotterdam Airport provides for over 200,000 m² of high-quality new business accommodations which will be realized between 2010 and 2020 and will offer about 4,000 jobs.

9.3.2 Accessibility

The city of Rotterdam is well accessible by road, rail, air and water. It has good road and rail connections with surrounding economic regions as Amsterdam (75 km), Brussels (150) and Paris (450 km) especially once the HST becomes operational.

Car

Just as any other European city also Rotterdam has to deal with congestion problems. The ring road of Rotterdam is one of the most congested highways of the Netherlands. Rotterdam wants to tackle the accessibility of the Schieveen area in two ways:

1. Influence the use of different kinds of mobility (modal split). Concrete plans still have to be worked out.
2. Realise new infrastructure. Some plans are already made. At the moment Schieveen can be reached via the N209 (Doenkade). This road is being doubled which makes it possible to deal with the extra traffic that will be generated from the business park. The business park lays at close distance of highway A13 (1.5 km) and A20 (4.5 km). The accessibility will be improved by the construction of highway A13/A16 and the A4 which are both important to solve some of the bottlenecks at the North side of Rotterdam.

Schieveen is divided into different zones which all have a different parking solution that bring along different costs. Parking places are kept out of sight to maximize the quality of the public space. Therefore parking must be realised in the buildings. In the campus zone no parking places will be created. That zone will only be accessible by foot. This will create more walking which also enhances the liveability of the area. To realise a cost effective parking solution the rent price for parking places lies between € 500 and € 1,100 per parking place per year depended on the chosen parking solution. It is not yet decided if the places are being rent or sold. According to Rotterdam the companies probably will be obligated to take the number of places proportional with their amount of m². The minimum parking norm at Schieveen is 1 at 50 m² GFA.

The parking norm at Lindholmen and Flight Forum is 1 at 60 GFA. At Flight Forum the norm was set much higher at the beginning (1 at 120 GFA) to discourage car use. This did not worked out as companies demanded parking places or otherwise would not locate in the area. The same happened at Amstelveen. It changed the parking norm from 1 at 90 GFA to 1 at 50 GFA as developments of the business park stagnated although parking was not the only reason for this stagnation. From Lindholmen the following can be learned. To discourage car use a number of measures can be taken:

1. Create parking places at the edge of the area so people need to walk and combine that with a central stop of the collective transport system. In some cases people who use the collective transport system have a closer walk then people who arrive by car. According to Lindholmen it is a good incentive for people to start using collective transport.
2. Make parking expensive and only give companies the possibility to rent places (100 euro's a month at Lindholmen). Also give companies the possibilities to rent less places then based on the norm. As good accessibility by car is one of the most important location factors of Schieveen it must be careful with making parking to expensive.

Both at Flight Forum and Amstelveen it was tried to fit in parking at such a way that it was not visible. At Flight Forum only the parking places at the edge of the area were visible.

Collective transport

At the moment the central station of Rotterdam is being redeveloped. At the station travellers can transfer to train, bus, light rail and metro. Coming years, the station will become part of the HST network. Once it

will be fully operative Schiphol can be reached within 19 minutes. Furthermore the city is constructing a new light rail connection that connects Rotterdam with The Hague. This light rail connections stops at a distance of 6 km of Schieveen. Schieveen is not connected to a collective transport system and there are not yet any concrete plans. However, already some studies have been performed. The following possibilities are mentioned:

- *Shuttle connection.* A shuttle bus connection between the nearby randstadrail station Meijersplein (which will be renamed as Rotterdam Airport), via the Airport and Schieveen to Randstadrail station Berkel en Rodenrijs can be created.
- *Airportbus.* The airport is connected with the city centre by a bus line. This bus needs to be comfortable and can also drive from the airport to Schieveen.
- *ZoRo.* ZoRo is a high grade bus connection which uses a bus lane between Zoetermeer via Randstadrail-station Rodenrijs and Schieveen to the Central station of Schiedam. At Schiedam passengers can transfer to train and metro.
- *HOV-Science Port.* This line must create a relation between Rotterdam Central Station and Delft Central Station via Rotterdam Airport, Business park Schieveen and Technopolis. This collective transport line has a length of about 17 kilometres. According to the Stadsregio the travel demand is to low to create a tram connection but on the long run it does belong to the possibilities.
- *TramPlus connection to Rotterdam Airport.* The study ‘OV-ontsluiting Science Port Holland’ (2008) describes that it might be possible to create a tram connection from Rotterdam Central Station to Rotterdam Airport. Two variants are described. First an extension of the existing tramline 20 to Rotterdam Airport which can be realised rather easy as space for the construction is already reserved. The second option is to create a whole new tramline via Overschie to Rotterdam Airport. Both connections will not disclose Schieveen.



Figure 9.1 Possible collective transport connections

Accept for the airportbus all above described possibilities are showed in figure 9.1. The first three options offer a collective transport connection to Schieveen as well as Rotterdam Airport. The ZoRo only offers a connection to Schieveen and the TramPlus only connects Rotterdam Airport. According to the Stadsregio (2008) it is not relevant to investigate an extension of the TramPlus connection from the Airport to Schieveen as the tram only will serve a small amount of travellers. Besides that the Stadsregio mentions the fact that it will be faster for passengers to use the ZoRo connection to get to Rotterdam Central Station as total travel times are shorter. The Stadsregio only looks to total travel times. Maybe when looking at the GTC different conclusions can be made. For instance, when passengers use the ZoRo connection they need to transfer to the Randstadrail. People do not like to transfer and that will impact their GTC. Passengers attach more value to a direct connection.

Rotterdam can profit from the fact that Delft also thinks about connecting Technopolis to Rotterdam Airport to improve their competitive position and create a fast connection with the rest of Europe (Mobycon, 2006). This can make it more profitable to create such a connection and combine it with a connection to Schieveen.

At Amstelwijck and Flight Forum the only collective transport mode is a bus (single line). At Lindholmen travellers can, besides bus line 16 also choose to take other buses or the ferry.

Airplane

Rotterdam Airport is a regional airport that gives direct and indirect access to destinations across Europe. It aims to be a business airport with capacity for private business air traffic but there also are a lot of holiday flights. Rotterdam airport is served by several carriers including VLM Airlines and Transavia and has direct flights to and from a number of cities around Europe. Schieveen lies at 2 km distance of the airport. More information is given in the next section.

9.3.3 Special qualities

Business park Schieveen characterizes itself by a specific combination of the strategic location and the spatial quality of the area.

Airport ambiance

Schieveen is in the proximity of Rotterdam Airport. Measured in number of passengers Rotterdam Airport is the second regional airport of the Netherlands, coming after Eindhoven Airport. In 2008 more than 1 million passengers used the airport. Until 1990 the airport was owned by the city of Rotterdam, but in 1990 Schiphol Group became the new owner.

The accessibility by car of the airport is the same as Schieveen. Accessibility by collective transport is organised by means of:

1. Airport Shuttle bus 33. The bus drives from the central station of Rotterdam via Overschie to Rotterdam Airport. The frequency is 6 buses per hour and the journey time is approximately 25 minutes. The bus has 14 possible stops.
2. Airport Shuttle bus 50. The bus drives from the Wilhelminakade via Station Rotterdam Blaak and the Central Station to Rotterdam Airport. The fastest route in relation to the traffic situation is chosen, as there are no bus stops between Rotterdam Airport and Rotterdam CS on this line.

3. RET Bus 41. The bus drives from Schiedam Central Station via Rotterdam Airport to station Rotterdam Noord. The bus has a frequency of 4 per hour. From Schiedam Central Station it takes 35 minutes and the bus has 20 possible stops. From station Rotterdam Noord it takes 22 minutes and the bus has 13 possible stops.

At the moment about 10 % of the passengers to Rotterdam Airport use the collective transport, an average of approximately 300 passengers a day. Rotterdam Airport has about 2,500 employees.

The nearby presence of Rotterdam airport contributes to the representativity and the image of the area. If Schieveen can profit from the airport also depends on if and how it will be connected to the airport but the proximity of an airport is for most companies not a decisive location factor.

From Flight Forum and chapter two can be learned that the close proximity of an airport does make the business park attractive but in most cases it is not the primary reason to locate in the area.

Strategic location

Schieveen is a favourable location as it lies between Rotterdam and Den Haag. It is a good accessible location by car and airplane as it lays at the N209 and the N470, is very close to two highways (A13 and A20 and on the long run the A13/A16), is located at the edge of the city and lays next to Rotterdam Airport. Besides the good accessibility the location is also close to two knowledge centres namely the Erasmus University of Rotterdam and the Delft University of Technology. Good and fast collective transport connections with the centre of Rotterdam are necessary to connect the area with the city centre and the university.

According to the key persons at Flight Forum and Amstelwijck good accessibility by car is one of the factors that are important for the performance of the business park.

Spatial quality

With the creation of a representative public space at the business park Rotterdam wants to create an atmosphere that attracts high educated knowledge workers. The parks must offer a high level of facilities and a high quality for instance by getting car parking out of view, high grade buildings, green spaces and good infrastructure for all modalities. This high quality of the park is combined with the development of a nature and recreation area at the north of the business park. This is a rather unique combination and distinguishes Schieveen from other business parks. Employees can walk or lunch in a very attractive environment. Besides that the nature area is accessible for inhabitants of Rotterdam.

All three benchmarks mention the importance of offering a high qualitative environment at the business park. Especially at Flight Forum the high spatial quality of the area is seen as very important. The Flight Forum CV even won a price.

Campus

Schieveen wants to promote and facilitate interaction and innovation at the business park. As this interaction and innovation foremost happens between people the core of the business park will be designed as a campus. The campus concept can be characterized by creating optimal possibilities for interaction by sharing facilities and spaces. This concept can be compared with the community centre at

Lindholmen which turned out to be successful in stimulating interaction between different companies (already showed at section 9.3.1).

9.4 Collective transport

9.4.1 Mode

As already described in section 9.3.2 concrete plans for Schieveen are not yet designed. Based on the expected travel demand for the coming years a bus seems the most logical mode. Other systems are too expensive with regard to construction and operational costs. As already described in the above section Schieveen does want to offer a high quality which is also necessary seen their target group. This will be discussed below.

Maybe there is a possibility to construct a tram connection with Delft in the future. Also Delft has interest in such a connection (Mobycon, 2006). It would be wise for Schieveen to reserve some space for such a future connection just as Lindholmen did.

The advantage of a bus system instead of rail is that infrastructure costs are lower, the system is more flexible and it takes less time to realise the required infrastructure. Although a bus is not always perceived as high grade Lindholmen and Flight Forum showed that it is also possible to offer a high quality connection by bus if the bus meets a number of quality characteristic which will be discussed below.

9.4.2 General features

The Stadsregio is responsible for the collective transport in the Rotterdam Region. It grants concessions to collective transport companies and gives subsidy for the exploitation of collective transport. The RET has the concession to offer collective transports in the city of Rotterdam. One of the aims of Rotterdam is to stimulate the use of collective transport and reduce car emissions in the city. The city wants to realise a growth of 2-3 % a year. This aim is initiated by the Rotterdam Climate Initiative (RCI). The RCI is the ambitious climate programme of Rotterdam. It offers a platform for companies, government, organizations, citizens and other people to jointly create a better climate for the people, the environment and the economy. The concrete target is to obtain a 50 % reduction of CO₂ emissions in 2025 compared to 1990 while at the same time promoting the economy in the Rotterdam region.

From the benchmark research can be learned that a part of the collective transport infrastructure cost can be included in the land price. That brings a long the obligation to realise the connection from the start of the development but as investors are attracted first (like in Lindhomen) it also brings along a starting capital to construct the infrastructure.

Another interesting point is that the Phileas in Eindhoven is partially funded with the financial help of the European Commission. The Stadsregio could investigate if such a construction is also possible at Schieveen.

The literature showed that stimulating the use of collective transport not always leads to a reduction in car emission.

9.4.3 Quality

Reliability

No information is available for Schieveen.

From Eindhoven the following can be learned. The risk of implementing a new system is that it might have to cope with beginner failures. That can make the system less reliable.

Frequency and travel time

To offer the employees of Schieveen a collective transport connection from the start of the development, already in an early stage collective transport must be offered. As Schieveen is not yet connected to any collective transport system it is important to develop new plans.

The development of Schieveen is planned over a long period (2008-2030). This will influence the size of the traffic demand from and to the business park. Especially in the beginning this will lead to a limited size of traffic demand. That makes it difficult to realize collective transport. Besides that the traffic flows will be concentrated at rush hours. That is why a flexible collective transport system which can respond to the gradually growth of traffic, would be preferable. If the connection to Schieveen will be combined with that of Rotterdam Airport, TU Delft the travel demand will be higher and more spread during the day as airport travelers also travel outside rush hour.

From Lindholmen and Flight Forum can be learned that the bus connection must be fast. To shorten travel time by bus attention must be paid to:

- priority at road crossing
- dedicated bus lanes
- stops inline with bus routes increase the average speed (no travel sideways when stopping)
- several entry and exits points
- limit the number of stops (only at Lindholmen)

For the quality and use of the future connection to Schieveen it is important that it is a direct fast connection, without a transfer. Travelers do not like to transfer especially when they carry suitcases.

One of the failure points at Dordrecht is that people have to transfer from the bus to a shuttle bus. In chapter three is shown that transfers raises the perceived travel time as it also brings along waiting time.

Comfort

As Schieveen wants to be a high quality business park it seems logical that this will also be translated in high grade collective transport. This is also necessary as the system wants to be attractive for knowledge workers, one of the target groups of Schieveen.

From the benchmark can be learned that paying attention to the following points can make the collective transport system more comfortable:

- low vehicle noise
- large windows
- high quality seats
- greater lengths between stops
- low, continuous flat floors
- air-condition
- fancy design
- priority measures at road crossing

Real time information

No information is available for Schieveen.

As the literature already showed customers appreciate real time information as it influences the image of the system, creates confidence and reduces waiting stress. At Lindholmen and Flight Forum bus stops this real time information system is being used.

Availability

No information is available for Schieveen.

From Eindhoven can be learned that it is important to have enough places in the collective transport system. Overcrowded systems decrease the level of comfort for passengers.

Travel costs

No relevant information available.

Part of network

It seems logical that the future collective transport connection to Schieveen will be a single line (spoke).

9.5 Synthesis

Rotterdam wants to strengthen their economic knowledge base with the development of Schieveen. That is why Schieveen will focus on knowledge intensive and airport oriented companies. It can be difficult to attract knowledge intensive companies as Rotterdam has no tradition with such companies and the number of high qualified people in the region is relative low. The area can profit from the fact that its good accessible by car, forms a unique location as it is combined with a nature park and that it is in close proximity of Rotterdam Airport. It is important to strive after a high quality with regard to the environment of the business park. During the first phase some facilities will be realized which is important as shown in the benchmark research. To stimulate the development of the park it is important to attract a reputed (inter) national firm from the start.

One of the weak points is that no concrete plans with respect to a collective transport connection are made. A problem for Schieveen can be that it is hard to create a critical mass. That is why the collective transport connection must be combined with other areas for instance Rotterdam Airport. This can be combined with locating education facilities and/or public services in the area. Rotterdam can combine these measures with measures to stimulate collective transport as it is in line with the target of the Rotterdam Climate Initiative to realise a collective transport growth of 2-3 % a year. Possible options are

measures with regard to parking in order to stimulate collective transport. Rotterdam must be careful with setting the parking norm too high as it still is a very important location factor for companies.

When choices must be made with regard to the collective transport connection Rotterdam must not only look to total travel time but also to the GTC. The benchmark research showed that the bus can be used as high grade collective transport when certain measures are taken with regard to frequency, total travel time and comfort. It is important that the collective transport is available from the start otherwise people already found other ways of travelling and then it is even harder to persuade them to use collective transport.

With regard to the cost can be said that Schieveen should put a part of the infrastructure costs in the land price. Besides that, it must look if it is possible to get a subsidy from the European Commission.

10 Conclusions and recommendation

10.1 Introduction

This thesis analysed the influence of the early realization of high grade collective transport on the development of business parks. The addressed research objectives were:

- To gain insight in the relation between high-grade collective transport and business park development in order to find out if it is helpful to provide a high grade collective transport connection to business parks at an early stage.
- To perform benchmark research in order to gather information on and learn from the experience of other business parks with regard to the role of high-grade collective transport in relation to business park development.
- Analyse the case 'Business park Schieveen' and provide suggestions for the accessibility of Schieveen by collective transport.

The next section focuses on answering the sub questions that have been put forward in chapter 1 to be able to conclude with an answer to the central research question. After answering the central research question, some recommendations will be presented with regard to the future development of Schieveen.

10.2 Summary and conclusions

The answers to the research questions as given below, result from the literature study and the benchmark research described in the chapters 2 and 3 and 5-8 respectively.

What type of business parks can be distinguished?

Based on the type of located companies, five different business parks can be distinguished: a. heavy industry, b. seaport area, c. mixed area, d. high grade business park, e. distribution park. Only type C and D are relevant because they accommodate companies and offices which have a lot of employees who need to go to their job every day. That is why they are interesting with regard to collective transport. Schieveen corresponds to type D.

Besides looking to the company type, it is also relevant to look to the type of locations. The chosen location types are based on office locations as Schieveen will also host offices. Seven different office location types can be distinguished: a. metropolitan prime location, b. urban centre locations, c. collective-transport junction locations at the edge of cities, d. regional collective-transport junction locations, e. highways locations, f. office locations at business parks. At Rotterdam there is a need for type C. Schieveen is a combination of type C, E and a greenfield location. The fully make Schieveen as a junction location, collective transport should be realised.

What does literature tell about the location factors of knowledge intensive companies? And what is the role of collective transport?

In literature a distinction is made between site and situation factors. They both work together in making a place attractive to companies. Site factors are the factors of an actual location. Some important site factors are: car accessibility, parking space and visibility from the highway. Situation factors deal with the overall

attractiveness of the region. Important situation factors are: quality and availability of the labour force, quality of life and the image of a region.

Accessibility (site factor) is the factor that is most directly affected by the realisation of a collective transport system. Although accessibility by collective transport is mentioned in some research there is no prove that it plays a dominant role in the location decision of companies.

What distinguishes business parks near regional airports from business parks elsewhere?

Business parks near regional airports can also be attractive because of airport related location factors as airside accessibility, landside accessibility and the airport image. These factors do play a role but in most cases the reason why companies locate at business parks near regional airports will be a combination of airport related factors and other location factors. Of course this depends on the size and the character of the airport.

What features have to be taken into account when considering the role of collective transport for business park development?

Although for most people the private car is steadfast favourite, some features can be distinguished which can have influence on the meaning of collective transport at the short and the long run. With the ongoing congestion the door to door convenience of cars compared to collective transport starts to erode. The car becomes less reliable as travel time is more uncertain. Besides that, environmental concerns brings along more attention to sustainable transport. Collective transport modes are usually considered as supportive to sustainability although this is not always the case. At last the rising parking costs can favour collective transport above the use of the private car.

To offer an alternative to private car users, collective transport must offer a certain quality level. Different aspects with regard to quality have been distinguished: reliability, frequency, total travel time, comfort, real time information, availability, travel cost and if the system is part of a network. The most important factors turn out to be: frequency, reliability, total travel time (speed) and comfort.

What can be learned from the benchmark research?

From the case studies it appears that it is important to offer a high quality at the business park. Creating a multifunctional area brings liveability. Stimulating interaction between companies can be realised by creating a community building in the centre of the area to serve as meeting place. To promote the development of the area a reputed (inter) national company should be attracted from the start.

To make a new collective transport connection feasible there must be critical mass of users. Governments can contribute to this critical mass by moving public functions to the business park. Especially the establishment of educational facilities will enlarge the collective transport demand. Another way to enlarge the collective transport demand is to use the same collective transport line to connect other areas like an airport or a residential area.

Governments can also stimulate the use of collective transport by making parking expensive, putting the parking places at the edge of the area, only allowing companies to rent parking places instead of buying and situate the collective transport stop at the middle of the business park. However, companies find it important to have enough parking places so the parking norm can not be set too high.

To the finance of the collective transport Göteborg and Eindhoven showed that it is possible is to include a part of the costs in the land price and look for subsidy possibilities.

When collective transport demand is low a bus system is the cheapest and most flexible system which can be realized relatively fast. Buses can be 'upgraded' to high grade collective transport when frequency is high and measures are taken to shorten total travel time and increase comfort. When choosing for a bus it is important to take measure to increase the average speed of the bus.

What can be said about business park Schieveen from this research?

Rotterdam wants to redevelop Polder Schieveen into a high grade business park combined with a nature reserve and some new dwellings. By doing so Rotterdam tries to strengthen its knowledge base. That is why the city defined three target groups namely: knowledge intensive companies, airport oriented companies and 'remaining' companies. This definition is rather broad as still no specific sectors are chosen. Knowledge intensive companies need highly educated people. As the percentage of highly educated people in Rotterdam is rather low it could be difficult to attract those companies. Moreover, other cities are vying for educated people as well.

The purpose of Rotterdam is to create facilities like a day care centre, a restaurant and meeting rooms and maximize the possibilities to facilitate interaction between companies at Schieveen to create a nice ambiance. Although Rotterdam has to deal with congestion Schieveen will be well accessible by car as it is at close distance to highways A13 and A20 and to the new highway A13/A16 that will be constructed in the future. To make the location more attractive for companies the parking norm is set rather low and companies are obliged to buy or rent a number of places proportional with the size of their site. Schieveen will offer some special qualities as it is in the proximity to the airport. It is located at a strategic location, uses a campus concept and wants to realise high spatial quality in combination with a nature reserve which gives to location something special.

Central research question:

What is the influence of the early realization of high grade collective transport on the development of business parks? With an application to the airport linked Business Park Schieveen.

The realization of high grade collective transport to business parks has direct consequences for the accessibility of the area. Although employees will not always use collective transport it makes the location more attractive as it influences the value of choice and the option value. Extending accessibility by car with accessibility by collective transport, can make the business park more attractive and through that influence the location choice of companies. It is shown that accessibility by means of collective transport plays a role in location decisions of companies but it does not appear as a decisive factor. There is no proof that the development of business parks that offer a collective transport connection are more attractive. In the location decisions of companies, accessibility by car is mentioned as more important than accessibility by collective transport. There is also no prove that collective transport makes the location more attractive for a certain kind of companies although offices and government institutions make more use of collective transport then for instance distribution or production centres. Therefore this thesis only focused on mixed areas or high grade business parks because they accommodate companies and offices which have a lot of employees who need to go to their job every day and that is why they are interesting with regard to collective transport.

Based on the ranking from the key persons of Göteborg and Flight Forum no conclusion can be drawn with respect to the role of collective transport. They both mention it as a strong location factor but it is one of the many factors.

It can be concluded that collective transport does not have a great influence on the development of business parks. In the long run there is a possibility that this will change due to the ongoing congestion, the growing attention to sustainable transport and the rising parking costs.

If a new collective transport system will be realised it should connect the business park from the start. This is important for two reasons. First, if it is not available from day one people already have found another way of travelling and then it is harder to persuade them to use collective transport. Second, when collective transport infrastructure is created at the beginning of the business park development it guarantees that it will be there for the next 30 years, especially with rail. This creates stability for developers.

The benchmark and the literature showed that the presences of collective transport at business parks can influence the modal split when the choice rider is attracted. To compete with private transport, the systems must offer high quality and total travel time must compete with that of the private car. To offer high quality the chosen system must offer fast, comfortable and frequent services. When frequency is too low at the beginning it cannot be judged as collective transport with a high quality and then it does not attract the choice rider. It has to be noticed that not all choice riders actually have a choice, for instance because they do not live in the proximity of collective transport or really need a car for their job.

The realization of new collective transport can change the transportation behaviour of people. Whether people do so depends on how this new collective transport influences their GTC. When choices must be made with regard to the quality of the new collective transport one must realize that high grade collective transport will have influence on the GTC of travellers different from that of general collective transport.

10.3 Recommendations for Schieveen

The literature study and the benchmark research provide concrete suggestions that could be of interest to Schieveen:

First some suggestions with regard to the development of the business park:

- Create attractive facilities at the business park from the start. This can be done by putting a community centre in the middle of the area which accommodates all sorts of facilities, like a restaurant.
- Attract a reputed (inter) national firm from the start.
- Consider if it is possible to locate education facilities and/or public functions at Schieveen.
- Create an attractive high quality working environment, including a mix of functions.
- Set the minimum parking norm not too high but 1 at 50 m² GFA is quite low especially when collective transport must be stimulated. At Lindholmen and Flight Forum the parking norm is set at 1 at 60 m² GFA.
- Create the parking places at the edge of the area and give companies only the possibility to rent those places. Also give companies the possibilities to rent less places than based on the norm.

Second, some suggestions with regard to the realization of collective transport to Schieveen:

- Turn Schieveen into a junction location as there is a rising demand in the Rotterdam region for high grade office locations which offer an environment with good accessibility by car and collective transport, multi functionality and high spatial quality.
- Take measures to stimulate collective transport as it is in line with the target of the Rotterdam Climate Initiative to realise a collective transport growth of 2-3 % a year.
- Do not only look at total travel time when choosing a collective transport system or route but take into account the GTC.
- Choose the bus as collective transport mode as it can serve the expected travel demand, is the most flexible and cheapest system and it can be realised fast.
- Turn the bus into a high grade collective transport system by taking measures with regard to the frequency, total travel time, comfort, real time information and capacity.
- Realize the collective transport connection from the start.

Third, with regard to the costs of collective transport the following can be said:

- Include a part of the collective transport cost in the land price as it also provides a form of certainty for the developers. As companies already paid a part of the costs, governments have an obligation to actual realize the bus system.
- Look to the possibilities of subsidy from the European Commission to finance the new collective transport system.

To conclude, the following suggestion with regard to collective transport to business park Schieveen can be made. With regard to collective transport Schieveen should profit from the proximity of the airport. As Rotterdam Airport has no fast, high grade collective transport connection the city should focus on that connection and combine it with Schieveen. Besides that, Schieveen is part of Science Port Holland and should develop a collective transport plan within that context. As Delft also seems to be interested in a fast connection to Rotterdam Airport, Rotterdam should profit from that. Schieveen also has a favourable location as it lies between Rotterdam and The Hague, it should make more use of that position.

That leads to the following solution. Rotterdam should construct a fast, comfortable and high frequent bus connection that goes from Rotterdam Central Station to The Hague Central Station and stops at Rotterdam Airport, Schieveen and Technopolis/Delft University of Technology. That way the connection has a critical mass, can profit from the educational institutes at Delft and can also benefit from the presence of high educated people at Delft and The Hague. The bus is chosen as this study showed that buses also can be experienced as high grade, can serve the expected travel demand, is the most flexible and cheapest system and it can be realised fast. Besides that the average speed of a bus is higher as of light rail. It is not preferable to also make a stop at for instance Park Zestienhoven because the number of stops must be limited to guarantee a fast connection and the line should focus on business travellers.

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Appendix

Ranking

The influence of location factors on the performance of business parks

Norra Älvstranden

Mr. F. Högberg and Mr. J. Ekman

	Strong	Weak	No influence
The presence of a qualified labour pool	II		
Quality of life in the area	II		
Image of the area	II		
Nearby presence of an airport	I		I
Amount of parking space	I	I	
Accessibility by car	I	I	
Accessibility by public transport	II		
Presence of a catalyst (representative (inter) national firm)	II		
Presence of special facilities at the business park (Community centre)	II		
Visibility from the highway			II

Flight Forum

Ms. P. van Engelen and Mr. T. van Dijk

	Strong	Weak	No influence
The presence of a qualified labour pool	I		I
Quality of life in the area		I	I
Image of the area	I	I	
Nearby presence of an airport	II		
Amount of parking space	II		
Accessibility by car	II		
Accessibility by public transport	II		
Presence of a catalyst (representative (inter) national firm)	I	I	
Presence of special facilities at the business park (spatial quality)	I	I	
Visibility from the highway	I	I	

Amstelwijck

Mr. C. Kooijmans and Mr. G. Harkink

	Strong	Weak	No influence
The presence of a qualified labour pool		II	
Quality of life in the area	I	I	
Image of the area	II		
Nearby presence of an airport		I	I
Amount of parking space	II		
Accessibility by car	II		
Accessibility by public transport		II	
Presence of a catalyst (representative (inter) national firm)		II	
Presence of special facilities at the business park (hotel, restaurant etc.)	II		
Visibility from the highway	II		

Ranking of the importance of the following factors to the current public transport system

Ranking (1-5)	Norra Älvstranden		Flight Forum	
	Fredrik Högberg	Johan Ekman	Petra van Engelen	Theo van Dijk
Frequency	1	1	3	3
Travel demand (there are	4	1	5	2
Comfort of stops and vehicles	2	3	4	1
The fact that it was present	5	1	1	4
Total travel time by public	3	2	2	5

			Lindholmen	Flight Forum	Amstelwijck
Situation	Economic performance	gdp	€ 34,130	€ 39,770	€ 28,400 (per housekeeping)
		number of inhabitants	485,000	210,000	118,187
		unemployment rate	5.6%	2.1%	4.1 %
		city ranking Datar	46	85	no usefull information
		Huggins & Davies competitiveness monitor	22	31	no usefull information
	Quality of labour	economic activity rate	72%	n.a.	70.7 %
		percentage of high educated people in the region/city	40%	32%	33%
Quality of life	atlas van de Nederlandse gemeente	x	15	23	
Business Park					
General Features	Size	netto ha.	300,000 m ²	275,000 m ²	213,383 m ²
		number of expected establishments	n.a.	n.a.	n.a.
		number of present establishments	150	52	7
Land price		price per m ² gross floor area	n.a.	€ 265 - € 275	n.a.
Type of business park		five types of section 2.3.1	high grade business park (Type D)	mixed area (Type C)	mixed area (Type C)
Type of office location		seven types of section 2.3.2	metropolitan prime location (Type A)	collective-transport junction location (type C)	highway location (Type E)
Target groups		specific sectors (appendix A)	IT	no	no
		number of competing business parks within 20 km	n.a.	2	n.a.
Size of working population		number of employees at business park	16,000 (including students)	1,473	n.a.
Size of working population		number of expected employees at business park	40,000 (exclusing students)	n.a.	n.a.
Liveability		mono or multi functional	multi functional	mono functional	mono functional
Accessibility	By car	degree of daily congestion	normal	normal	low
		distance to highway (km)	3.5 km (E6) and 5 km (E20)	1 km (A2), 3.7 km (A58)	20 m (A16) and 15 km (A15)
		number of parking places per m ² GFA	1 per 60 m ² GFA	1 per 60 m ² GFA	1 per 50 m ² GFA
	By collective transport	average distance to stop (m)	n.a.	n.a.	n.a.
		distance to city centre (km)	6.5 km	8.3 km	7 km
		travel time from central station to business park	8 minutes	15 minutes	19 minutes
	By plane	distance to airport (km)	25 km and 15 km	0,7 km	34 km, 86 km and 90 km
Special qualities	The indicators depend on the special qualities which differ per location				
Collective Transport					
Mode	Bus, Light rail, Metro, Train, Ferry		bus (and ferry)	bus	bus plus shuttle bus
General Features	Organization	who is responsible for the organization?	Göteborgs Spårvägar	Arriva	Municipality
	Financing	how is the system being financed?	part of cost in land price subsidy government	part of cost in land price subsidy government	Municipality
Quality	Reliability	information on delays	n.a.	n.a.	n.a.
		percentage on time	n.a.	n.a.	n.a.
	Frequency	number of vehicles per hour	12	6	bus: 4 / shuttle: n.a.
		time spent waiting at rush hour	max. of 5 minutes	max. of 10 minutes	n.a.
Travel time		average speed (km/hour)	n.a.	56 km/hour	n.a.
		number of stops to central station	4	15	bus: 13 / shuttle: 1
Comfort		comfort in transport system (in vehicle and on stops)	high	high	low
Real time information		travel information at stops (yes or no)	yes	yes	no
		travel information in vehicles	no	yes	no
		travel information at companies on the business park	n.a.	no	no
Availability		number of seats per vehicle	max.165	max. 185	
		occupancy rate (supply versus amount of use)	n.a.	n.a.	n.a.
Travel cost		costs in Euros for a day return CS to Business Park	€ 1.38	€ 3.00	€ 1,94
Part of network		hub or spoke	spoke	spoke	spoke
Timing	momentum of exploitation	day one or later	a normal bus at day one Bus line 16 from 2003	a normal bus at day one and when Phileas fails Phileas from 2004	a tempory solution from day one

Table 8.1 Information from benchmark