# Increasing the benefits of stadiums for a municipality through sustainable development : a case study of Stadion Feijenoord

# INCREASING THE BENEFITS OF STADIUMS FOR A MUNICIPALITY THROUGH SUSTAINABLE DEVELOPMENT: A CASE STUDY OF STADION FEIJENOORD

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## *ABSTRACT*

*Almost all Dutch municipalities hosting a professional football club are owner of the stadium. The uncertainty of the indirect social and economic benefits of a stadium together with often unhealthy financial situations of professional sports club can result in the vacancy of the stadium. Thus, unmonitored decisions bring along irresponsible high financial risks for these municipalities in relation to the gained benefits. With sustainable (re)development these stadiums can become more beneficial for both the municipality and the main user, a sport club itself. A questionnaire among 31 City Councillors of the Dutch cities Amsterdam, Rotterdam, Eindhoven and Enschede showed that limited financial risks and attracting companies are the most important criteria for public investments in stadium projects. Specific aspects related to sustainability had a lower impact, but the sustainability of the whole project, including long-term planning for example could increase the benefits for municipalities. A case study of Stadion Feijenoord was analysed for this research.*

***Keywords:*** *stadiums, municipalities, sustainable development, financial risk, case study, the Analytic Hierarchy Process*

## 1 INTRODUCTION

### *1.1 Public owned stadiums in the Netherlands*

Dutch professional football organisations (BVOs) often have an unhealthy financial management, which cannot be compared with regular competitive companies. The amounts of money they pay for players and their salaries are often disproportional to the revenues that are obtained with it. A crucial difference lies in the fact that if a competitive company makes too much mistakes in their financial management they will probably go bankrupt, while BVOs in the same situation are often saved by external parties (e.g. Roda JC, PSV, AC Milan, Real Madrid, etc.). This is because BVOs have thousands of supporters who are emotionally concerned with the club. Because the stadium often will become useless after bankruptcy of the using BVO, since it is an obsolete real estate object, a municipality that is shareholder or investor in the stadium will not just abandon the club in order to protect its own investment. Also local companies often benefit from the club or stadium in their city, but since saving a BVO is usually not beneficial for a single private company, impending bankruptcies are often avoided by the municipality.

This is because they recognize the positive social and economic impact of professional football clubs, hence they have an interest in keeping the club in their city (*WVB marketing, 2007; Miller, 2005; Santo, 2005; Baade, 1994; Baade & Dye, 1988*). However, financially supporting a private company is prohibited for a public party according to European Commission's regulations. A solution for this is that municipalities can become shareholder of a stadium or co-founders of a stadium project. In that case they do not directly financially support the club. This resulted in the fact that over 75% of the stadiums of Dutch BVOs are officially (partly) owned by the municipality and most of the other stadiums are realized with financial support of the concerning municipality (*Metze et. al., 2011*). This trend is automatically causing a financial involvement of municipalities in the business of the stadiums or BVOs. This again results in the undesirable situation that when the BVO again

gets financial problems, the municipality will be problem owner too, since they will not recoup their investment when the BVO will go bankrupt (*Encorys, 2012*). The municipality is then in some way forced to offer financial support to the BVO or stadium again as a result of a simple cost-benefit analysis, which is commonly used decision making tool for public as well as for private parties (*Damart & Roy, 2009*). This process will continue, until a municipality decides that they have invested enough money in the BVO or stadium without any prospect of improvement. The BVO then has to look for other sources of financial support, like local companies or wealthy supporters. In most cases these private parties are not able to provide enough money, so the clubs will go bankrupt and the municipality eventually has to take its losses. Despite multiple recent examples of vacant stadiums in the Netherlands, municipalities keep investing in stadium projects.

*1.2 The increasing importance of stadiums*

"*Stadiums combine culture, art and sport, and play a social and cultural role in all host cities. They can help to shape our towns and cities more than almost any other building type in history and at the same time put a community on the map"* (*John, Sheard & Vickery, 2007*). This description by three British sports architects reflects the value of modern stadiums in cities. Their statement is strengthen by the fact that the Wembley Stadium in London (2007), the Beijing National Stadium (2008), and the Allianz Arena in Munich (2005) are respectively the 21st, 33rd, and 37th most-visited landmarks in the World (*Travel+Leisure, 2012*). Furthermore, according to CNN, sports stadiums and arenas are the most popular check-in places on Facebook in the USA in 2012. This increase of popularity of stadiums does not only count for the fanatic sports fans, but also for political diplomacy purposes and city branding (*Thompson, 2005; Hong & Xiaozheng, 2010; Beard, 2011; Will, 2011*).

Next to this tendency, professional sports (especially football) are playing an increasingly large role in Dutch society. Since the mid-eighties the average attendance at the highest Dutch football league is increased from 7,000 to 19,500 spectators per match last season. An increase in stadium attendance is 179%, while the total Dutch population increased only 17% in the same period of time. In addition, the international success of Dutch football clubs in the eighties was better compared to the performances in European competitions nowadays, and even the average reference ticket price for Dutch football matches increased. It has to be something else that changed the minds of thousands or even millions of Dutch citizens, the stadiums might be a key. According to Jansma (*2000*) traditional Dutch football fans changed from fanatics who wanted to witness every success and disappointments of their team, regardless the weather conditions and other circumstances, to families and friends who want to experience a sports event in a state-of-the-art stadium with a roof, seats and enough modern facilities. Since the Heizel-tragedy, during the European cup final of 1985 in Brussels, where 39 people died because of a riot on the stands (*NAi, 2000*), new stadiums have to be provided with seats, good emergency escapes and other facilities for the comfort and safety of the spectators.

These changes played an important role in making municipalities aware of the added value of football and stadiums in their city. Despite the endless studies to the benefits and disadvantages for municipalities, public parties invested more and more in professional football in their city. Municipalities began to consider football as a social event and started to give loans for the construction or renovation of stadiums in their cities (*Metze et al., 2011*). However, the most comprehensive public investments in stadiums were those of municipalities who wanted to help their local BVO by purchasing their stadium. This resulted in the current situation that from the 41 Dutch stadiums that were used by professional football clubs since the 90's, only six stadiums are fully owned by private parties, from which four are realized with money or a loan from the municipality (*Metze et al., 2011*).

The problem that is considered in this research can therefore be state as follows: *The financial risks for a municipality due to investments in stadium projects turn out to be higher than expected, resulting in an undesirable financial situation for the municipality.* It is irresponsible for municipalities to have high financial risks caused by stadium investments, but on the other hand they also do not want to lose the benefits of a stadium in their city. The current way of financing or developing stadium projects should therefore be changed to solve this problem.

*1.3 Hypotheses*

It is possible that municipalities accept the risks of investments in stadium projects, because the gained benefits are worth it. The problem is however, that the aftermath of these investments can require new commitments or risks, causing an unbalanced ratio between the financial risks and the benefits of the investment. The future has turned out that most European municipalities do not reconsider real estate investments, which is causing them unnecessary high costs (*Deloitte, 2011*). This problem has a dual cause. Firstly, a stadium is a very unpredictable real estate object regarding its exploitation. The potential economic and social (indirect) benefits from a stadium are very high, as well as the potential direct profitability of a stadium. But with wrong management or an unpredictable change, like the relegation of the using sports club or even the interest rate for mortgages, the

whole situation can change (*Sapotichne, 2012*). The whole business plan of most stadiums is based on the permanent use by the concerning sports club. Without the club, the stadium is an obsolete real estate object, since it can only be used for a few purposes (e.g. sports and music concerts). Secondly, professional football clubs often have financial problems due to irresponsible financial management. Looking at the numbers it can be concluded that the continuity of a BVO is far from assured, which makes the outcome of an investment in stadium projects also very unpredictable. To solve the second cause of the problem, all Dutch BVOs should change their financial management and their view on managing professional sports in general. But changing the exorbitant salaries and transfer fees of players which are common in professional football is almost impossible, especially in the short-term future. And if only Dutch BVOs changes their financial management, they will fall behind compared to other European BVOs. This will have a very negative impact on their income and attraction to (international) sponsors, which can result in the end of professional football in the Netherlands (*Van Oostveen, 2012*). This is why changing the financial management of Dutch BVOs is not a realistic solution for the nearby future. Therefore it is assumed that the solution of the stated problem lays in changing the exploitation of the stadiums itself. By redeveloping the stadium the profit of the stadium and the benefits for the municipality can be increased, while the costs and financial risks can possibly be constrained. And when the new stadium is also more profitable for the using BVO itself, its financial situation will also improve, which again decreases the financial risks for the municipality. After all, the club is the one that has to recoup the public investment.

An extra dimension in this research is that sustainability is still poorly adopted in the world of stadiums. This is because professional sports clubs are usually living in the present. They are judged by their current performances, and therefore are less concerned in investing in the future or do not have the possibilities for it. Next to this, it requires a whole new way of looking at a stadium to make it more sustainable. The average stadium is a highly inefficient building regarding its energy consumption. It has a very low occupancy and very high peaks. In general, a stadium is empty about 27 days a month and three or four days a month tens of thousands of people are intensively using it. This results in the construction of a very large building, including all the energy costs and carbon-dioxide emission, while it is only used about twenty-five times a year. However, since municipalities have sustainability as an increasingly important objective, sustainability could be the solution for making a stadium more beneficial for a municipality and at the same time making it a more reliable investment for the future, without the high financial risks.

### *1.4 Research approach*

Therefore, this research will start with determining which criteria are beneficial for municipalities. These benefits then will be prioritized. After that, different ways of (re)developing a stadium are analysed to determine to which extent these development alternatives can make a stadium more beneficial for a municipality. By assessing the benefits of the different sustainable stadium development alternatives the decision making process of municipalities can be supported. A generic answer cannot be given to the question which stadium development alternative is the most beneficial for a municipality, since there are too many case specific aspects for each stadium, municipality, or situation. Therefore, a topical case study is performed as an example to apply the results of the research.

## 2 METHOD

### *2.1 Multiple-Criteria Decision Analysis*

Multiple-Criteria Decision Analysis (MCDA) is a tool in which multiple decision criteria are analysed in order to get a prioritization of the different available alternatives. The aim of the MCDA is to guide the decision maker in determining the course of action that best achieves the long-term goals, by providing the decision-maker with some measure of consistency (*Stewart, 1992*). There is no uniform classification of MCDA methods, and therefore there are many ways to classify them, such as form or model (e.g. linear, non-linear, stochastic), characteristics of the decision space (e.g. finite or infinite), or solution process (prior specification or preferences or interactive) (*Saaty, 1990*). For intangible criteria as applied in this research (e.g. economic value and social impact) the Analytic Hierarchy Process (AHP) and the Analytic Network Process (ANP) are both suitable approaches to relative measurement (*Saaty, 2005*). With these approaches a scale of priorities is derived from pairwise comparison measurements when the elements to be measured are known (*Saaty, 2005*). Furthermore, AHP and ANP are useful for making multi-criteria decisions involving e.g. benefits (*Saaty, 2005*).

### *2.2 The Analytic Hierarchy Process*

The AHP approach is based on pair-wise comparisons among criteria in order to prioritize them at each level of the hierarchy. In addition to AHP, ANP technique is a general form that allows interdependencies, outer-dependencies and feedbacks among decision criteria in the hierarchical or non-hierarchical structures (*Görener, 2012*). ANP is therefore used when the different criteria influence each other, which is a more realistic approach.

However, ANP requires a much more comprehensive questionnaire, which will result in a lower responds rate. Since City Councillors indicated that they will probably not participate on a survey that will take them more than fifteen minutes, the ANP methodology would probably provide too few responds for this research. AHP will therefore be selected for this study, which also is easier for participants to understand. The responds of the pair-wise comparison questionnaires represent the input for AHP software (Expert Choice, or by creating an own Excel document) which calculates the Eigenvalue and normalized value of all criteria and sub-criteria per respondent, and the Consistency Index (CI), Random Inconsistency Index (RI) and the Consistency Ratio (CR).

*2.3 Pair-wise comparison matrix*

In the pair-wise comparison questionnaire the respondent can determine the relative importance of two different criteria, by selecting a certain intensity of importance. Each pair-wise comparison of each respondent is put in a matrix (Eq.1) in fractions and further converted to decimals. For example, if criterion 1(A1) is three times more important than criterion 2 (A2), then *w1/w2=3/1=3* and *w2/w1=1/3= 0.3333*. The criteria compared with itself always have a value of exactly 1, because it is the same criterion. Also we can notice that, bottom left values are the inverse values resulting from the questionnaire. The formula *Saaty (2004)* uses is for the pair-wise comparison matrix is (Eq.1):

$$\begin{array}{c} \\ A1 \\ \vdots \\ An \end{array} \begin{array}{c} \begin{array}{ccc} A1 & \cdots & An \end{array} \\ \begin{bmatrix} w1/w1 & \cdots & w1/wn \\ \vdots & \ddots & \vdots \\ wn/w1 & \cdots & wn/wn \end{bmatrix} \end{array} \tag{1}$$

*2.4 Super matrix*

The next step is squaring the matrix to get the so called supermatrix. In the supermatrix the values of the pair-wise comparison matrix are square with each other according to the following method: the value of a cell in the supermatrix is the first cell (from the left) of the row of the same cell in the pair-wise comparison matrix, times the first cell (from above) of the column of that cell, plus the second cell of that row time the second cell of that column, etc. The formula *Saaty (2004)* uses for squaring the matrix to a supermatrix is (Eq. 2):

$$W= \begin{array}{cc} & \begin{array}{ccccccc} c1 & & c2 & & \cdots & cN-2 & & cN-1 & & cN \end{array} \\ & \begin{array}{ccccccc} e11 \cdots e1n1 & & e21 \cdots e2n2 & & & e(N-2)1 \cdots e(N-2)nN-2 & & e(N-1)1 \cdots e(N-1)nN-1 & & eN1 \cdots eNnN \end{array} \\ \begin{array}{c} \\ C1 \\ \\ \\ C2 \\ \\ \\ \\ \\ CN \\ \\ \end{array} & \begin{array}{c} e1 \\ \vdots \\ e1n1 \\ e21 \\ \vdots \\ e2n2 \\ \bullet \\ \bullet \\ \bullet \\ eN1 \\ \vdots \\ eNnN \end{array} \begin{bmatrix} 0 & & 0 & \cdots & 0 & & 0 & & 0 \\ W21 & & 0 & \cdots & 0 & & 0 & & 0 \\ 0 & & W32 & \cdots & 0 & & 0 & & 0 \\ \bullet & & \bullet & \cdots & \bullet & & \bullet & & \bullet \\ \bullet & & \bullet & \cdots & \bullet & & \bullet & & \bullet \\ \bullet & & \bullet & \cdots & \bullet & & \bullet & & \bullet \\ 0 & & 0 & \cdots & W1n-1,n-2 & & 0 & & 0 \\ 0 & & 0 & \cdots & 0 & & Wn,n-1 & & 1 \end{bmatrix} \end{array} \tag{2}$$

The 'Eigenvector' of a criterion is then determined by the sum of the four comparison scores in the row of that criterion. The 'Normalized Eigenvector' is determined by dividing the Eigenvector by the sum of the Eigenvectors of all criteria in that matrix. In this way the sum of all Normalized Eigenvectors is always exactly 1, which is after all the definition of normalization.

*2.5 Consistency analysis*

For the consistency analysis the Consistancy Ratio (*CR*) is determined of each supermatrix. The CR is an approximate mathematical indicator, or guide, of the consistency of pairwise comparisons (*Suárez Bello, 2003*). A CR ≤ 0.10 is assumed to be reliable enough of the assessment of the relative importance of the different objectives (sub-criteria) for a municipality (*Saaty, 1987*). In literature, there are some researchers who call this

rule into question and claim that a higher minimum of consistency ratio (up to 0.20) also can be reliable (*Bhushan & Rai, 2003; Karlström, Runeson & Wohlin, 2002; Karlsson & Ryan, 1997; Bodin & Gass, 2003; Heo, Kim & Cho, 2012*). *Saaty (1987)* however is restraint in increasing the consistency limit and warns for the possible errors it can entail. Because the rule CR $\leq$ 0.10 would exclude too much data from the conducted questionnaire for this research, which makes the research also unreliable, and CR $\leq$ 0.20 entails possible errors, this research will be applied with an inconsistency limit of CR $\leq$ 0.15. Consistency analysis should be determined for each super matrix of a respondent (*Saaty, 1987*), for each individual respondent in total, the overall participant's consistency (*Saaty, 1987*), and for all respondents together, the groups consistency (*Tung, Chao & Julian, 2012*). The Consistency Ratio is determined by the formula: $CR = CI / RI$, where the *CI* is the Consistency Index, determined by $(\lambda_{max} - n) / (n - 1)$, and RI is the Random Consistency Index (0.9 for four criteria). With this formula the CR of each super matrix is determined. The overall CR of individual respondents is determined by the sum of the CR of all its matrices, and the same is done to determine the CI and the RI. Also here the formula $CR_{overall} = CI_{overall} / RI_{overall}$ is used. For the ground consistency, the geometric mean is taken of all consistent responses. These outcomes are put again an a super matrix were the same consistency analysis is used as for normal matrices ($CR_{group} = CI_{group} / RI_{group}$).

*2.6 Normalisation*

Normalisation of the scores of alternatives in AHP or ANP is sometimes causing some problems, e.g. rank reversal, etc. (*Nishizawa, 2012*). *Howlett & Jain (2006)* discussed different normalisation methods for AHP. One is a normalised verification by the traditional AHP procedure and another is a normalised verification by maximum alternative value to 1. The difference between those two normalisation verifications is that in the traditional AHP procedure the sum of the scores of all alternatives equals 1. This meant that when adding another alternative the difference between the scores of the other alternatives is slightly fading. This reflects with reality since the prioritization of a human decision maker is also fading when more alternatives are added.

The normalisation of the alternatives in this research is done by first normalising the relative score of the sixteen sub-criteria for each alternative. The normalisation is done by dividing the score of the alternative per sub-criteria by the highest score of the six alternatives on that specific sub-criteria, called Perfect Evaluation Score (*Nishizawa, 2012*). In this case the score on specific sub-criteria cannot be higher than 1, but the sum of the scores of all alternatives on that specific sub-criteria are always $\geq 1$. Values of 'negative' criteria are converted with the formula: $A_{positive} = (1 - A_{negative})^2$ (*Wang, 2010*). However, this is not the case in the decision making process of municipalities regarding stadium projects, since this kind of comprehensive and expensive projects are pair-wise compared and therefore the relative importance does not fade when another alternative is added. This error can be solved by using the normalised verification by maximum alternative value to 1. The maximum score for each (sub-)criteria is rated with 1, and all other alternatives are rated with a score determined by comparing them with the alternative with the maximum value.

*2.7 Using two different kinds of normalisations*

By using the alternative way of normalisation to assess the prioritization of the different alternatives than the normalisation of the prioritization of the criteria a validation seems required. However, these two ways of normalisation are totally independent from each other. The normalisation for the prioritization is done in a valid and proved scientific way, which resulting in a well substantiated prioritization of the different (sub-)criteria. When determining the prioritization of the different alternatives with different kinds of normalisation methods, the validity and accuracy of the prioritization of the (sub-)criteria is not changed. It is therefore possible to use a different kind of normalisation for the (sub-) criteria and the alternatives in the same research (*Howlett & Jain, 2006).* In order to collect the data for this research, a questionnaire was conducted among Councillors from Amsterdam, Rotterdam, Eindhoven and Enschede, which are the cities in the Netherlands that have a stadium with a capacity higher than 30,000 seats. The Councillors are the decision makers of a city and therefore are expected to have proper knowledge of determining the importance of the different objectives for a municipality. The lower limit of 30,000 seats for a stadium is chosen, because this is the minimum requirements for hosting a European Championship game or a Europe League final according to the current UEFA regulations. The goal of this research is increase the benefits of stadium development projects for municipalities with supporting the decision making process of municipalities. This is done by determining the relative importance of the objectives of municipalities regarding stadium development projects, which can be used for municipalities to assess the relative importance of different Stadium Development Alternatives. The second part of the research is an application of the results of this first part of the research to the case Stadion Feijenoord in Rotterdam. With this case study the most beneficial alternative is determined for the municipality of Rotterdam.

*2.8 Questionnaire*

The questionnaire consists, apart from the introduction, of five parts. The first part is the pair-wise comparison on a 1-9 scale between the four criteria, which are the main objectives of Dutch municipalities regarding stadium development projects. The participants got to list of six pair-wise comparisons, which are [A] vs. [B], [A] vs. [C], etc. The second part are again 4 x 6 pair-wise comparisons on a 1-9 scale between the four sub-criteria of each main objective, which are [A1] vs. [A2], [A1] vs. [A3], and [B1] vs. [B2], etc. The third part is a direct relative preference of the six stadium development alternatives of the case study. This is not a usual part of an questionnaire for the AHP, but is included to use as a control function to determine how the direct preference of City Councillors relate to what is the most beneficial for them based on relative preference of the (sub-)criteria and scores of the alternatives assessed by the AHP. The six alternatives are shortly introduced with some numbers and facts. The fourth part is an assessment of the intangible sub-criteria of the alternatives of the case study. These are assessed with a score from 1 (low) to 10 (high). The eight intangible sub-criteria are the sub-criteria of the two main criteria Economic value and Social impact. The fifth and last part of the questionnaire is a more personal part about the political option and the personal emotional involvement in football of the respondents. With this control function the reliability of the responds is guaranteed. Hence, if only right orientated City Councillors or City Councillors that all do not like football, the outcome of this research can be misrepresented.

*2.9 Data collection*

The survey for this research was performed by conducting a questionnaire among the Municipal Councils of Amsterdam, Rotterdam, Eindhoven and Enschede. These four cities have the four biggest stadiums in the Netherlands, the four highest average attendances during last Eredivisie-season (2012/13) and have the four best performing football clubs since the introduction of professional football in the Netherlands in 1957. These aspects are important for this research, because it can be assumed that the stadium is playing an important role in the decision making of the concerned municipalities.

## 3 RESULTS

A total of 31 City Councillors completed the pair-wise comparison part of the questionnaire, from which 25 also completed the ranking of the six stadium development alternatives. The assessment of the 16 intangible sub-criteria of the six alternatives for the case study 'Stadion Feijenoord' is completed by 17 City Councillors and 1 stadium expert involved in the Stadion Feijenoord redevelopment project.

The prioritization of the alternatives (Figure 1) is the result of the scores of these different alternatives in the case study of Stadion Feijenoord regarding the sixteen considered sub-criteria.

First the consistency of the responds is analysed, in order to determine if the results are reliable. Then the relative importance of the criteria and sub-criteria according to the municipality regarding stadium development is presented in table and figures, followed by the variation in relative importance between the different subgroups. The results of the second part of the survey are shown by two figures about the direct prioritization of the different development alternatives for the case study Stadion Feijenoord and the prioritization based on the AHP analysis. Finally, the sensitivity analysis of the results is determined.

*3.1 Relative importance*

The final prioritization of the (sub-)criteria and alternatives is presented in figure 1. Looking at the second layer it can be concluded that according to all participating Dutch City Councillors the most important aspect for a municipality regarding stadium development projects is creating social impact (29.5%). The direct financial flows (28.2%) and the economic value (26.8%) are valued as less important. Sustainability is considered as least important (15.6%).

The importance of the sub-criteria, which is related to the relative importance of the main criteria, shows some evident results. The financial risks of a possible investment in a stadium development project and attracting companies as a result of stadium development in a city (both 10.7%) have by far the highest relative importance for a municipality. The four sub-criteria that follow, from which three are related to social impact, have an almost equal relative importance; the enjoyment a stadium can create for the inhabitants (8.3%), city branding due to the stadium and its events (7.8%), the promotion of sports among youth (also 7.8%), and the creation of jobs due to the stadium development projects and activities related to it (7.7%). The least important sub-criteria of stadium development projects are; tax income (4.0%), expenses of supporters during match days in the stadium and in the city (3.0%), and three of the four sustainability sub-criteria; $CO_2$ emission (2.3%), energy costs (3.1%) and the use of natural resources for the construction of the stadium (re)development (3.5%).

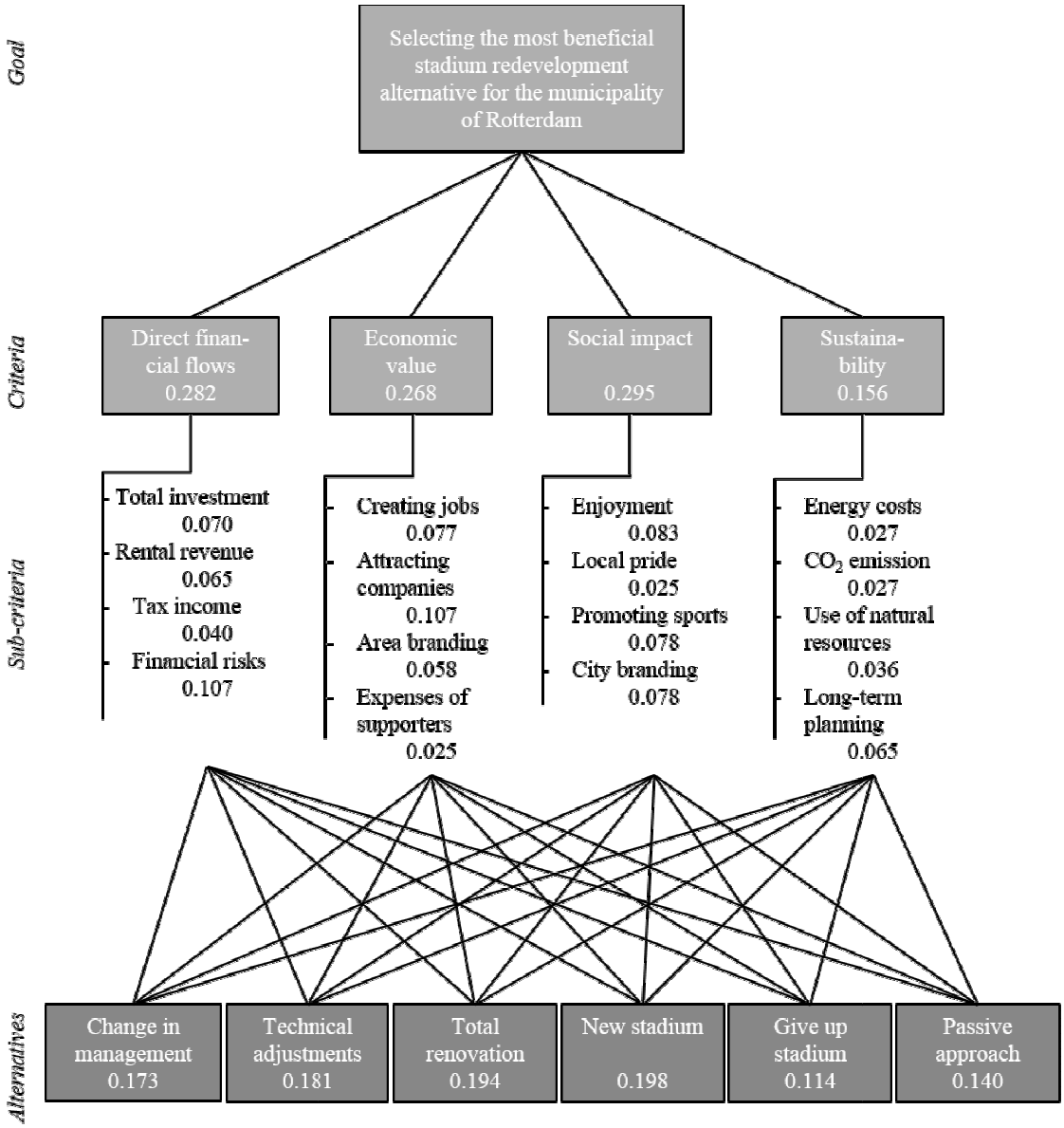


Figure 1. Prioritization of the (sub-)criteria for Dutch municipalities regarding sustainable stadium development

*3.2 Results for the case study*

The prioritization of the different sustainable stadium development alternatives for the case study Stadion Feijenoord in Rotterdam is determined in two different ways. First the participant filled in the pair-wise comparison part of all the criteria and sub-criteria and not being aware of the alternatives – indirect way (Figure 2). For the prioritization the AHP is used. The second is a direct prioritization (Figure 3) as an additional survey in the questionnaire, where the participants had to rank the different stadium development alternatives based on a short description of the six alternatives.

*3.2.1 Prioritization with the AHP*

The prioritization of the different development alternatives of Stadion Feijenoord determined with the AHP has a different outcome, presented in figure 3. The difference between the two inconsistency limits (CR $\leq$ 10% and CR $\leq$ 15%) is not more than 0.2% for the priority of each alternative, which means it has a low sensitivity regarding this aspect. After assessing the score of all six stadium development alternatives for the sixteen sub-criteria, the scores where normalized with the in chapter 8 described idealization method. The results in *table 6.9* show that the alternatives are very close to each other. Regarding to the benefits of the municipality of Rotterdam a new stadium has a relative score of 19.8%, while a total renovation of Stadion Feijenoord is not far behind (19.4%).

Also performing technical adjustments to the stadium (18.1%) and a change of management regarding the exploitation of the stadium (17.3%) have a significant high score. A passive approach (14.0%) and giving up the stadium (11.4%) are the lease beneficial alternatives for the municipality of Rotterdam.

*3.2.2 Direct prioritization*

The additional survey of the direct prioritization (Figure 3) of the development alternatives for Stadion Feijenoord are completed by 25 City Councillors, by ranking the six alternatives from 1 (most beneficial) to 6 (lease beneficial), presented in figure 2. Making technical adjustments has the highest ranking with 25.6%. Also the other two alternatives that are changing the current stadium are highly ranked. Changing the current management of the stadium in order to optimize the exploitation of the current stadium (21.9%) and total renovation of the stadium (19.6%). Giving up the stadium, by selling or demolishing it, by far has the lowest priority with 5.7%. Building a new stadium (12.5%) and leave the stadium as it is (14.6%) got an average score of the 25 City Councillors.

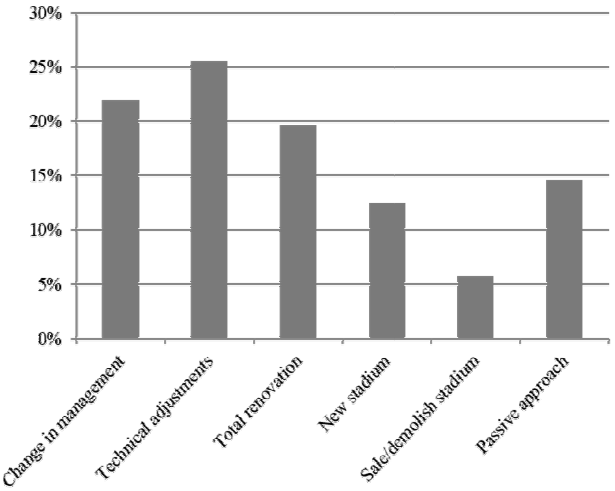


Figure 2. The direct prioritization of the development alternatives of Stadion Feijenoord according to City Councillors

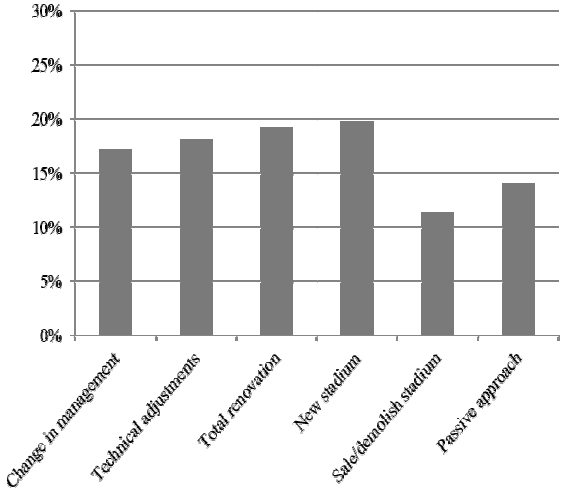


Figure 3. The indirect prioritization (with AHP) of alternatives according to the same City Councillors

## 4 DISCUSSION

With the results of this study it seems like single sustainability aspects (e.g. energy use, use of natural resources, and $CO_2$ emission) are not playing an important role in the decision making process of municipalities regarding stadium development projects. During the conduction of the questionnaire City Councillors also suggested that a stadium is not the most efficient way to express the sustainable objectives of a municipality. Sustainability aspects (e.g. long-term planning) that ensure the municipalities of increased benefits from the other main objects are relatively more important in their decision making process.

The main discussion of this research is the fact that it attempts to catch the decision making process of a municipality with a scientific approach. According to the Councillors this is almost impossible, since public decisions are often partly based on emotion and the issues of the day. However, the same Councillors admitted that this research can still support their decision making process.

*4.1 Process*

This study intends to increase the benefits for municipalities and constrain their financial risks of investments in stadium projects. Still, the objectives are dual since also stadium developers can use the results of this research to convince the municipality of investing in a new stadium project. Furthermore, sustainability is seen as a part of social impact and therefore the relative importance of it according to the respondents is somehow distorted. When it was a sub-criteria of social impact the relative importance of the different sustainability sub-criteria would possible be much higher. Regarding the prioritization of the different stadium development alternatives of the case study Stadion Feijenoord, the impact of the total investment could be underestimated in the normalisation, although the most suitable method is used. The nature of Councillors is to look at the outcome of a decision and not only to the investment costs. But, since an investment in a stadium project is about such large

amounts of money the decision making process gets distorted. This is reflected in the decision of the municipality of Rotterdam to not invest in the new stadium, because of the high financial risks for the municipality, which is in contrast to the results of this research.

*4.2 Questionnaire*

During the conduction of the survey, some discussion was initiated by an number of participating Councillors. The first was about the alternative 'sale/demolish stadium'. This confused the participants since these both words suggesting totally different situations. Although, the selection of alternatives is well substantiated, the formulation or effect of it has on the participants should have been better considered. The second discussion was about the consistency of the participants. Despite an explanation about consistency of the pair-wise comparison survey, still participants filled in totally inconsistent answers. The explanation they gave for it was that the importance of a number of criteria can differ when it is compared to different other criteria. This suggests that Analytic Network Process (ANP) should be more suitable for this research. However, with this survey, based on AHP, participants already indicated that the questionnaire was too comprehensive. With ANP the survey would become even more comprehensive which affects the number of respondents.

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