

# Location analysis for a new football stadium

*The case of Feyenoord Rotterdam*

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*Football club Feyenoord aims to hold its position as a top three football club in the Netherlands. The old stadium does not provide enough possibilities to expand the capacity and multifunctionality. A new football stadium does provide these services and that's why Feyenoord wants a new football stadium. It is not the question whether the football stadium will be build, but where to build the new football stadium. This report will take a look at the location factors for a sports stadium and the decision making process of concerning the new football stadium. Possible locations are tested and a recommendation is given in the conclusion.*

## **Preface**

This paper was written as a bachelor thesis for the major Urban, Regional and Transport Economics at the Erasmus University, Rotterdam. The paper is focussed on the new football stadium that has to be built in Rotterdam. The question raised from this project is where to build this football stadium in Rotterdam.

Special thanks go to Erik Braun, my supervisor during this period. He gave me several ideas to steer me into the right direction. He also gave some interesting sources that were useful for this paper.

Rotterdam, July 2012

Frank Penning

## Executive Summary

This paper investigates the location factors in the decision making process for constructing a football stadium in Rotterdam. Feyenoord wants a new football stadium and it is the question where to construct this football stadium. Therefore, a location analysis is required in order to find an optimal location for a football stadium in Rotterdam.

It is important to analyse the location factors for sports stadiums. The location factors are supported by location theories, like the neoclassical theory, behavioural theory and the institutional theory. The neoclassical theory is seen as a benchmark while the empirical value of the behavioural theory is appreciated. The institutional theory regards the firm not as an active decision agent, but as a dependent agent who has to negotiate with its suppliers.

The main location factors are those that influence attendance, income, and occupancy. Sports teams has to take into account the land costs, the market potential, the capacity of a sports stadium and the accessibility.

Several urban structure models has been used as a theoretical background. The urban structure models show that there is no clear urban structure applicable for every city. The urban structure can be influenced by a governments policy like gentrification or greenbelt policy which can lead to higher land prices in those areas.

In order to investigate the relocations of football stadiums, an analysis has been done about football stadiums constructed between 1995 and 2012. The results indicate that most of the football teams are moving away from the central city to the edge of the city. Proximity to a highway is preferred while a location in suburban areas is still rare.

Stadion Feijenoord N.V. and Feyenoord Rotterdam N.V regard the renovation-variant and the Varkenoord-variant as the most plausible options for a new football stadium. A critical analysis for these locations has been done. Possible locations for a new football stadium are investigated regarding land prices, availability of land, and accessibility.

Finally, recommendations are given to Stadion Feijenoord N.V. and Feyenoord Rotterdam N.V. They should expand their search area for a new football stadium and they should take

into consideration possible location in Rotterdam-Noord and along the highways A15 and A16.

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# 1 Introduction

## ***1.1 Background***

During the last few decades, the demand for a brand new sports stadium has increased rapidly. Professional football clubs have the desire to increase the turnover in order to stay competitive with other football clubs. This goal can only be achieved by a well-functioning management and by optimizing sponsors revenues, match revenues and broadcasting rights. Football clubs want to maintain this growth of turnover, but it is the question whether this is a feasible goal. The maximum of business seats and sky boxen is limited and therefore a new football stadium is needed to accommodate this growth. But the football clubs spent their money on players and therefore they look at the public sector to invest a lot of money in new football stadiums. The governments yield to the pressure and that's why almost every football stadium has been financed partly or entirely by the government the last decades.

As mentioned above, the government is an important financer of football stadiums. Their main goal is to keep the costs as low as possible and therefore a location analysis is required. Thus, the main question is where to construct a new football stadium and this makes the location choice the most important factor in the beginning of the decision making process. All possible locations have their own advantages and disadvantages and the government should investigate which location is the best for a sports stadium. This choice is dependent on the goal of the government. In some cases, the government wants to develop a downtown area and sometimes the government wants to spend as little as possible on sports stadiums. It is often the case that a lot of fuss is made by the local people. A sports stadium has a great influence on the area and therefore it is important to analyse what location is the best for a sports stadium.

This report will discuss the location for a new football stadium in Rotterdam where Feyenoord plays their matches. Feyenoord argues that it is necessary to build a new football stadium to maintain their performances. The growth possibilities are restricted due to the outdated construction of the stadium. Therefore Feyenoord has the desire to play in a brand new football stadium with the goal to double their turnover. But Feyenoord has no money to build a new stadium and private investors are not willing to invest in this project because of the low return on investment, as explained later. So the government has to invest in this project, but the decision to construct the football stadium hasn't been taken yet. There are

three possible locations for the football stadium and I will analyse what location is the most suitable in the case of Rotterdam.

The amount of literature on football stadiums is limited, but there is a lot of literature of stadiums in other sports. Most of the literature comes from the North-American continent and focuses on stadiums that are used for baseball, hockey, American football and basketball. Although these stadiums are used more frequently than football stadiums, most important investment factors are applicable for football stadiums. This makes the literature relevant.

The literature used in this report come from Baade and Dye (1987), McCann (2001), Pellenbarg et al. (2001) and several other authors.

This study is relevant because it is of interest to analyse where to construct a new sports stadium. Constructing a sports stadium is an expensive project and the government must economize to meet the rules set up by the European Union. This makes constructing a sports stadium a sensitive decision and therefore it is necessary to investigate some locations for a football stadium in Rotterdam. I will end up with a conclusion about the locations for a football stadium in Rotterdam.

## **1.2 Research question**

The research question of this report can be defined as follows: *What are the location factors for football stadiums and what are suitable locations for a new football stadium in Rotterdam?* It is of the importance to analyse the location factors of sports stadiums in order to answer this question. This will be done in the second chapter. It is necessary to investigate these factors, because they can influence the decision making process where to build the football stadium in Rotterdam. The third chapter examines the development of location choices for football stadiums in the Netherlands, Germany, England, Spain and Austria. The fourth chapter discusses the current state of 'de Kuip', the current football stadium where Feyenoord plays their matches. After that, possible locations for a new football stadium are discussed. Chapter five will conclude the findings and ends up with a recommendation for a football stadium in Rotterdam.

## 2 The location choice of sports stadiums

The high initial costs of constructing a sports stadium makes it worth to analyse the location determinants. The government doesn't want to spend too much money on sports stadiums and therefore a location analysis is required. Sometimes the government's policy is to (re)develop an urban area by constructing a new sports stadium. In all cases, the location determinants play a major role. This chapter examines the location factors and the (re)location of sports stadiums.

### 2.1 Spatial changes of location choices of sports stadiums

The location choices of sports stadiums vary a lot during the twentieth century. Apparently, the motives of the location choices change all the time. Before an analysis of location factors is presented, it is worth to analyse the different waves of location choices and their motives during the twentieth century.

#### *Until 1950s*

In the beginning of the twentieth century, the sports stadiums were not constructed in the dense urban environments, but originally on cheap land surrounded by little development and low dense areas. Four factors were considered in the location choice process: accessibility, neighbourhood, space for expansion, and availability. Land costs was the most important factor in the decision making process, because team owners usually financed and constructed the sports stadiums themselves. It was of the interest to keep the costs as low as possible while still siting the stadium in a location accessible to the core market. Transportation and accessibility were also important, but they were of secondary importance. Although, the stadiums were constructed in suburban areas, these areas became dense urban areas. The sports stadiums attracted people to live nearby the sports stadiums. This development led to a higher degree of accessibility of sports stadiums and more proximity to the fan base (Chapin, 2000).

#### *1950s until 1970s*

In the 1950s and 1960s, the suburbanization started in North America. Cheaper land, larger homes and racial tensions led to a development of suburbanization of middle and upper class.

The upcoming use of the automobile was very important for this development. The sports teams followed their fan base and chose a location outside the city to construct a sports stadium. In the 1950s and 1960s, forty-three sports stadiums were constructed in suburban area in the United States (Chapin, 2000).

In the 1970's, most of the sports stadiums were constructed in remote suburban locations. This location ensures people, mostly suburbanizing middle class, an easy access to the sports stadium. In the 1950s until the 1970s, the location of sports stadiums mirrored the location of the core market, the fan base and this led to a development of sports stadiums constructed in the suburban areas (Chapin, 2000).

### ***1980s and 1990s***

In the 1980's and the 1990's, the sports stadiums returned to the city centre in North America. The explanation for this development is that the sports stadiums provide urban experience what leads to more civic pride (Chapin, 2000). The sports stadiums didn't follow the middle and upper middle class anymore. Most of the sports stadiums in North America were constructed in the city centre, because the government wanted to (re)develop downtown areas by constructing a new sports stadium. This radical change mirror the change in investors of sports stadiums. Before the 1970's, the sports stadiums were financed by the team owners and private investors. Their goal was to minimize the costs of constructing a sports stadium. In the 1980's and the 1990's, however, the public sector was the main investor of sports stadiums. Their goal was not to minimize the construction costs, but to develop downtown areas and to reinforce the civic pride.

On the other hand, in Europe the sports stadiums still shift from dense, urban environments to suburban areas. Bale (1993) states: "The suburbanization of sports stadiums has been a part of the segmentation of cities distinct, less complex sectors, defined largely by land uses and activities that take place in these areas." The land use for sports facilities has become much more segmented with distinct agglomerations or zones of specialized sporting land use. In the 1990's, most of the sports stadiums in Europe were constructed in suburban areas. The reason for this development is that the land prices are much lower in suburban areas than in the city centre. This is also important for the parking places, used by the spectators. Another reason for the shift to the suburban areas is the higher degree of accessibility. There are more

opportunities to improve the public transport and it is mostly possible to construct a sports stadium along a highway.

### ***Twentieth century***

The development of location choices showed a change in the importance of location factors during the twentieth century. Until the 1950's, team owners considered three primary location factors, namely available, cheap land, accessibility and proximity to the fan base. During the 1950's and the 1960's, the above location factors were still considered as the primary location factors. It was still of the importance to keep the construction costs as low as possible. But in the 1980's, government wanted to develop downtown areas by constructing a new sports stadium, despite the high land costs and the poor accessibility.

The return of sports stadiums in the United States to the city centre mirrors the growing influence of the public sector. Until the 1980's, private investors were the main financers of the sports stadiums and they wanted to keep the costs as low as possible. Upward of the 1980's, government became the main financer and their goal was to develop downtown areas and they had not a limited budget compared with private investors.

## **2.2 Location theories in literature**

Sports teams attract a lot of people to their stadiums and many people watch sports matches on television. This development leads to a growing interest of sponsors and to a growing budget of sports teams. All these happenings seems to confirm that sports is business. Therefore it is of the interest to analyse the location theories for firms in general.

There are many location theories and none of them seems to dominate the field at present (Scott, 2000). There is no clear paradigm for location choices and therefore an overview of several approaches will be given. Hessel (1992) states: "An evaluation of location theory might help impose some order upon the myriad elements that influence the location of firms". Therefore different location theories will be analysed, because it can help firms in the location decision process. Literature mentions three types of location theories: a neo-classical, a behavioural and an institutional approach (Hayter, 1997; Mariotti and Pen, 2001; Brouwer et al, 2004)

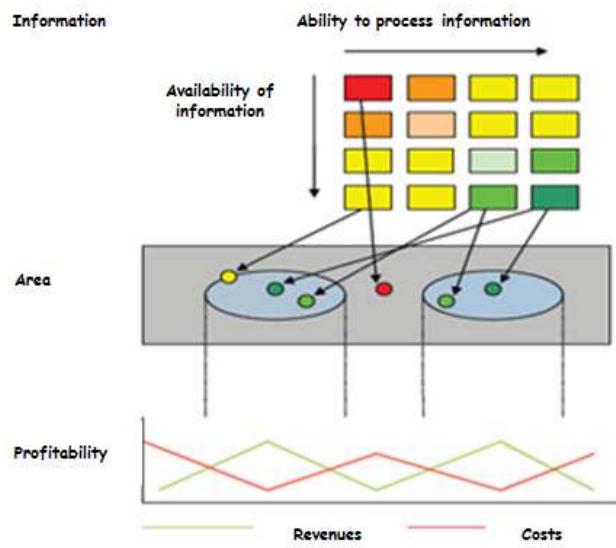
### **2.2.1 Neoclassical location theory**

The building blocks of the neoclassical location theory are cost minimization and profit maximization (Pellenbarg et al., 2002). The optimal location is calculated with the aid of different location factors, such as transport costs, labour costs, and market size (Brouwer et al., 2004). Every firm has the possibility to calculate the optimal location, because the neoclassical theory states that there is complete information in the market. Every firm will locate on the optimal location, because economic agents are always rational (Mariotti and Pen, 2001).

The neoclassical theory calculates the optimal location, but the empirical value of this theory is questionable. Smith (1971) states: “Classical theories have been more concerned with the construction of elegant theories of location equilibrium, or with the fusion of location and production theory, than with providing a guide for empirical enquiry” The neoclassical theory states how location decisions should be made instead of how decisions are taken in reality.

### **2.2.2 Behavioural location theory**

Neoclassical theory is useful as a benchmark, but it does not take into account the internal dynamics of firms in a context with imperfect information and uncertainty where profit maximization is not the ultimate goal. Therefore a behavioural approach was introduced by Pred (1967). He mentioned four key elements: the role of limited information, the ability to use information, perception and mental maps, and uncertainty. Pred (1967) combined these elements into the behavioural matrix, where firms are classified along two dimensions, namely the availability of information and the ability to process information. Firms with high information levels and a large ability to process information come close to the classical optimal location (green square in figure 1). The behavioural matrix of Pred was simple and popular, but it offers just a conceptual basis for constructing a behavioural location theory.



**Figure 1 Behavioural matrix of Pred (1967)**

The behavioural theory wants to understand the behaviour of entrepreneurs and, with respect of the neoclassical theory, it relies more on empirical work rather than on an explanatory model. The behavioural theory focuses more on the decision making process. McCann (2001) mentioned the relocation costs as very significant costs since these costs, along with imperfect information, will mean that firms are unlikely to move. However, when a firm must move, it will choose more frequently nearer places, because these places are more familiar and easier to imagine.

### 2.2.3 Institutional location theory

In the neoclassical and behavioural approach, the firm is set down as an active decision making agent in a static environment. However, this simplistic view of locational behaviour by the firm was questioned a lot during the 1980s. This new development leads to a common belief that economic processes in space are mainly shaped by society's cultural institutions and value systems. The social and cultural context became important in the decision making process.

Firms have to interact with its environment (Hayter, 1997). This means that firms have to negotiate with their deliverers and suppliers, local, regional or national governments, labour unions and other key factors in the production process of the firm. Firms became 'pawns in a game', they were dependent on several institutions and therefore they had to negotiate with

them in order to get the most optimal location for their firm. This development influenced mainly the larger firms, because they have more negotiating power and are able to exert a substantial influence upon their environment. In contrast, small firms have to accept the restrictions due to the small negotiating power (Hayter, 1997).

#### **2.2.4 Applicability of location theories for sports stadiums**

The location theories are relevant for this study, because they are applicable for sports stadiums. A sports stadium can be used in the perspective of the neoclassical location theory, because cost minimization is very important in the decision making process of a location. The government wants to spend as little as possible and that is the most important thought of the neoclassical theory. It is also possible to apply the elements of a sports stadium for the behavioural location theory since relocation costs are very important. It is possible that sports teams cannot move due to the high relocation costs. The institutional location theory can be used for sports stadiums in the way that sports clubs have negotiation power. Many municipalities subsidize sports clubs because of the negotiation power of these sports clubs. Municipalities are put under pressure by the fan base of sports clubs.

#### **2.3 Location factors for sports stadiums**

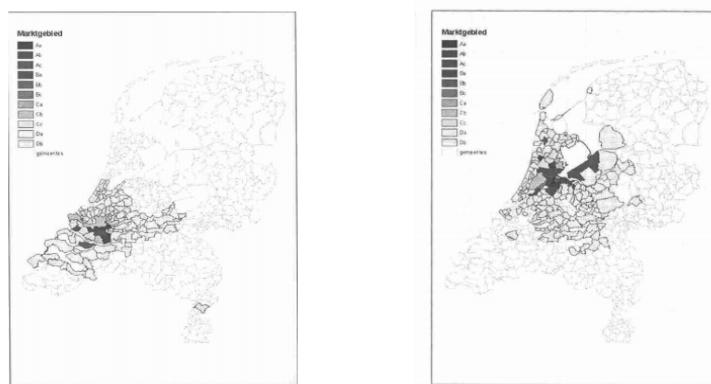
The location theories examined in paragraph 2.2, are applicable for sports stadiums. There is, however, also literature about location factors specifically focused on sports stadiums.

Petersen (1996) states: "The three most important factors to consider in selecting a site for a convention, sports, or entertainment facility are those that affect attendance, income, and occupancy." Petersen's primary location factors are considerations of size, visibility and scale, parking availability, and transportation accessibility. John and Sheard (2006) mention client base, land costs, land availability, and land use regulations as the primary location factors. The obtained location factors in literature indicate that the primary location factors for sports stadiums are based on site characteristics (size, availability), economic factors (land costs), and transportation (accessibility). These factors play a major role in the decision making process of football stadiums in Europe. In the next subparagraphs, I will set out the location factors that influence attendance, income, and occupancy.

### 2.3.1 Site characteristics and economic factors

Site characteristics and economic factors have a great influence on the construction costs of sports stadiums. In the beginning of the process, land is required to construct a sports stadium. Land costs vary between different land areas. Land prices in the city centre are higher than land prices in rural areas (McCann, 2001). Construction costs also contains costs of parking places and sometimes extra facilities like a training ground next to a sports stadium. It is possible that some land owners have to be bought out to construct the sports stadium on the desired location. This leads to extra costs, because the land owners don't want to leave their area and therefore they have to be compensated by extra money.

The size of a sports stadium is also important in the location choice. A bigger sports stadium requires more land with respect to a smaller sports stadium. A bigger sports stadium attract more people and therefore more space is needed for parking places. The land costs of sports stadiums are dependent on the capacity of a sports stadium. The higher the capacity, the more costs have to be made. Therefore it is useful to estimate the attendance of a sports club which is influenced by the market potential. When a sports stadium is located far away from the city, the market potential will be smaller compared to a sports stadium located nearby the city. The market potential is also crucial for the income of sports stadiums. The income of sports stadiums will be the highest in an area where the market potential is the greatest. So an potential location should not only provide cheap land and enough space, but it has to take into account the market potential.



**Figure 2: The market area of Feyenoord (left) and Ajax (right) (Source: Presentation Erik Braun at the Erasmus University)**

Figure 2 illustrates the market area of the biggest football clubs of the Netherlands, Feyenoord and Ajax. Their market area is very big compared to smaller football teams in the Netherlands. A big market potential can justify a location outside the city or even in suburban areas. An additional advantage is that the possibilities of a location in proximity of a highway are greater outside the city and in suburban areas than in the central city.

I made a comparison between three football stadiums in Europe in order to illustrate the relation between the capacity of a sports stadium and its land costs. All football stadiums are located on the edge of the city so the land costs per square metre are equally distributed. Table 1 contains the construction costs of the football stadiums. The land costs are, however, a substantial part of the construction costs. Therefore it is justifiable to conclude that the land costs increase if the capacity of the football stadium increases.

<b>Stadium</b>	<b>Capacity</b>	<b>Construction costs</b>
Kyocera Stadium (The Netherlands)	15.000 seats	€27million
Stadion Miejski (Poland)	42.771 seats	€167,8 million (729,7 mln PLN)
Allianz Arena (Germany)	69.901 seats	€340 million

**Table 1: Comparison between stadiums constructed in the period 2006-2012**

It should be noted that the construction costs also depend on the functions a sports stadium provide. For example, Fc Groningen has a football stadium that provides extra facilities like a supermarket, cinema, fitness centrum and a casino. These extra facilities make the construction of the sports stadium more expensive. The degree of exploitation is, however, better by providing these extra facilities. As a result, the revenues will increase due to the non-sport related facilities.

Another location factor that plays a major role in the location choice process is the occupancy. The occupancy factor of sports stadiums is not very great. It depends on the amount of matches that take place in a sports stadium. For example, in the NBA<sup>1</sup> every basketball club plays at least 41 matches a year at home, but in the Dutch football league most of the football

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<sup>1</sup> NBA is the National Basketball Association, a basketball competition in the United States.

clubs play 17 matches a year at home. It is necessary for a stadium operator to provide more services due to the low occupancy factors of sports teams. Therefore, it provides services like spaces for business meetings and events, and services like a supermarket, casino, cinema and entertainment.

A sports stadium provides a lot of services and facilities in order to stay profitable. However, the use of these services and facilities are dependent on the location of a sports stadium. Services and facilities are used more in dense environments than in sparsely populated areas. A government may justify an expensive location for a sports stadium, because the occupancy factor is much higher than for a cheap location in a sparsely populated area.

Site characteristics and economic factors are very important in the decision making process, because these location factors have a great influence on the construction costs of a sports stadium. Since these costs are already high, it is worth to analyse the location factors in order to keep construction costs as low as possible. Especially, the land costs play a major role in the decision making process, because the land costs vary a lot between urban and rural areas.

### **2.3.2 Accessibility**

Petersen (1996) noticed that location factors are factors that influence attendance, income and occupancy. In order to improve these factors, it is worth to analyse the accessibility possibilities. Accessibility is affected by the transportation possibilities, proximity of a highway and parking facilities.

Transportation accessibility is a key factor in the location choice of a sports stadium. Many people are attracted to a sports stadium during event or sports matches. This requires a well-functioning transportation accessibility. A sports stadium has to provide public transport in order to cope with the amount of people that come to a sports match. A sports team has to take into account the possibilities to construct the sports stadium next to a railway station. Another option is to provide a tram or subway connection to the sports stadium. The public transport possibilities are very expensive and therefore a sports team has to take into account the possibilities to locate the sports stadium next to public transport facilities that already exist.

The last decade, many sports stadiums are constructed along a highway. A highway improves the accessibility of a sports stadium. The necessity of a highway is dependent on the market potential of a sports team. Sports teams with more market potential has a bigger market area. Therefore it is useful for them to construct a sports stadium nearby a highway. In contrast, small sports teams with little market potential has little utility of a sports stadium located nearby a highway.

Parking facilities improve the accessibility of sports stadiums. During the last decades, the use of the automobile increased a lot and this development makes it necessary to provide enough parking places for visitors. Parking facilities are very expensive due to the high land costs. Therefore it is worth to construct a sports stadium outside the city centre where the land costs are lower and where it is sometimes possible to construct a sports stadium along a highway.

The primary location factors justify the location choice of sports stadiums in suburban areas. The land costs are lower and the accessibility is better with respect to dense urban areas. In North America, however, many sports stadiums were constructed in the city centre in the 1990's while this is in contrast with the location factors. Apparently, there are other reasons for constructing sports stadiums in the city centre.

## **2.4 Intangible profits**

Although, most of the literature indicates that sports stadiums should be built outside the city centre, there are proponents for constructing a sports stadium in the city centre. They mention the intangible benefits of sports stadiums and the area development around sports stadiums.

Baade and Dye (1987) tested whether a sports stadium attract new non-stadium-related business activities, but they found no positive correlation between a stadium and general measures of economic activity. They show that sports stadiums have an insignificant impact on the level of metropolitan area income.

Coates and Humphreys (1999) estimate that the construction of a new baseball stadium reduces a city's per capita income by \$10 and a new basketball stadium reduces a city's per capita income by \$73. However, they indicate that this loss may reflect a compensating differential effect. People might accept lower wages because of the existence of new amenities, for example a new sports stadium. Baade and Sanderson (1997) found that the

city's share of its state's employment in leisure and recreation may fall due to a new sports stadium.

Sports stadiums bring attention to a city and the media contribution provides higher earnings. The city of Chicago calculated that the intangibles account for between 3.4% and 7.9% of a baseball team's impact on a city's economy if the team plays in a new stadium (Baade and Dye, 1987). A new sports stadium results in higher retail sales in metropolitan areas, but since retail sales constitute only a fraction of the incomes it is not enough to positively influence a metropolitan area's share of regional income (Baade and Dye, 1990).

Johnson, Groothuis, and Whitehead (2001) investigate whether the substantial civic pride generate more value than the costs of sports stadiums. They conclude that the substantial civic pride is far too low to cover the costs of sports stadiums. But bivariate analysis found evidence to support the importance of civic pride in the decision making process of constructing sports stadiums. The civic pride is primarily found in fans of these professional sports clubs and therefore insufficient to subsidize sports stadium by public money. Sport teams contribute to civic pride of a city, but a minority of the society is willing to pay for it.

Literature seems to conclude that new sports stadiums have no significant impact on the area around the sports stadium. There is, however, also evidence for area development due to the existence of a new sports stadium. Santo (2005) found that new baseball stadiums and football stadiums have a significant positive impact on regional income share for eight cities and a negative impact on regional income share for two cities. He concluded that the context matters. Nelson (2001) support the notion that context matters. He found that the association between the number of teams playing in the central business district and share of state per capita income is positive. The association with teams playing outside the central business district is negative.

Austrian and Rosentraub (1997) found additional evidence of the importance of the context. They found evidence that the real wages per employee increased in the area around a new sports stadium after constructing the sports stadium. The sports-related jobs also increased by 22.6%. Austrian and Rosentraub, Nelson and Santo accounted for the context in which sports stadiums are built. This is important, because the ability of a sports stadium to impact its area is tied to its context.

I can conclude that there is no consensus in literature about the intangible benefits of sports stadiums. In the twentieth century, the common belief was that sports stadiums didn't have a significant positive effect on its area. They believed that sports stadiums contributed to a reduction in a city's share of regional income while the purpose of constructing sports stadiums was to develop the area around sports stadiums. Sport teams contributed to civic pride of a city, but there was no common support to finance a sports stadium because of the low benefits compared to the high initial investment. This thought was questioned in the beginning of the twenty-first century. Some authors examined the effect of sports stadiums on its area and they found evidence that sports stadiums have a significant positive effect on its area. They noticed that the context matters in which a sports stadium is constructed.

## **2.5 Conclusion**

The development of location choices showed a change in the importance of location factors during the twentieth century. Until the 1980s, land costs were the most important location factors. In the 1980s, however, governments wanted to develop downtown areas by constructing a new sports stadium, despite the high land costs and the poor accessibility. The location factors like land prices and accessibility are supported by location theories like the neoclassical theory, behavioural theory and the institutional theory. The neoclassical theory is seen as a benchmark while the empirical value of the behavioural theory is appreciated. The institutional theory regards the firm not as an active decision agent, but as a dependent agent who has to negotiate with its suppliers. These location theories are relevant since those are applicable for sports stadiums. Land prices, relocation costs and negotiation power of sport clubs are related with these location theories. The main location factors are those that influence attendance, income, and occupancy. Sports teams has to take into account the land costs, the market potential, the capacity of a sports stadium and the accessibility. These location factors confirm the location choices to construct a sports stadium outside the city centre. In North America, however, many sports stadiums have been constructed in the city centre due to the area development goals. Unfortunately, there is no consensus in literature about the intangible benefits of these development goals.

### 3 Analysis

In this chapter, several theories of urban structure will be discussed. Successive to that, an analysis of the spatial changes of football stadiums in Europe will be done. The results give an idea about the possible locations for a football stadium in Rotterdam.

#### 3.1 Theories of urban structure

The land costs play a major role in the location decision process. Therefore, it is of the interest to consult literature about the different levels of land costs in cities. Von Thünen (1826) introduced the first economic model of spatial organization. Von Thünens main idea was that identical plots of land may be used for different purposes depending on their accessibility to the market. Figure 3 illustrates the Von Thünen Model. The land rent gradient is positively influenced by the yield-specific gross revenue potential and negatively influenced by distance. So the more you get away from the city centre, the cheaper the land rent gradient will be.

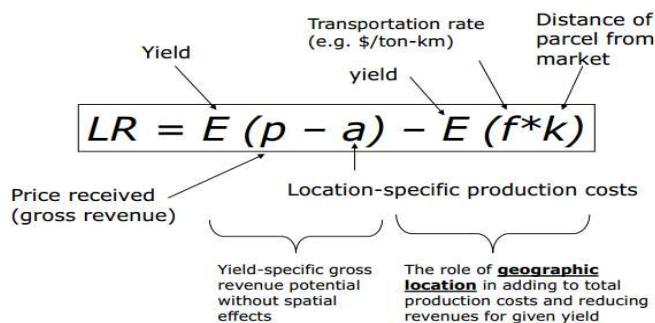
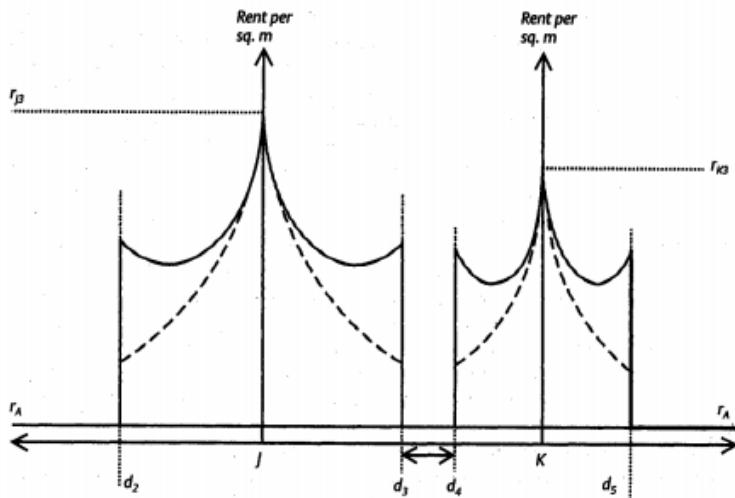


Figure 3 Von Thünen Model (Source: Presentation Martijn Burger at Erasmus University)

Von Thünen already stated that the land prices decline when the distance to the city centre increase. Von Thünen gave us an indication about the spatial density of a city, but the Von Thünen Model is outdated due to the too simplistic conception about the land gradient. Some parts of a city are higher valued than it would be in the Von Thünen Model and some parts of a city are lower valued than it would be in the Von Thünen Model. This can be caused by a governments policy. A government can implement a gentrification policy which is a policy to attract young, high-skilled people to the city centre in order to redevelop the area. As a result, the land prices will increase because of this development. The former low-skilled people are pushed away from the city centre to a location further away from the city centre.

Another policy a government can implement, is the greenbelt policy which is a policy that does not permit urban development in a zone of land surrounding an urban area. This policy leads to higher land prices on the edge of the city because of the aesthetic and archaeological value of the rural area. As a result, wealthier people will live on the edge of the city, because of the extra value created by the greenbelt policy. Figure 4 illustrates the effect of the greenbelt policy on land prices.



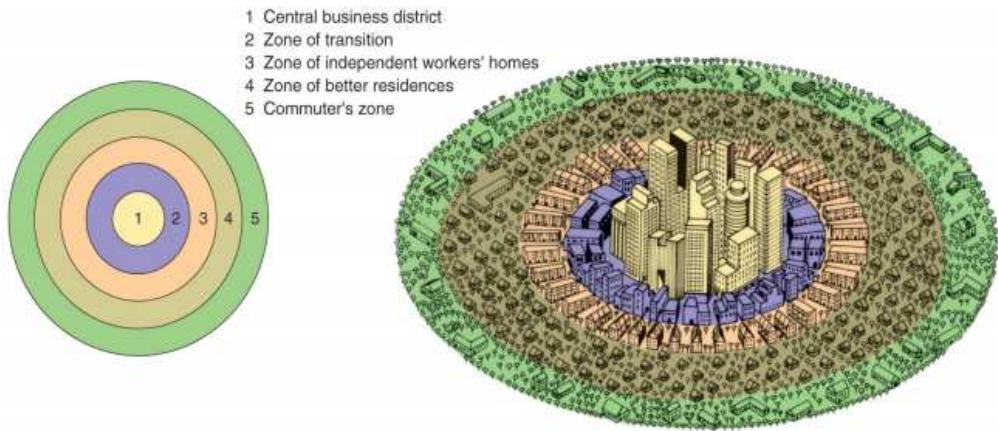
**Figure 4: Land price effects of a greenbelt policy (Source: Presentation Erik Braun at the Erasmus University)**

The Von Thünen Model can be used as a benchmark, but every city contains areas where the land prices are higher or lower compared to the Von Thünen Model. The aesthetic and archaeological value of some areas can lead to higher land prices. So the land costs are dependent on the urban structure of a city. Some economists wanted to elaborate the urban structure of cities. The results of this development were four common theories: the concentric zone model, sector model, the multiple nuclei model and the urban realms model.

### 3.1.1 The concentric model

The concentric model was founded by Burgess (1923) and the theory says that a city is divided into several rings. Each ring represents different economic activity, because the value of land decreases as you move away from the core. The first ring represents the central business district, this is an area where most buildings are office space or retail. This is a non-residential area. The second ring represents a zone of transition. This is an area that provides industry and low rent and low quality housing. The third ring represents a zone of working

class homes. Working class families live in this area. The fourth ring represents a zone of better residences. Middle class families live in this area. The fifth ring represents a commuter zone. Suburbs belong to this ring where wealthier families live. The concentric model assumes that the poor cannot afford to commute long distances and that's why they must live near the central business district. In contrast, the wealthier families can afford to commute long distances.



**Figure 5: The concentric model (Source: martinaspugh.com)**

The concentric model divides a city into clear zones, however, there are no clear zones in reality. As I already stated, a government can (re)develop areas by implementing gentrification or greenbelt policy. These policy programmes lead to more expensive housing in these areas. The concentric model is useful as a benchmark, but the applicability of this model is slight. This model describes cities until the 1920s in North America and the urban structure has changed a lot since then.

### 3.1.2 The sector model

The sector model was founded by Hoyt (1939). He agreed with Burgess's existence of land zones, but he suggested that there are sectors of land uses in the city due to the emergence of star-shaped transportation routes like train rails and bus lines. He represented a model where transportation and industry would lie along transport routes coming into the city centre. The poor people live next to the industry and the wealthier people live on the opposite of the city centre.

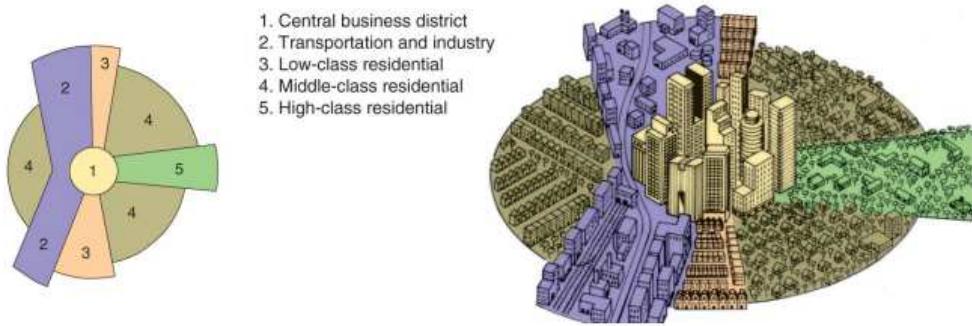


Figure 6: The sector model (Source: martinaspugh.com)

### 3.1.3 The multiple nuclei model

The multiple nuclei model was founded by Harris and Ullman (1945). They argued that the concentric model and the sector model were not applicable anymore due to the increased possibilities of movement. More and more people tend to buy a car in the 1940s and this development lead to a reduced importance of the central business district. Harris and Ullman argued that large cities would develop by peripheral spread and not from one central business district. There are several nodes of growth and each of them has their own speciality. For example, shopping malls, industrial areas and large residential suburbs can develop a city. Central business district has no longer monopoly power on retail and commercial activities since outlying malls and industrial areas compete with each other.

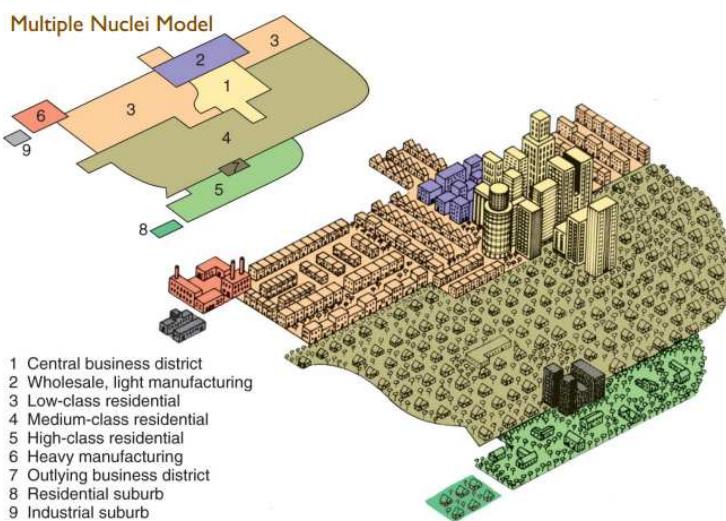


Figure 7: The multiple nuclei model (Source: martinaspugh.com)

### 3.1.4 Urban realms model

The urban realms model was founded by Vance (1964). He divided the city into realms and each realm has their own separate economic, social and political entity. The urban realms model shows a widely dispersed metropolis with several independent realms, each focused on their own suburban downtown. The only exception is the central business district, although the importance of it has declined, compared to earlier urban models. This model mirrors the development of cities in the late-twentieth century in North America where suburban downtowns became edge cities.

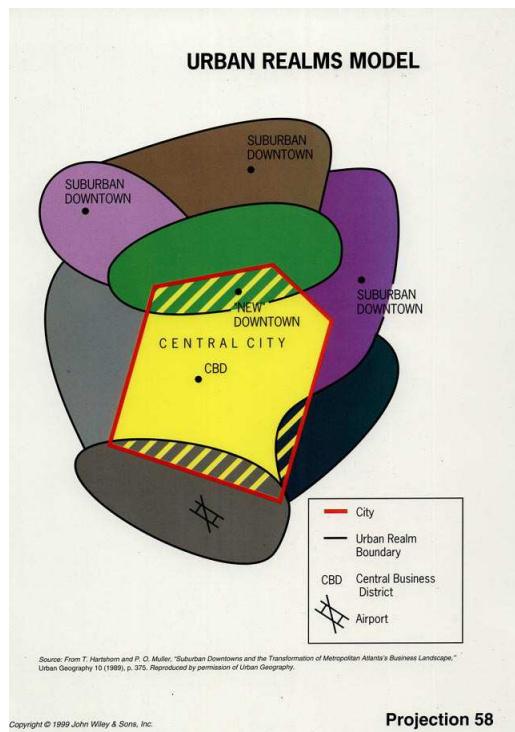


Figure 8: Urban realms model (Source: [lewishistoricalsociety.com](http://lewishistoricalsociety.com) )

### 3.1.5 Possible locations for a football stadium

The four urban structure models show a wide variety of urban structures of a city. The concentric model is not realistic anymore, because a city does not have those clear rings as mentioned in the concentric model. The sector model is more applicable since there is a possibility that the city Rotterdam is built like the urban structure mentioned in the sector model. In that case, a location in the middle class residential will be preferred since the land prices of the high class residential area are too expensive. Another possibility is to locate the football stadium just outside the city along the transportation routes. The land prices will be

lower outside the city and the infrastructure already exist. This makes the location very attractive compared to the location in the middle class area.

The multiple nuclei model mentioned several areas with their own speciality. Each area can develop a city. Building a football stadium with extra services like a supermarket, cinema and casino can develop the area. The speciality of an area with a football stadium could be providing entertainment facilities. Such an area does not necessarily have to be located nearby the city centre since this area has their own speciality. Therefore, an area on the edge of the city will be preferred since the land costs are much lower compared to the city centre.

The urban realms model seems to be the most realistic and applicable model. A football stadium could be located in a suburban area with its own industry. In this case, a football stadium could develop the suburban area. The urban realms model looks further away from the city centre compared to the other three models. This is an interesting fact since just a few football stadiums are located in suburban areas nowadays. Following the urban realms model, it is interesting to look at locations for a football stadium in suburban areas. A government can justify such a location far away from the city centre when their goal is to develop a suburban area.

It is interesting to apply the urban structure models for Rotterdam. The aim of the municipality of Rotterdam is to (re)develop the south of Rotterdam and this aim is best related with the multiple nuclei model. A football stadium provides entertainment facilities and this can be mentioned as a speciality of this area. Rotterdam also belongs to the urban realms model since the aim is to develop a realm, in this case the south of Rotterdam.

### **3.2 Methodology**

In chapter 4, the possible locations for a new football stadium in Rotterdam will be discussed. Therefore, it is of the interest to investigate the trend of relocation of football stadiums in Europe. I will use the results in order to give a well recommendation for a new football stadium in Rotterdam. I use a density model in order to classify whether a football stadium is located in the city centre, on the edge of the city or in suburb. I also look at the proximity of a highway. As already stated in chapter 2, the importance of the accessibility for car drivers has increased a lot during the last decades. This development makes the proximity of a highway more important. The proximity of a highway is measured by a benchmark of half a kilometre.

I focus on football stadiums constructed from 1995 until 2012, because the motives of constructing a football stadium on a certain area are time phased and this makes spatial changes of locations of football stadiums before 1995 irrelevant. The football stadiums in the Netherlands, England, Germany, Spain and Austria are investigated. It must be noticed that some locations of former football stadiums are missing due to a lack of information. The whole dataset can be found in the appendix.

### 3.3 Results

It is necessary to investigate the former locations of football stadiums in order to analyse the spatial changes of the locations of football stadiums. Figure 9 illustrates the type of locations of former football stadiums for the Netherlands, Germany, England, Spain and Austria. Figure 9 also illustrates the amount of football stadiums located in proximity of a highway.

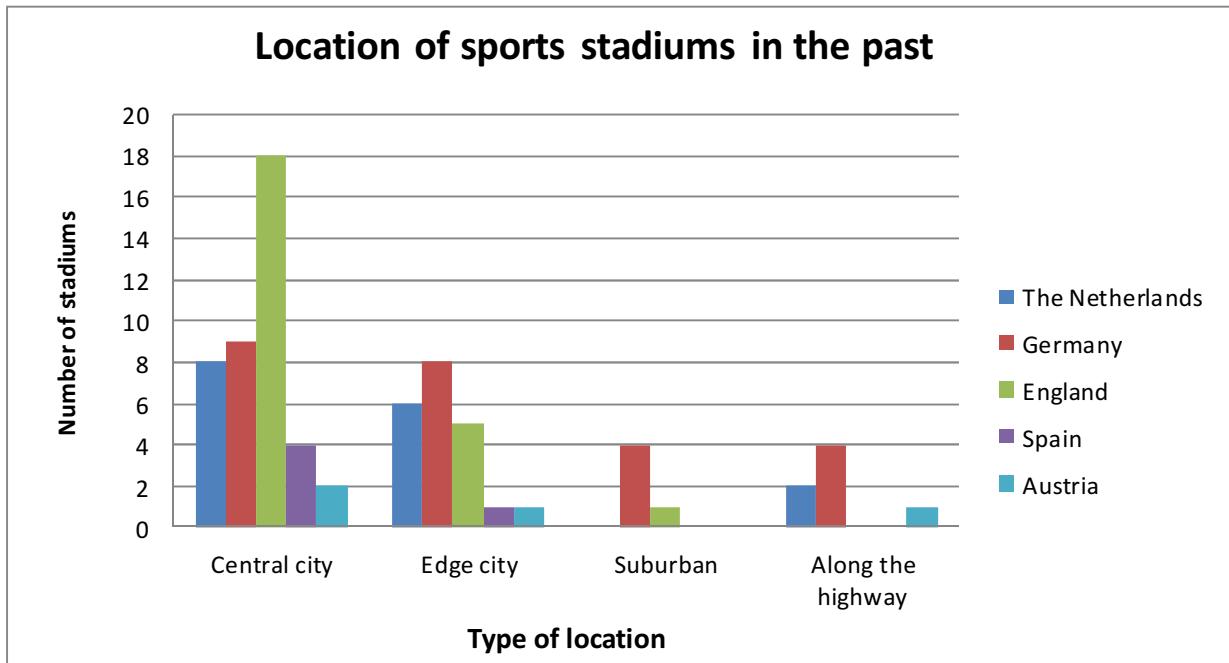


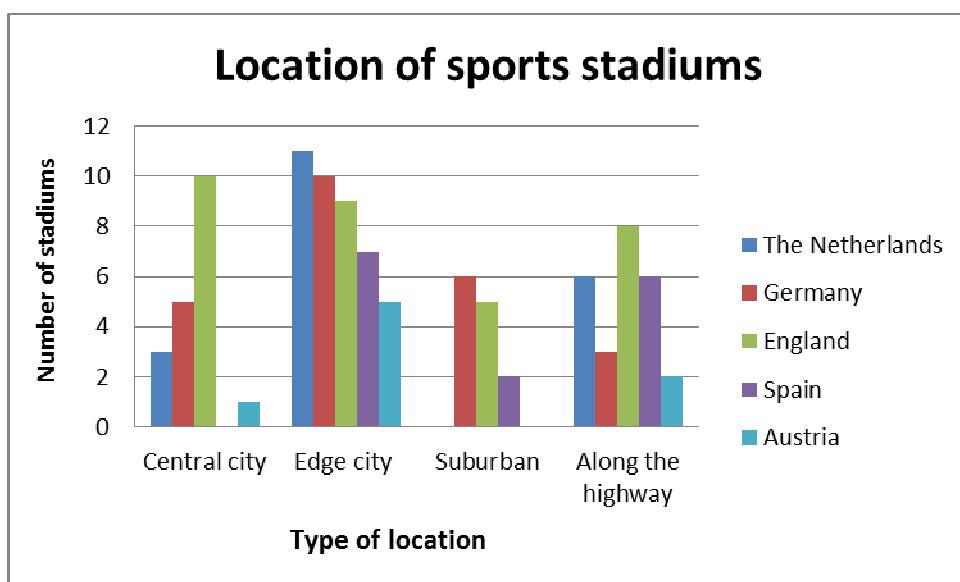
Figure 9: The location of sports stadiums in the past

The results of figure 9 show that the majority of former football stadiums were located in the central city. Successive to that, the edge of the city is the most common location for football stadiums. Only a number of football stadiums were located in suburban areas. The pattern of the locations of the former football stadiums is the same for every investigated country.

However, the differences between the type of locations in Germany are small. In contrast, the differences between the type of locations in England are great. The proximity of a highway is not a typical characteristic for football stadiums in the past. Germany is the only country with

a few football stadiums located in proximity of a highway. This is, however, not surprising, because Germany has more football stadiums on the edge of a city or in suburban areas.

The locations of football stadiums constructed in the period 1995-2012 are presented in figure 10. The results show that the central city is not the most common type of location anymore. It is overtaken by the edge city. This does not apply, however, for England where most of the football stadiums are still located in the central city. Some football teams decided to reconstruct or renovate their current football stadium. Probably, the benefits of reconstructing or renovating their football stadiums were higher than the benefits of constructing a new football stadium in another location.



**Figure 10: The location of sports stadiums from 1995 until 2012**

The suburban locations are also more common than it was used to. Figure 10 also shows the growing importance of constructing a football stadium in proximity of a highway. It is remarkable that Germany falls behind if you look at this characteristic. Germany was progressive in the development of constructing a football stadium in proximity of a highway, but Germany lost her position to England. More than a half of the English football stadiums, located on the edge of the city or in suburban areas, are located in proximity of a highway. This development seems to indicate that football teams in England decide whether to reconstruct or renovate the old stadium in the central city or to construct a new football stadium in proximity of a highway.

In chapter 4, some locations will be discussed for a new football stadium in Rotterdam. It is of the interest to analyse the type of location in the Netherlands. It can be concluded that the majority of the football stadiums in the Netherlands are located on the edge of the city. Not one football stadium is located in a suburban area while there are still some football stadiums located in the central city. More than a half of the football stadiums on the edge of the city are located in proximity of a highway. In the case of Rotterdam, it will be interesting to investigate some locations in proximity of a highway in order to cope with the increasing importance of accessibility.

The results of figure 9 and 10 showed that the locations of football stadiums shifted from central city to the edge of the city. Especially, Germany and the Netherlands had a great relocation of football stadiums to the edge of the city. England, in contrast, has still many football stadiums in the central city. Many English football teams chose to stay at the same location. This is maybe due to the historical value of the football stadiums in England. Football stadiums like Anfield Road, White Hart Lane or Old Trafford contain a lot of history and the football teams are maybe afraid of a loss of atmosphere in a new football stadium.

The importance of the proximity of a highway has also increased a lot the last decades. The Netherlands has a lot of football stadiums located in proximity of a highway. A highway improves the accessibility of a football stadium and therefore Rotterdam has to take into account the possibilities to construct a football stadium in proximity of a highway.

The obtained results seems to indicate that the main location factor is still the land costs. Most of the new football stadiums are constructed on the edge of a city where the land prices are lower than in the city centre. The growing importance to construct a football stadium in proximity of a highway indicates that the accessibility has become also very important, especially the accessibility by car. The governments urban development policies to (re)develop an area by constructing a new football stadium is not implemented a lot the last decade. Only England contains numerous football stadiums in the central city and there are several explanations for this development. It might be caused by the historical value of the football stadium. It is possible that the government wants to keep the football stadium in the downtown area, where it is already located, in order to keep the downtown residents satisfied. It is also possible that football teams want to stay at their home and football teams have a lot of negotiation power.

### **3.4 Conclusion**

The land prices decline when the distance to the city centre increase. However, this observation is not as clear-cut as that. The urban structure models show that there is no clear urban structure applicable for every city. The urban structure can be influenced by a governments policy like gentrification or greenbelt policy which can lead to higher land prices in those areas. The urban structure models show some potential location for a football stadium in Rotterdam. A location along the transportation routes is possible while a location in a suburban area is preferred in the urban realms model. The obtained data from football stadiums indicate that most of the football teams are moving away from the central city to the edge of the city. Proximity to a highway is preferred while a location in suburban areas is still rare. In the case of Rotterdam, it is interesting to investigate whether to locate the football stadium on a cheap land or in proximity of transportation accessibility.

## 4 The case of Rotterdam

I will take a look at the plans for constructing a football stadium in Rotterdam in order to answer the second part of the research question: *What is the most suitable location for a new football stadium in Rotterdam?* I will analyse these locations with the obtained location factors of chapter three. Successive to that, I will look at other possible locations which might be interesting locations for a new football stadium. In the end, a conclusion will be drawn.

### 4.1 Introduction

In 2004, initial steps were taken by the direction of Stadion Feijenoord N.V. and Feyenoord Rotterdam N.V. in the decision making process of a new football stadium in Rotterdam. A new football stadium was required in order to stay competitive with other football stadiums. Events like pop concerts were taken away from the current football stadium because of the lower revenues compared to new football stadiums. TNO (2006) investigated whether adaptions for the current football stadium were possible in order to achieve an expansion of capacity and multifunctionality. Unfortunately, they concluded that these adaptions were impossible.

In 2008, the municipal council of Rotterdam introduced a project of area development in the south of Rotterdam, called ‘Structuurvisie Stadionpark’. They expect that a football stadium can improve the city image and that a football stadium can develop an area around the stadium. A new football stadium should be considered as a catalyst for the ‘Stadionpark’. The main goal of the area development is to develop the south of Rotterdam with the focus on education and sports. The current football stadium could be used as a place to live, just the same as what happened with Highbury. ‘Structuurvisie Stadionpark’ is connected with the ‘Stadsvisie Rotterdam 2030’, a vision to improve the attractiveness of Rotterdam along with a strong economy. Some area developments are taken into consideration and ‘Stadionpark’ is one of these area developments.

#### 4.1.1 Location possibilities for the new football stadium

In the beginning of the decision making process, three locations were taken into consideration. All these three locations are locations in proximity of the current football stadium. The municipal council of Rotterdam is convinced of the fact that a football stadium in the south of Rotterdam is indispensable. The focus on a small part of Rotterdam makes it

interesting to investigate whether this focus is justifiable and whether there are better, and maybe cheaper, location possibilities.

#### 4.1.2 The Maas-variant

The first location for the new football stadium was a location along the Maas. This location was preferred by the direction of Stadion Feijenoord N.V. and Feyenoord Rotterdam N.V. The new football stadium would contain a capacity of 80.000 spectators and the football stadium would be an eye catcher in the skyline of Rotterdam like the Opera House in Sydney. This location would also provide enough space for a training complex on Varkenoord. The location along the Maas is, however, far too expensive. Until 2010, Rotterdam was hoping that the Netherlands would get the World Championship football of 2018. Unfortunately, the Netherlands didn't get the World Championship and this development made the option of a football stadium along the Maas too expensive to justify.



Figure 11: The location of the football stadium following the Maas-variant (Source: Feyenoord.nl)

#### Testing the location along the Maas

The main location factors for a new football stadium are land prices, availability and accessibility. When looking at these factors, it can be noted that the land prices are quite low in the south of Rotterdam compared to other areas in Rotterdam (see figure 13). However, the location does not contain available land which makes the location more expensive. The accessibility is quite good due to the presence of a railway station and a highway in proximity.

#### 4.1.3 The Varkenoord-variant

The second location possibility for a new football stadium is the Varkenoord-variant. Volker Wessels wants to construct a new football stadium with AKD, MVSA Architecten and Erasmus Development in Varkenoord. The Varkenoord-variant locates the football stadium not far away from the current football stadium. This variant leads to a connection between the neighborhoods Hillesluis and Vreewijk with Lombardijen and Kreekhuizen in IJsselmonde (ad.nl). The railway line Rotterdam-Dordrecht will be covered. The location of the new football stadium will be located central in the planning area in contrast with the Maas-variant. All parties involved support a location in proximity of the current football stadium. The ‘Stadionpark’ contains plans about a new railway station and the football stadium in the Varkenoord-variant will be located in proximity of this new railway station which is an advantage. The current football stadium can be used for other sports.



Figure 12: The location for a new football stadium following the Varkenoord-variant (Source: Feyenoord.nl)

#### Testing the location Varkenoord

The land prices for the Varkenoord-variant are the same as the Maas-variant. Thus, the land prices are quite low compared to other areas in Rotterdam. The land of this location is available. It is already used by young football players of Feyenoord. The accessibility is quite good. There is a railway station in proximity and there is a highway in proximity.

#### 4.1.4 The renovation-variant

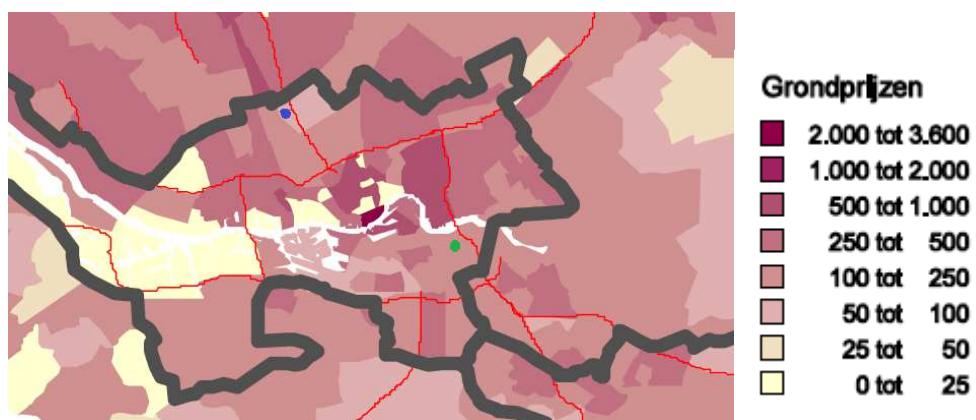
The renovation variant is added later on in the process due to the high costs of building a new football stadium. The construction companies BAM, Siemens and Eneco are willing to

renovate the current football stadium. Football matches can still be visited by 40.000 spectators during the renovation. The advantage of the renovation-variant is that the infrastructure already exist and that the Varkenoord area can still be used for recreational purposes. The disadvantage of the renovation is the limited possibilities of parking spaces around the football stadium.

The remained options are the Varkenoord-variant and the renovation-variant. Both variants provide a capacity of 63.000 spectators and the construction costs are in both variants about €300 million. How much the municipality of Rotterdam will contribute, is still unknown. In any case, the municipal council of Rotterdam wants to minimize the risks of financing a football stadium. Nowadays, the renovation-variant is supported by the majority of the municipal council. Jan van Merwijk, stadium director of the current football stadium, assumes that the renovation-variant is the most realistic variant due to the lower contribution for the municipality.

#### Testing the location of the renovation-variant

The land prices are a very important location factor for a new football stadium and therefore it is interesting to illustrate the land prices of Rotterdam. The green dot in figure 13 is the location of the current football stadium. The current football stadium is located in an area where the land prices are quite low. The football stadium is already located along a highway, namely the A16. The football stadium is also located along a railway station and there is a tram connection. Only a subway station is missing. So when I look at the most important location factors, land prices and accessibility, then I can conclude that the location of the current football stadium provides many advantages.



**Figure 13: Land prices in the area of Rotterdam (Source: Centraal Planbureau: Stad en land, 2010)**

## 4.2 Testing other locations for a new football stadium

The location variants mentioned above are all locations in proximity of the current football stadium. This limited search area is due to the ‘Stadionpark Structuurvisie’ which is a project that wants to develop the South of Rotterdam. A new football stadium is the catalyst of the area. I think that this search area is too small and therefore I will look at other possible locations for a football stadium. I will follow some urban structure models mentioned in chapter three.

### 4.2.1 Potential locations

#### Location in proximity of the airport

In chapter three, I looked at the urban structure models in order to set possible location areas. Following the sector model, it is of the interest to investigate possible locations along some transportation routes. A possible location would be in Rotterdam-Noord, along the A13 in proximity of the airport of Rotterdam (the blue dot in figure 13). The land prices are low in this area, even lower than the current location. Additional advantage is the proximity of a highway. There is already an intersection, so the infrastructure for automobiles is already present.

It should be noticed that the presence of the airport is a disadvantage. It is possible to locate the football stadium a little southwards to avoid the airport externalities, but the land prices are there a degree higher. The public transport system is also a problem. A railway station, tram connection or a subway station is necessary to cope with the amount of spectators. The airport has a subway station, so it might be possible to extend the subway line to the new football stadium. However, a subway connection is useful for spectators who live in proximity of the football stadium. A railway connection is easier for spectators who live far away from the football stadium. Since the market potential of Feyenoord is huge, it is useful to have a railway connection.

#### Location Prins Alexander

The location in proximity of the airport entails some problems with the accessibility. That’s why I looked at more locations in Rotterdam. Figure 14 illustrates the yellow dot, which is a location in the area Prins Alexander. The location correspond to the possible locations in the sector model of chapter three. The land prices in Prins Alexander are the same as the land

prices at the current location. The potential football stadium at Prins Alexander is located along the A20 and a railway station is present at this location. There is also a subway station present, so at this location the accessibility of the football stadium is much better than the location in proximity of the airport.

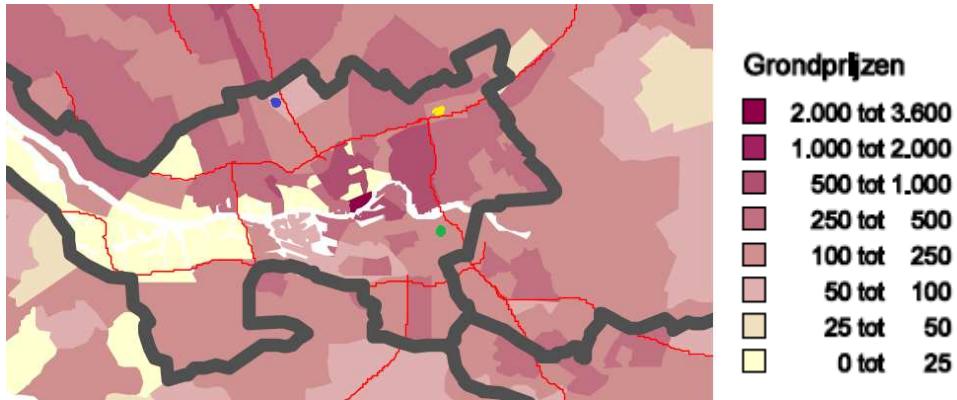


Figure 14: Land prices in the area of Rotterdam (Source: Centraal Planbureau: Stad en land, 2010)

It should be noticed that the location Prins Alexander has some problems. It can be concluded that the land prices are not very high in this area. However, there is no land available in this area and therefore people has to be bought out what leads to higher land costs. This makes the location less interesting. The area in proximity of the airport is a rural area which means lower land costs compared to the location Prins Alexander.

#### Location along the highways A15 and A16

AZ Alkmaar and ADO Den Haag located their football stadium next to a highway. That's why I looked at locations just next to a highway in Rotterdam. The white dot in figure 15 illustrates the possible location for a football stadium next to the highways A15 and the A16. This is a location in proximity of the current football stadium and the land prices are equally distributed. An advantage of this location is that the area is now rural area which means that no residents have to be bought out.

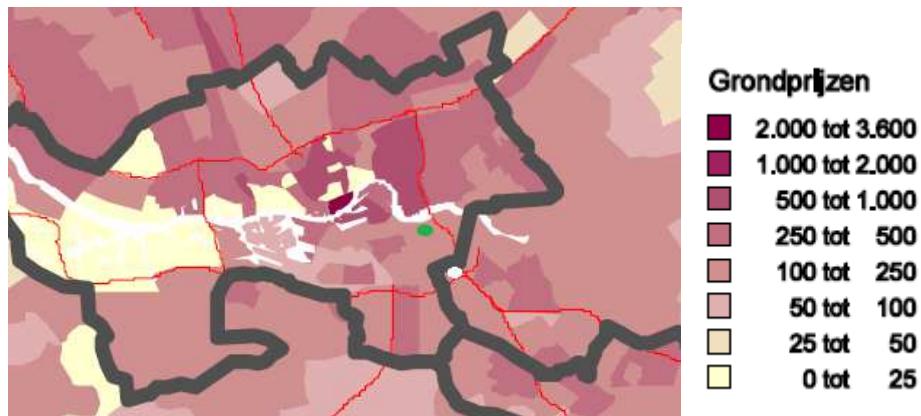


Figure 15: Land prices in the area of Rotterdam (Source: Centraal Planbureau: Stad en land, 2010)

There is, however, no public transport available at this location. I looked at the public transport system for the stadiums of ADO Den Haag and AZ Alkmaar and these stadiums don't provide a well-functioning public transport system. For ADO Den Haag, it is possible to come by bus and tram, but these transport modes can only cope with a limited amount of spectators. There is also a railway station located in proximity of the stadium. People have to walk about 15 minutes (ADO Den Haag.nl). ADO Den Haag provides shuttle buses during matches in order to provide enough public transport. AZ Alkmaar also provides shuttle buses during matches. This is, however, the only public transport possibility to get to the football stadium.

In the case of Feyenoord, it will be difficult to locate the new football stadium along the A15 and A16. ADO Den Haag and AZ Alkmaar compensated the limited public transport possibilities by providing extra services like shuttle buses. The attendance for these football clubs is, however, a fraction of the potential attendance for a new football stadium of Feyenoord. Feyenoord should provide many shuttle services in order to cope with the huge amount of spectators and it is questionable whether Feyenoord wants to pay these costs. Therefore, a location along the highway of A15 and A16 won't be the best option for a new football stadium.

### Location Kralingen

Another location possibility is a location in Kralingen (the black dot in figure 16). This option is a rigorous and implausible option, though interesting to take into consideration. The land prices are very high in this area, but at this location Excelsior plays their matches. Excelsior is a satellite club of Feyenoord and therefore it is maybe possible to merge. Excelsior attract

about 3000 spectators during matches when they play in the Dutch league (Eredivisie Live.nl). In the Jupiler League, the attendance is about 1944 spectators per match (elfvoetbal.nl). The attendance of Excelsior is not very great while the area of Kralingen is a wanted area. Therefore, it might be possible to construct a new stadium at the location where the current stadium of Excelsior stands.

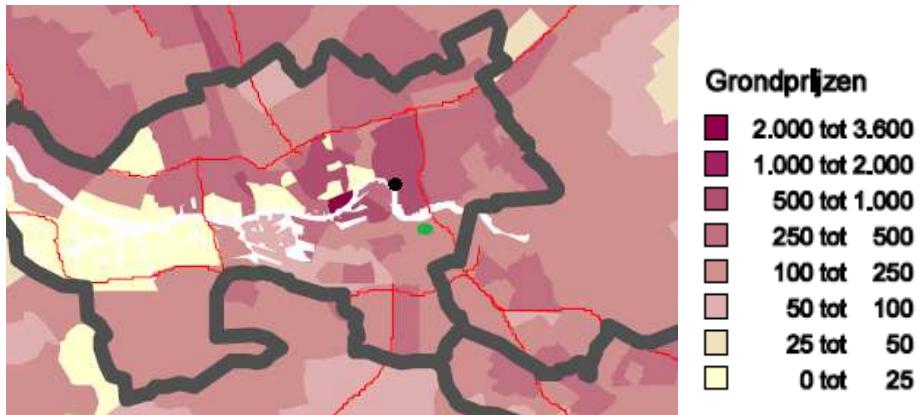


Figure 16: Land prices in the area of Rotterdam (Source: Centraal Planbureau: Stad en land, 2010)

The multiple nuclei model stated that a football stadium could be used as a catalyst for the area by providing extra services. The speciality of this area will be providing entertainment facilities. Although, such an area can be located outside the city centre, it might be possible to locate this area nearby the city centre. Many students live in Kralingen nearby the Erasmus University. A football stadium can provide extra services for the students like a cinema, casino, supermarket and pubs. It might even be possible to use the football stadium as a place to live since many students want to live in Kralingen.

It must be noticed that a new football stadium of Feyenoord requires more land than the current football stadium of Excelsior. However, next to the stadium of Excelsior, four football fields are present. Along with these football fields, it might be possible to construct a new football stadium. But there is also a problem with the accessibility. There is no railway station in proximity of Kralingen. There is only a tram station and a subway station in proximity. It is also possible to come by bus. However, the public transport system is insufficient enough to cope with the amount of spectators during matches of Feyenoord. Another problem is the limited amount of parking places around the stadium.

Although, the location Kralingen is a rigorous option and expensive, it can provide services for students who live in Kralingen. The accessibility is, however, a huge problem. A football

stadium in Kralingen might sound well, especially for students, but the feasibility of this area is not very great.

### Location in suburbs

It is hard to find a suitable location for a football stadium in suburbs since Rotterdam is surrounded by several cities like Schiedam and Dordrecht. But a suitable location in a suburb would be a location in north of Rotterdam (blue dot in figure 17).

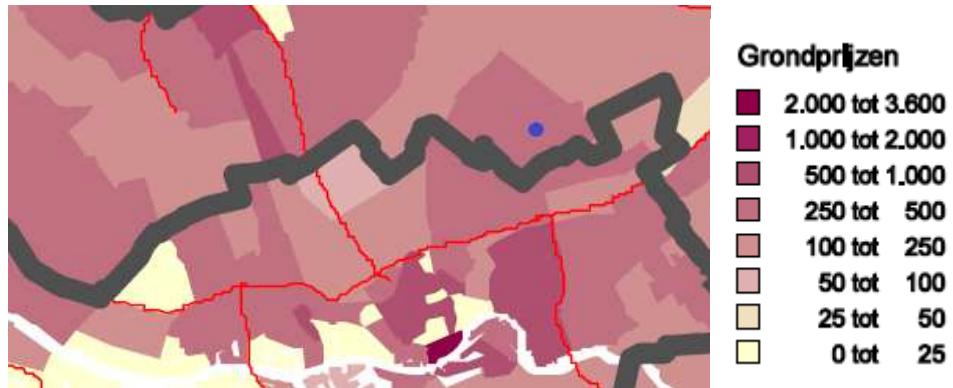


Figure 17: Land prices in the area of Rotterdam (Source: Centraal Planbureau: Stad en land, 2010)

This is a location nearby the suburb Berkel en Rodenrijs and despite the high land costs, it is still an interesting location, because it provides the RandstadRail<sup>2</sup>. The RandstadRail connect the cities Den Haag, Rotterdam and the suburbs with each other. A location next to the RandstadRail provides a well-functioning public transport network and despite the location outside the city, it is still quickly accessible for people who live in Rotterdam.

This location provides a well-functioning public transport network, but the accessibility for car drivers is less well. There is no highway in proximity and it is questionable whether Berkel en Rodenrijs can provide enough parking spaces since the land costs are high in this area.

### **Conclusion**

Stadion Feijenoord N.V. and Feyenoord Rotterdam N.V. regard the renovation-variant and the Varkenoord-variant as the most plausible options for a new football stadium. Their search

<sup>2</sup> RandstadRail is a light rail network in Zuid-Holland, a province in the Netherlands.

area was small and that's why I chose to look at location further away from the current football stadium. The location in proximity of the airport provides cheap land, but the public transport possibilities are restricted. The Prins Alexander area also provides cheap land, but it has to be noticed that the residents have to be bought out what means that extra costs have to be made. Prins Alexander does provide public transport possibilities due to the existence of a railway station and a subway station. The location along the highways A15 and A16 provides cheap land, but the public transport possibilities are restricted. Other football teams provides shuttle buses in order to cope with the amount of spectators. This option is, however, for Feyenoord too expensive. The last option, and the most rigorous and expensive one, is the Kralingen location. A football stadium in Kralingen can develop the area, although the area is still well-developed. On the other hand, the occupancy will be great in this area due to the amount of students in this area.

All possible locations have their own advantages and disadvantages. It must be noticed, however, that the current location is maybe the most suitable location for a new football stadium due to the existing infrastructure. A well-functioning public transport system is inevitable and the current football stadium is also located in proximity of a highway.

## 5 Conclusion

In this chapter, I will answer the research question '*What are the location factors for football stadiums and what is the most suitable location for a new football stadium in Rotterdam?*' by answering the sub questions. I will also discuss some restrictions of my report. In the end, a recommendation is given.

### 5.1 Conclusion

*What are the location factors for football stadiums?*

The main location factors for a football stadiums are those that influence attendance, income, and occupancy. Sports teams has to take into account the land costs, the market potential, the capacity of a sports stadium and the accessibility. These location factors confirm the location choices to construct a sports stadium outside the city centre. In North America, however, many sports stadiums have been constructed in the city centre due to the area development goals. Unfortunately, there is no consensus in literature about the intangible benefits of these development goals.

The obtained results of chapter three illustrates that most of the football teams have moved away to the edge of the city in proximity of a highway. It seems to be that the lower land costs and better accessibility for car drivers are the major factors in the decision making process of the location for a new football stadium.

*What are suitable locations for a new football stadium in Rotterdam?*

First, it has to be noticed that the location of the current football stadium of Feyenoord provides a well-functioning public transport system. The football stadium is located next to a railway station and in proximity of a highway. I investigated a couple of possible locations for a new football stadium regarding the land prices of Rotterdam. However, every location had their own advantages and disadvantages. The accessibility is a major problem for every possible location. Some locations provide a well-functioning infrastructure for car drivers while other locations provide a well-functioning public transport system. There is no dominant location and it seems to be that the current location of the football stadium of Feyenoord has a great advantage due to the existing public transport system.

## 5.2 Limitations

It is important to realise that this report has a number of limitations. The limitations are listed below.

The historical waves of sports stadiums in chapter two have been occurred in North America, while my investigation of the relocation of football stadiums is focused on Europe. A lot of literature came from North America and, while it is still relevant, it would be better to use more literature from Europe.

Some former locations of football stadiums are missing in the dataset due to a lack of information. The bar graph contains only available information and this can make the comparison a little bit biased.

In chapter four, I investigated some possible locations for a new football stadium in Rotterdam. The locations are chosen by looking at the land prices, accessibility and density of an area. I don't know the laws of the government. It might be that the location in proximity of the airport is impossible due to restrictions of the government.

## 5.3 Recommendation

The investigated locations are only tested by land prices, availability of land, and the accessibility. All the investigated locations have their own advantages and disadvantages. It is the question which location factor is valued more, the land prices or the accessibility. I would recommend Rotterdam to extend their search area, because there are many interesting locations in Rotterdam. The municipal of Rotterdam wants to minimize the costs of a new football stadium and therefore the renovation-variant is a very interesting option. The infrastructure is already available and the costs are much lower compared to constructing a new football stadium at another location. The main goal of the municipal of Rotterdam is to (re)develop the south of Rotterdam and a new football stadium is inevitable. Therefore, the renovation-variant would be the most suitable location for the municipal of Rotterdam.

However, for private investors it would be interesting to investigate other locations in Rotterdam like the north of Rotterdam. The south of Rotterdam is less developed than other areas of Rotterdam and this makes it less interesting for them to construct a new football

stadium in the south of Rotterdam. But also private investors want to minimize the costs of a new football stadium and this makes the renovation-variant the most suitable location for a new football stadium in Rotterdam.

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## 7 Appendix

Football Stadium	Year	Football Club	Capacity	Where located? (Downtown, central or suburban)	Where located in the past?
Amsterdam ArenA	1996	Ajax	52.960	Edge city (along the highway)	Edge City (along the highway)
Grolsch Veste	1998	FC Twente	30.205	Edge city	Central city
Gelredome	1998	Vitesse	29.600	Edge city (along the highway)	Central city
Euroborg	2005	FC Groningen	22.500	Central city	Central City
Parkstad Limburg Stadion	2000	Roda JC	19.200	Edge city	Edge City
Rat Verlegh Stadion	1996	NAC Breda	19.000	Edge city	Central city
AFAS Stadion	2006	AZ Alkmaar	17.023	Edge city (along the highway)	Edge City
Kyocera Stadion	2007	ADO Den Haag	15.000	Edge city (along the highway)	Central city
Koning Willem II Stadion	1995	Willem II	14.700	Edge city (along the highway)	Edge City (along the highway)
Trendwork Arena	1999	Fortuna Sittard	12.500	Edge city	Central city
Goffert Stadion	2000	N.E.C.	12.500	Central city	Central city
Het Kasteel	2000	Sparta	11.000	Edge city	Edge city
Stadion de Vliert	1999	FC Den Bosch	9.000	Central city	Central city
FC Zwolle Stadion	2009	FC Zwolle	10.500	Edge city (along the highway)	Edge City
Wirsol Rhein-Neckar Arena	2009	Hoffenheim	30.164	Edge city (along the highway)	Edge City
Allianz Arena	2005	Bayern München and 1860 M	69.901	Edge city (along the highway)	Central city
SGL Arena	2009	FC Augsburg	30.660	Edge city (suburban)	Central city
Audi Sportpark	2010	FC Ingolstadt 04	15.445	Suburban	Edge city
Imtech Arena	2000	Hamburger SV	57.000	Suburban	Central city
Commerzbank Arena	2005	Eintracht Frankfurt	52.300	Suburban	Suburban
Brita Arena	2007	SV Wiehen-Wiesbaden	13.500	Central city	Suburban
Volkswagen Arena	2005	VFL Wolfsburg	30.122	Edge city	Central city
Veltins Arena	2001	Schalke 04	61.027	Suburban	Suburban (along the highway)
Espíritu Arena	2004	Fortuna Düsseldorf	54.600	Edge city	Edge City (along the highway)
Borussia Park	2004	Borussia Mönchengladbach	53.138	Suburban	Edge city
Rhein Energy Stadion	2004	FC Köln	50.997	Edge city	Edge City
Neuer Tivoli	2009	Alemannia Aachen	32.900	Edge city	Edge City
Schauinsland-Reisen-Arena	2004	MSV Duisburg	31.000	Edge city	Edge City (along the highway)
Bayer Arena	1999	Bayer Leverkusen	30.210	Central city	Central city
Energeteam-Arena	2008	SC Paderborn	15.000	Suburban (along the highway)	Suburban (along the highway)
Coface Arena	2011	FSV Mainz 05	34.034	Edge city	Central city
Red Bull Arena	2003	RB Leipzig	44.345	Central city	Central city
MDCC-Arena	2006	FC Magdeburg	27.250	Edge city	Edge city
Rudolf Harbig Stadion	2009	Dynamo Dresden	32.066	Central city	Central city
Erdgas Sportpark	2011	FC Hallescher	15.057	Central city	Central city
Pride Park	1997	Derby County	33.597	Central city	Central city
Walkers Stadium	2002	Leicester City	32.500	Edge city	Edge city
B2net Stadium	2010	FC Chesterfield	10.379	Suburban (along the highway)	Edge city
Community Stadium	2008	Colchester United	10.084	Suburban (along the highway)	Suburban
Wembley Stadium	2007	National team	90.000	Central city	Central city
Emirates Stadium	2006	Arsenal	60.000	Edge city	Edge city
White hart lane	1998	Tottenham Hotspur	36.214	Central city	Central city
Stadium of light	2000	Sunderland	49.000	Central city	Central city
Riverside Stadium	1997	Middlesbrough	35.049	Edge city	Central city
Sports Direct Arena	2000	Newcastle United	52.387	Central city	Central city
The Darlington Arena	2003	FC Darlington	27.500	Edge city (along the highway)	Central city
City of M'ster Stadium	2002	Manchester City	48.000	Central city	Central city
Reebok Stadium	1997	Bolton Wanderers	28.723	Suburban (along the highway)	Central city
DW Stadium	1999	Wigan Athletic	25.000	Edge city	Central city
St Mary's Stadium	2001	Southampton	32.000	Central city	Central city
Madejski Stadium	1998	Reading	24.984	Edge city (along the highway)	Central city
Home Park	2002	Plymouth	20.134	Central city	Central city
AMEX Stadium	2011	Brighton and Hove Albion	22.374	Suburban (along the highway)	Central city
Stadium:MK	2007	Milton Keynes	22.000	Central city	Central city
Ricoh Arena	2005	Coventry City	32.000	Suburban (along the highway)	Central city
The Hawthorns	2001	West Bromwich Albion	27.200	Edge city	Edge city
New Meadow	2007	Shrewsbury Town	10.840	Edge city (along the highway)	Central city
Keepmoat Stadium	2006	Doncaster Rovers	15.000	Edge city	Edge city
Kingston Communications	2002	Hull City	25.405	Central city	Central city
Estadio Mediterráneo	2004	UD Almería	22.000	Edge city (along the highway)	-
Nuevo Carlos Tartiere	2000	Real Oviede	30.000	Edge city	
Iberostar Estadi	1999	Real Mallorca	23.142	Edge city (along the highway)	Central city
Estadio de Gran Canaria	2003	UD Las Palmas	31.250	Edge city (along the highway)	City centre
Estadio Reino de León	2001	Cultural Leonesa	13.451	Edge city	
Estadi Cornellà-El Prat	2009	Espanyol	40.500	Edge city (along the highway)	Central city
Nuevo Estadio Vívero	1999	CD Badajoz	15.200	Suburban	-
Coliseum Alfonso Pérez	1998	Getafe	16.000	Edge city (along the highway)	Edge city
Estadio Nueva Condomina	2006	Real Murcia	33.045	Suburban (long distance away) (along the highway)	City centre

Hypo Arena	2007	SK Austria Kärnten	32.000	Edge city	
Bullen Arena	2007	Red Bull Salzburg	30.000	Edge city	Central city
Gerhard Hanappi Stadion	2002	SV Rapid Wien	17.500	Edge city (along the highway)	
Tivoli Neu	2007	FC Wacker Tirol	17.400	Edge city (along the highway)	Central city
Pappelstadion	2001	SV Mattersburg	15.700	Edge city	
UPC Arena	1997	SV Sturm Graz	15.461	Central city	