Project alliances in the infrastructure market

Developing a decision model on the suitability of infrastructure projects for alliances

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Preface

In front of you lies the result of my graduation project that is executed as my final examination for my master programme System Engineering, Policy Analysis and Management (SEPAM) at the Technical University of Delft. The graduation project has been executed at Heijmans, within the business unit HIGP in Rosmalen. HIGP is the business unit that focuses on complex integrated projects within the infrastructure market.

I have executed the research with great enthusiasm and pleasure. The project was a great opportunity to get acquainted with the construction and infrastructure market. I have been interested in these markets for a long time and liked it to get the chance to execute my graduation project in this market. The subject of alliances was a perfect match with the characteristics of the master programme System Engineering, Policy Analysis and Management. The combination of technical, legal, social and financial aspects made the subject challenging for me as a SEPAM student. The fact that alliances are getting more applied within the infrastructure market made the relevance of the research even more valuable in my opinion.

In my research project, I had the opportunity to talk to different people from within the infrastructure market. They all contributed to the final result of my thesis in a valuable way. Without them I would probably not have been able to execute the research. Therefore I want to thank these people for their great contribution and their support during my research. I want to express special thanks to some people who were closely involved in my research.

In the first place I want to thank my attendees from the TU Delft. Martijn Leijten for his intense support, when this was necessary, and for the nice discussions we had during the meetings. The outcomes of these discussions have increased the quality of the thesis continuously. I also want to thank Hans de Bruijn and Hans van Ham for their clear contribution during the meetings.

In the second place I want to say thanks to the attendees from Heijmans. Maarten Hellemans for his motivating and clear support and the time he always set aside for me. Especially the many contacts he has, have been valuable for my graduation project. I also want to say thanks to Sybrant van der Werf and Martien Heijmans, who created the opportunity to execute my graduation project at Heijmans and provided a great contribution to my research based on their experiences.

In the third place I want to thank my family and friends for their support during the project. Their support in hard times during the project has been indispensible and kept me motivated to finish my work. At last, but not least, I want to thank God almighty, who blessed me with the skills to execute the project and carried me in hard times.

Gerbert Heijkoop
Delft, July 2009

Management Summary

By this research it is attempted to provide insight in project alliances within the infrastructure market. Particular attention has been paid to the assessment of infrastructure projects on the suitability for alliances. By desk research, case studies and surveys the research has answered the main research question. The main research question was formulated as follows:

> *"How can the appropriateness of infrastructure projects for alliances beforehand be assessed in a decision model and how should this be implemented?"*

Based on the main research question four main areas are distinguished for the research. 1. The basic characteristics of project alliances. 2. The determining factors on the appropriateness of infrastructure projects for alliances. 3. Combining these factors in a model generating the possibility to assess particular projects. 4. Behavioural and managerial points of interests to make an alliance become successful in application. These four areas have been worked out in seven sub questions.

Alliances have been defined as follows based on different definitions available in literature:

An alliance is an agreement between a client and a contractor for the endurance of a specific project in which they aim for cooperation, by creating equal interests through risks and rewards sharing and by principles of good faith and trust and an open book approach towards costs.

The theoretical framework of alliances is discussed in the Transaction Cost Economics theory. Based on this theory, in which contract choices are considered based on the costs for transactions, infrastructure projects have been classified to the proper contract type. For this classification, infrastructure projects are assumed as how they emerge in the business unit HIGP. These projects are characterised by a high complexity and containing multiple disciplines. For these kinds of projects, in which the investment characteristic can be characterised as idiosyncratic and the frequency of transactions can be classified as recurrent relational contracting fits best. Alliances are identified as a relational contract type and hence seem to fit for these projects according to the Transaction Cost theory.

The current practices within the infrastructure market bring along some inefficiencies. Basically neoclassical contracting is currently applied instead of relational contracting. Three areas in which inefficiencies arise are discussed. The tender procedure; the difference in priority of interest between client and contractor; and the distribution of responsibilities and tasks within a project are concluded as being a source for inefficiencies. Although alliances also bring along some weaknesses, they are proven to be valuable for solving these inefficiencies.

The suitability of a project for an alliance has been proven to depend on many factors. Before this research, the possibility was not present to look over all these factors and to make a deliberate decision for a particular project. The determining factors on the appropriateness of a project for an alliance are divided in three areas. These areas are the technical properties of a project; the political context and environmental characteristics; and uncertainties. In order to get a complete overview of the determining factors, interviews have been performed with persons who are, or have ever been involved in alliances. From these interviews it can be concluded that no person is able to fully assess the determining factors and are able to take a

deliberate decision, whether or not to apply an alliance in a certain project. Moreover it has been proved that the determining factors are hard if not impossible to quantify and no boundary values can be assigned. This makes the model impossible to provide a advice on the application of alliances objectively. Besides the dynamic characteristics of infrastructure projects makes it impossible to decide in advance of the project, since factors may change during the project. For this reason the aim of the model has been changed to support the decision making and provide a model to facilitate the decision making.

The determining factors are combined in a model by weighing the factors on importance regarding the success of an alliance. This has been executed by consulting experts on alliances and asking them to weigh the factors on importance. Combining these weights with a qualitative measuring of the factors, the model provides a method for assessing a project on the suitability for alliances. This needs to be executed jointly by client and contractor.

The success of an alliance within a proper project is dependent on proper behaviour of project participants and good management skills. If the alliance is chosen as the contract type within a project, this thesis provides points of interest for managers and on the behaviour of project participants, in order to perform a successful alliance.

Overall it can be concluded that a method and a model for assessment of projects is provided on the suitability for alliances and that an implementation plan for the use of alliances in the infrastructure market is presented.

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Introduction

This thesis describes the research project which is executed in the business unit HIGP of Heijmans NV in Rosmalen the Netherlands. The research project focuses on alliance contracts within the infrastructure market.

Within an alliance, client and contractor cooperate during the design and execution of the project. This cooperation is facilitated by sharing risks and optimisations within the project. This cooperation is unique, since in conventional contracts the tasks and responsibilities are strictly divided between client and contractor. Since these conventional contracts often lead to disputes and claims, resulting in cost and time overruns, alliances were considered as a means for solving these problem. An alignment of the Betuweroute in the Netherlands was the first applied alliance in the infrastructure market. This project performed successfully and was finished in time and within the budget. The project parties even gained additional profits, by the amount remaining in the alliance fund at the end of the project. .

Alliances are not suitable for all projects. Since they require long preparations and investments of time and people, projects should be of a certain size and complexity, before they are suitable. The exact requirements were not known in the market, which led to this research. This research aims for the provision of insight in the determining factors on the appropriateness of projects for alliances. Furthermore a decision model is desired in which the determining factors are weighed.

In chapter one the research project environment is discussed, after which in chapter two the research design is presented. This includes the motive and objectives of the research and the demarcation and research plan.

In chapter three alliances will be placed in a contextual framework. This includes on the one hand the theoretical framework of alliances and on the other hand the context of alliances in the infrastructure market.

Chapter four will provide an overview of the determining factors within projects for the suitability for alliances, after which in chapter five the factors will be combined in one model. Chapter five will also elaborate on the application and implementation of the model in the infrastructure market.

In chapter six points of interest will be discussed, which are important if alliances are applied on suitable projects. These points of interest include behavioural and managerial issues. After all, conclusions will be formulated and the research will be reflected. Also recommendations will be made based on the research.

1. Research project context

This chapter describes the context in which the research is executed. The business unit in which the research has taken place is “Heijmans Infra Integrated Projects” (HIGP). This business unit is member of the former division “Heijmans Infra” (HI), which on its turn is part of the company “Heijmans N.V.”. Recently a change in the organisational structure of Heijmans has taken place in which the division structure has been abandoned. This research has taken place partly during the old structure and therefore describes it in the former situation.

HI operates in the Infrastructure sector. The characteristics of this sector are essential for the behaviour of actors. As a foundation for this research the characteristics of the infrastructure sector will be discussed also in this chapter.

1.1 Heijmans N.V.

Heijmans is founded in the spring of 1923 by Jan Heijmans as a small paviours company in Rosmalen. In the following decades the company grows significantly and applies itself to the differentiation of the core business. The company gets involved in the residential and non-residential building sector. In 1970 the structure of the company is changed in a division structure. The next 20 years the company endures a constantly growing trend which results in the listing on the stock market in 1993. In 2007 Heijmans was the third biggest company in the construction sector measured by the turnover of the companies. These are the latest available numbers in the end of 2008.

The organizational structure of Heijmans is divided in two components distinguishing the international market and the national (Dutch) market. The national component on its turn is divided in five divisions that serve a specific market. These divisions are “Heijmans Vastgoed” (real estate), “Heijmans Woningbouw” (Residential Construction), “Heijmans Utiliteitsbouw” (Non Residential Construction), “Heijmans Infra” and “Heijmans Techniek” (Techniques). Heijmans Techniek is the division of the company that is specialized in fitting techniques of building infrastructure. The organizational structure of the divisions is presented in figure 1.1

Figure 1.1 Division structure of Heijmans

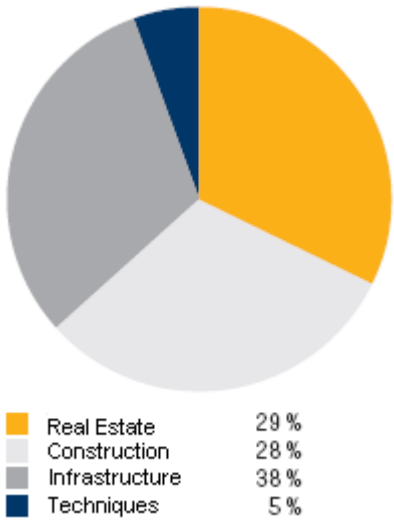

Figure 1.2 Dispersal of revenues (2007)

The dispersal of revenues among the divisions is defined as follows. The infra division contributes the biggest share to the company. In 2007 this part was responsible for 38 percent of the revenues. The second biggest contributor is the real estate division with 29 percent of the revenues followed by the construction division with 28 percent of the revenues. The contribution of all divisions is shown in figure 1.2.

At the end of 2007 Heijmans had about 11.500 employees who were together responsible for a turnover of more than 3.7 billion euro and a net profit of about 56 million euro.

HIGP is a business unit of the former Infra division. Within the Infra division there are various business units present which are specialized in their own knowledge and skills. The organization chart of the division infra is presented in figure 1.3. The HIGP business unit was founded the first January 2007 in response to changes of the market. Projects in the infrastructure market have been growing ever since and are even more getting multi disciplinary characteristics. The business unit HIGP contains specified knowledge on behalf of design, preparation and management of integrated infrastructure projects. Because complex projects exist of multiple disciplines and all these disciplines are dependent on each other, the integration should be managed accurately. Design choices made in one discipline might have consequences for others. Likewise might an optimal design for one business unit affect the design of another business unit, in such a way, that their profits might reduce. In order to protect the quality of the integrated design and the interests of the various business units HIGP has been founded as a separate business unit. Besides this is a time-saving solution for integration of disciplines in a project, also the knowledge and skills for multi disciplinary projects is now centrally organized in this situation.

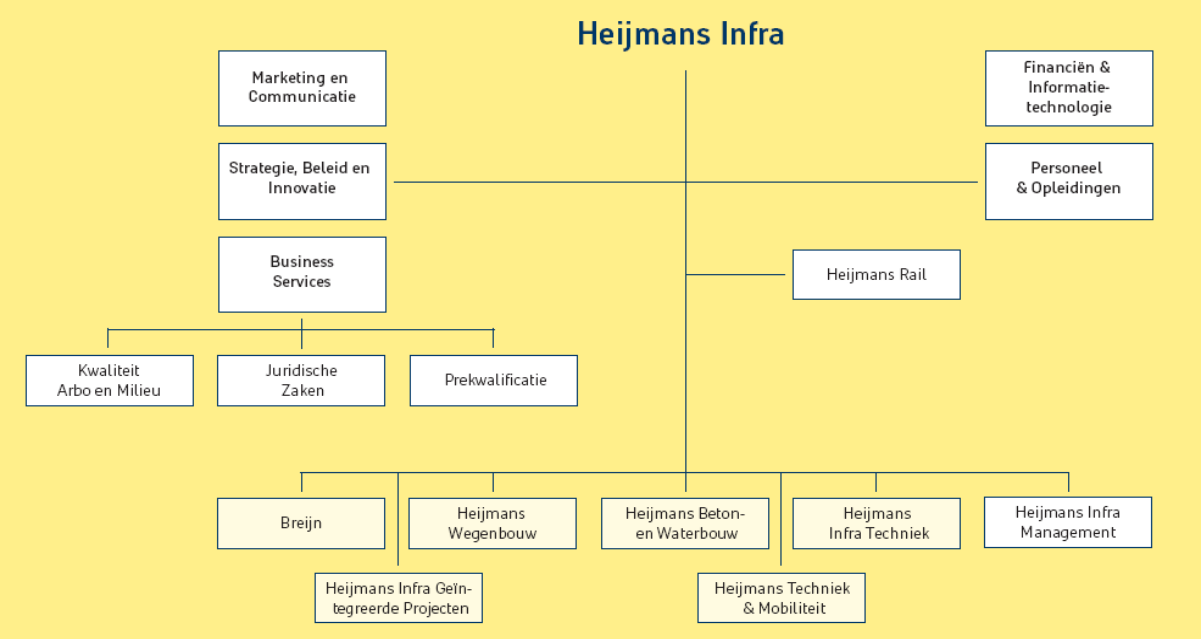

Figure 1.3 Organizational chart of the Infra division.

Furthermore the Systems Engineering theory was getting of increasing importance for the management of engineering projects. Systems engineering is defined as an interdisciplinary field of engineering that focuses on how complex engineering projects should be designed and managed. By creating one business unit for integrated projects, the application of

Systems Engineering had taken one step forward. Further implementation of Systems Engineering is better facilitated in this way.

The revenues of the Infra division were in the year 2006 791 million euro. In this year the operational results were determined 25 million euro. The next year the revenues were 911 million euro, but the operational results decreased to 22 million euro. Increasing competition in the market caused that margins on prices came under pressure, which on its turn resulted in lower operational results(Heijmans NV., 2008).
On the other hand contributed the projects obtained in 2006 to the revenues of 2007. On December 31st 2006 the order book contained 977 million euro. In 2007 no integrated projects were obtained by HIGP which resulted in an order book of 855 million euro on December 31st.

From all the revenues of the Infra division the HIGP share was 109 million euro. This share of 12 percent is lower than former years because of the absence of big infrastructure projects like 'de HSL-Zuid' and 'de Betuweroute'. The infrastructure market is highly dependent on the availability of projects. If the availability of projects is high the margins on the projects will increase simultaneously.

In the start of 2009 HIGP has eight projects in execution. The projects are presented in table 1.1.

Project	**Description**
A2 Eindhoven	Construction of a by-pass highway and widening of existing roads
A2 Culemborg-Deil	Widening of the highway and engineering structures
N201 Noord-Holland	Detour project and engineering structures
N302 Harderwijk	Detour and widening project including some engineering structures
Amsterdam Airport Schiphol	Maintenance contract of the Airport Schiphol
Flevocentrale	Piles to be driven for power plant in Lelystad
N242 Alkmaar	Maintenance obligation after construction
N34/N36 Ommen	Construction of new road

Table 1.1: Projects of HIGP in execution (January 2009)

The project N201 is the only project which is currently executed in an alliance. In case of project N302 the client had the wish to execute the project in an alliance; however after the tendering it was decided in cooperation with Heijmans to execute the project without a separate alliance organisation. In this project only some agreements on optimisations and risks were made in order to increase the project results. This alternative of the alliance will be discussed in chapter 3.5.

In terms of the research it is relevant to mention that Heijmans was also involved in the building of the alignment 'Sliedrecht-Gorinchem' of the 'Betuweroute'. The building of the project started in the beginning of the year 2000 and was part of the whole realization of the 'Betuweroute'. The result of this project would be a railway for freight trains from the

harbour of Rotterdam until Germany cross the Netherlands. The goal was to create a fast and reliable way of transport for freight to Germany, in which the roads would be relieved of trucks. The alignment 'Sliedrecht-Gorinchem' contained a length of 22 kilometres twin track to be build. The project was finished in the end of the year 2003. This alignment was contracted by Heijmans together with three other contractors Boskalis, Strukton and CFE.

The reason why this project has to be mentioned for this research is that this project was executed in an alliance. The alliance was called the "Waardse Alliantie". Moreover this project was the first alliance applied in the Netherlands in the infrastructure market. The project has been evaluated by several different institutes. In all these evaluations the application of the alliance contract was called a success. The alignment was finished in time and within budget and according to the Key Performance Indicators (KPI) the target values were fully met. The Key Performance indicators were environment, quality and safety together with time and budget. These KPI were set at the start of the project, in cooperation between the client and the contractors.

Due to this performance the "Waardse Alliantie" has been hold up as an example for many projects in the infrastructure market, as the way, how parties should work together in projects and reach the best results. The contract applied in this project, has also laid the foundation for the contract of the project N201, which was the second alliance in the infrastructure market.

The experience of Heijmans with alliances in the infrastructure market makes them one of the parties with the most knowledge and skills on alliances. Therefore in terms of the research Heijmans is an attractive company to execute the research.

1.2 Building and Civil Engineering Industry

Heijmans is not the only actor involved in alliances. Alliances involve also clients, for who the contractor has to execute the project. And furthermore, contractors often operate together in projects with other contractors in a syndicate. To get a clear insight into the market of competitors, co-operators and clients of Heijmans Infra this chapter will discuss the Building and Civil Engineering Industry.

The construction firms in The Netherlands had combined revenues of about 55 billion euro in 2007. The building and civil engineering industry is highly fragmented, which means that there are a lot of construction firms in the market over which the power is distributed. The five biggest construction firms are responsible for 24 percent of the market share. In table 1.2 the revenues for the year 2008 of the five biggest firms are presented. In table 1.3 the revenues of the five biggest firms in the infrastructure market are shown. In both cases Heijmans occupies the third place in the market after BAM and VolkerWessels.

Top 5 Dutch construction firms Revenues 2008 (€ mln)	Netherlands	Abroad	**Total**
BAM	3.901	4.934	**8.835**
VolkerWessels	3.955	1.438	**5.393**
Heijmans	2.507	1.124	**3.631**
TBI Holdings	2.404	0	**2.404**
Ballast Nedam	1.348	78	**1.426**

Table 1.2 Revenues Construction firms

Top 5 Dutch construction firms in Infrastructure Revenues 2008 (€ mln)	Netherlands	Abroad	**Total**
VolkerWessels	2.081	1.249	**3.330**
BAM	1.337	2.638	**3.975**
Heijmans	926	590	**1.522**
Ballast Nedam	692	-	**692**
Dura Vermeer	431	-	**431**

Table 1.3 Revenues in Infrastructure

In the infrastructure market contractors often cooperate in a syndicate to execute a project. It is called a syndicate when at least two main contractors form a temporary firm for the endurance of the project. A main contractor is a company who accomplishes a construction project upon instructions of a client. These main contractors could be of any size, but often these are the bigger construction companies (more than 100 employees). Within the syndicate a main contractor could contract subcontractors to execute parts of the activities.

There can be several reasons for acting in a syndicate. A main contractor may for example not have certain specialisms or references at his disposal. Another reason might be that the project is too big that no main contractor contains enough capacity to execute the project. This is often the case, because companies are always active in more than one project at a time. Risk sharing might also be a reason to form a syndicate in a project, when the project is complex.

Since January 1st 2009, it is for big construction companies (turnover above 5.5 million euro) in the Netherlands more restricted to form syndicates. The Building and Civil engineering industry has been exempted from the Competitive Trading Act for eleven years but has been involved now in this act by the minister of Economic Affairs (Koenen, 2009). With this involvement in the Competitive Trading Act, the minister wants to prevent the contractors to form competition restrictive syndicates. As a result syndicates should proof now, that they are not able to execute a specific project alone without another contractor. Furthermore the act formulates the constraint that the client should take advantages of the syndicates (Koenen, 2009). The Dutch Competition Authority (NMA) is the party who maintains this act.

In the building and civil engineering industry, the suppliers meet the buyers in projects. Because of the unique character of projects in fact the buyers do not buy a product. Suppliers are not able to standardize the product or the process and therefore do not supply products, but means of production.

In the infrastructure market different types of clients can be distinguished. The distribution of the types of clients on the number of projects is presented in figure 1.4. In this figure it becomes clear that the main clients for infrastructure projects are governmental parties. They are responsible for almost half of the orders. By governments is meant states, provinces, municipalities, water authorities and other public bodies. The share of the government is even getting bigger, given the fact, that the companies share mainly exists of semi-governmental companies, for example public transport companies. These companies give orders to create for example bus-lanes which are funded by the government (Buur and Pries, 2008b). In case of the business unit HIGP this distribution of clients does not represent the real distribution. HIGP mainly acts in complex multidisciplinary projects. These projects mainly originate from governmental organisations like “ProRail” or “Rijkswaterstaat”. For this reason, the governmental share of orders will be bigger in the specific case of HIGP.

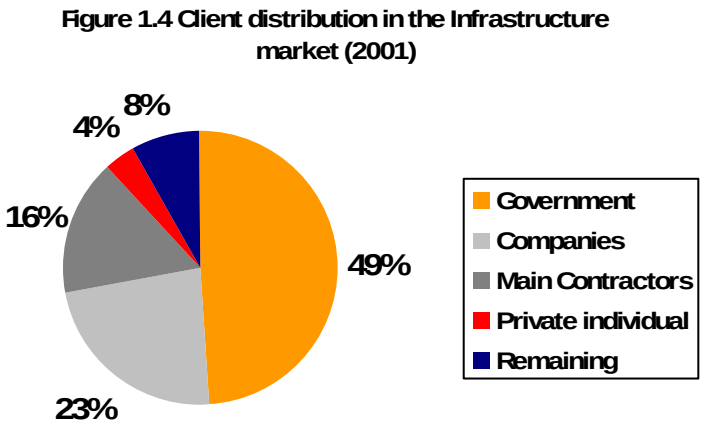

Figure 1.4 Client distribution in infrastructure market (2001)

The relation between a client and a contractor is given shape in four aspects according to the "Blauwdruk RAW2000". Van Ham and Koppenjan (2002) distinguish the following four aspects following this "Blauwdruk RAW2000":

- Type of tender. Governmental clients are bounded by European legislation for selecting a contractor to execute a project. For all different levels of governments, there is a value of budget for a project by which it is mandatory to call for tenders. This way in which they should bring a project on the market has several consequences for the progress of the project. This will be discussed in chapter 3.3.
- Contract type. The contract arranges the tasks and responsibilities of clients and contractors that are necessary to execute the project. This is the main aspect on which this research will focus. The subject of alliances involves also the other aspects though.
- Organisation model. The way in which the cooperation between client and contractor is arranged. In this aspect issues are arranged like the creation of a new juridical entity, the liability for third parties, the cooperation in managing the environment, fiscal advantages and shared exploitation.
- Information service. The relation between client and contractor is maintained by providing information. Therefore this is a central aspect in the relation. This is all about monitoring and acceptance of finished works.

All these aspects will be discussed later on in the research. In this chapter a description of the market in which alliances reside is given. Since it is clear now how the market is configured, the next chapter will elaborate on the research and how it will be executed.

2. Research design

In the previous chapter the context of the research has been described. This context has an influence on the motive, relevance and objective of the research. In this chapter these aspects will be discussed. In subsection 2.1 the motive of the research will be discussed and subsection 2.2 and 2.3 will elaborate respectively on the research objective and the demarcation of the research. Finally the research plan will be presented in subsection 2.4.

2.1 Motive of the research

The motive of this research has become clear in consultation with relevant people from the business unit HIGP inside Heijmans Infra. It was for that reason not an existing research desire from Heijmans but the result of a process in search for a relevant subject. In these consultations it became clear, that the domain of contract and project management was a relevant research field for the thesis for the study Systems Engineering, Policy Analysis and Management. In this field of the infrastructure market, where the business unit HIGP operates, the subject of alliances was one of the most discussed topics at that moment. This discussion is not only initiated by contractors like Heijmans but also by clients like the Ministry of Transport, provinces and municipalities.

On the one hand it was felt that alliances have become a political hot topic and therefore clients, who are mostly governmental parties, are more and more steering on executing projects in alliances. But on the other hand, there are still a lot of uncertainties and unknowns on alliances, which makes it hard to start an alliance, especially for contractors. Contractors want to be sure of return on investments before they act in new types of contracts. This reasoning can be stated as undifferentiated if one would analyse real life situations though. Contractors might for example participate in an alliance, because of the public attention that is paid to it and not because of the expected revenues. Such political choices can overrule the default commercial reasoning of contractors in particular situations. However on the long term contractors aim for continuity and therefore will strive for return on investments. Due to this state of affairs alliances are still no common practice in this sector.

Heijmans, as a contractor, is one of the parties with the most experience in alliancing on the Dutch infrastructure market. In the first alliance applied in the infrastructure market, the ‘Waardse Alliantie’, Heijmans was one of the main contractors. This alliance performed well and resulted in high profits and cost reduces for respectively client and contractor. Furthermore Heijmans has been involved in some other alliances of which the project N201 has the best match with the ‘Waardse Alliantie’. The other projects were a remediation project in Amsterdam at the “Oostergasfabriek” and the project N302. The latter one has already been discussed in chapter 1.1. In the project of the remediation of the “Oostergasfabriek” the alliance was a solution to problems occurring in the project and was not started at the beginning of the project. In this project the environment caused many delays which were not expected at the start of the project. The introduction of the alliance made the project finally succeed.

In the experience Heijmans has with alliances, it became clear that an important barrier in starting an alliance is the disability to determine the usefulness of an alliance in advance of the project. There seemed to be a lack of insight into the factors determining this usefulness. Since clients determine the contract type, used in a project, such an overview of factors would be desirable in order to make a deliberate decision about the contract. If this overview is not provided, contractors may be forced to operate in an alliance, even when this is not useful. The influence of contractors in the choice of contract is limited, since they often do not complain about requirements before they win the tender. Furthermore such an

overview may also give contractors a better view on the returns of their investment in an alliance.

These considerations created room for research in this playing field, to provide a considerable overview of factors influencing alliance suitability for a project. In general, this research might provide a contribution to the research field, by facilitating the proper use of institutional arrangements between parties within the infrastructure market. Shortly the initial research request can be defined as follows:

> *"What are the determining factors within an infrastructure project for the usefulness of alliances?"*

This initial research request will form the basis in formulating the research objective. This will be discussed in the next subsection.

2.2 Research Objective

Being able to assess projects on the usefulness of alliances may prevent failures in projects, resulting from inconsiderate use of alliance contracts. Furthermore this may result in more confidence in alliances by parties who are reticent in starting one. But an assessment tool would not only exert an influence on the performance of a particular project but also on the core business of both client and contractor.

On the client side one could make political promises on a successful project by an alliance, which can not be kept, assuming that an alliance is always profitable. Once a political decision is made to apply an alliance this is hard to get undone. Since politicians will be charged with their statements, providing an assessment tool may prevent politicians making these inconsiderate promises.

On the contractor side failures in alliances, as a result of inconsiderate use, may damage the confidence of the contractor in alliances. Also employees who apply themselves to alliances may loose confidence. These experiences could lead to less application of alliances; even in cases when it could be valuable for a project.

Following this desire of information about determining factors for the success of an alliance the following research objective can be formulated:

> *"To provide insight into assessment of infrastructure projects on relevance and efficiency for alliances, by determining the factors that exert an influence on this and combining these factors in a supportive decision model for decision makers."*

The main research question that will be leading in the research, serving the objective of the research is expressed as follows:

> ***"How can the appropriateness of infrastructure projects for alliances beforehand be assessed in a decision model and how should this be implemented?"***

The main question can be divided in several sub questions, which contribute to the answer of the main question. The following sub questions have been formulated:

1. *How can project alliances be defined and what is their contextual framework?*
2. *What comprises the (dis)advantage of alliances in infrastructure projects?*
3. *Which technical properties of infrastructure projects influence the appropriateness for alliances?*

4. *How do the political context and environment characteristics of projects influence the appropriateness for alliances?*
5. *Which uncertainties emerge in the trade-offs on the appropriateness of a project for alliances?*
6. *How can these factors be merged in a decision model and how should this be applied?*
7. *What other requirements are necessary if the project properties suits for alliances and how should these be implemented?*

In sub questions three, four and five there has been made a distinction between the characteristics of a project. These are the technical properties; the political and environment characteristics; and the uncertainties of a project. This distinction has been made in consultation with the graduation committee in the discussion of the research proposal. This graduation committee exists of a professor and two researchers, who are active in the same research field and the external attendee from Heijmans, who is the contract specialist of the business unit HIGP.

2.3 Demarcation of the research

The research field needs to be demarcated to determine what will be relevant for the research and what needs to be ignored, in order to maintain achievability of the research. Within this scope, the following demarcation is made.

- The research is executed within the company Heijmans and in the former Infra division. The application of the model is not only intended to be used by Heijmans though, but also for the other actors within the infrastructure market. Therefore sources for the research should not only be sought within Heijmans, but also on the client side and amongst other contractors. The sources should and will be widened as much as possible to get the highest reliable information.

- The infrastructure market is a project orientated market. This means most of the activities are executed in projects. A main characteristic of a project is that the relation between the parties in the project is temporary, i.e. for the endurance of the project. From this point of view the application of alliances should be analyzed. In literature there is also spoken about strategic alliances, which last for a longer term between parties. This type of alliance is not applicable in the infrastructure market between public clients and contractors, because European legislation prohibits long term alliances between a governmental actor and a private organization, in favour of competition. For these reasons the research will only focus on the short term project alliance. In the rest of the thesis, project alliances will be defined as alliances.

- The decision model, that will be the result of the research, is a model that will provide an overview of the determining factors within a project on the appropriateness for an alliance. It should not be expected, that the model as a whole, will replace the function of a decision maker in the selection of the proper contract in a project. If this would be the case, this decision maker would not be necessary anymore. In fact the decision should always be taken by a competent person, who is able to make a deliberate decision. The function of the model will be a supportive one for the decision maker in order to be sure of taking this deliberate decision.

- In the infrastructure market several contract types can be considered for appliance within a project. The most used contracts in this market are RAW estimates and Design-and-Construct (D&C) contracts. Another contract, that is getting more attention within the infrastructure market, is the Design, Build, Finance and Maintain (DBFM) contract. Within this contract the contractor will be responsible for the financing of the project and gets paid by the availability of the infrastructure. Contract types with an integrated 'operate' aspect are not used in the Dutch market, because possession of infrastructure by private parties is not applied yet in the Netherlands. For this reason contracts like Design, Build, Finance, Maintain and Operate (DBFMO) and Build, Operate and Transfer (BOT) are not used. These contract types will therefore not be integrated in the research.

- This research focuses on project characteristics, which influence the suitability of the project for alliances. Based on the main research question, the research is initiated from the view of the project. Client and contractor often consider the use of alliances for a particular project after this project has been tendered in another contract type, for example RAW or D&C. For this reason they want to know, if the project suits for an alliance and not if the alliance contract is suitable for the project. The focus of the research is therefore on the project and not on the contract. If the focus would be on the alliance contract and the suitability for projects, also other types of contracts should be involved in the research. This would make the research project too extensive for the time span of the research.

2.4 The Research Plan

In this section the Research plan will be discussed. The graphical image in figure 2.1 is a summary of this research plan. The research has been divided in four phases: orientation; problem analysis and research; modelling; and evaluation and conclusions. These phases are not followed linearly in the research, but provide mutual inputs among each other. This is also shown in the figure.

As a first step in the research, the environment, in which the research will be executed, needs to be analyzed. This orientation of the research field will affect the research scope. On the other hand the scope of the research subject will determine the environment in which the research will be executed. This phase therefore requires a good consideration about what needs to be involved in the research and what environment should be taken into account. This first phase is presented in chapter one and two of the thesis.

The next phase is the problem analysis and research phase. This phase will lay the foundation of the answering of the main research question and provide answers on the sub questions one to five.

In the first place a clear definition of alliances and the context in which they reside will be defined. Furthermore the theoretical framework will be discussed, to which alliances can be classified. There are several aspects that can be understood by the context of alliances. First, inefficiencies in the infrastructure market are discussed, to which alliances can provide improvements. Then an elaboration on the opportunities and threats of alliances will be given, in order to present why alliances can be considered and what are the downsides of alliances. Next, different types of alliances will be discussed and it will be concluded by a description of the application of alliances in The Netherlands.

The research method that will be applied to answer the sub questions will be desk research and theoretical analysis. On definitions of alliances and its context, a lot of research

has been executed in the past. Therefore desk research will suffice, in order to answer these questions. The input for the definition of the context of alliances will be the definition of the research project environment which can be found in chapter one. In order to prevent description of the building and civil engineering industry twice, the elaboration of the context of alliances needs to replenish the basics in chapter one.

When alliance definition and context is clear, the research can focus on project properties that influence the appropriateness for alliances. These factors will lay the foundation of the final intended decision model. This part of the research will answer the sub questions three to five. Since only a little research has been executed on these factors that influence the appropriateness of alliances, desk research will not suffice in this part. Though desk research will lay the foundation for these questions, further contribution to the answering of the sub questions will be derived from case studies and surveys. Case study will be executed on projects in the Netherlands to which alliances are applied. The case studies are mainly given shape by executing surveys with involved people in the projects. Furthermore, project evaluations and project plans will be analyzed.

In the analysis of decisive factors in projects, these factors are categorized in three parts. The research will distinguish technical properties; environment and political context characteristics; and uncertainties that emerge as the three pillars of decisive factors.

When a project suits for alliances, the success of an alliance is not guaranteed yet. The success will depend on how the alliance is executed. This research intends not to leave a project to its fate, when it is classified to suit for an alliance. Therefore it will provide points of interest on behavioural and managerial matters within an alliance. Several researches have been executed on how parties should behave in alliances. Therefore desk research will be used in order to create a valuable contribution to this question.

Besides the desk research, case studies and surveys will be applied to get a broader view on this area and to validate the desk research outcomes. The outcomes of sub question seven will be presented in chapter six. The input of this sub question does not have a standalone character, but depends on factors that are already discussed in chapter four. On the other hand behaviour and management in projects can influence the outcomes of factors. Hence chapter four and six interact with each other and will function as mutual input.

Modelling is the next phase in the research project to be executed. In this phase, the outcomes of the problem analysis and research need to be merged in a decision model. The modelling phase will give answer to sub question six, which will be discussed in chapter five. The design of the model will not only contain a merge of the factors of projects, but also an analysis of the interaction between these factors. This interaction between the factors will be determined by consulting experts in the infrastructure market. Finally the answer of this sub question will provide suggestions about the implementation of the model in organisations that should use this model.

In the final phase of evaluations and conclusions, the research project will be concluded. An answer to the main research question will be given and recommendations will be made. Furthermore the outcomes will be reflected to the theoretical framework, which is applied in the research. The full research will function as input for this phase. Also proposals for future research on this area will be made if necessary. As stated before the drawing of the research plan is shown in figure 2.1.

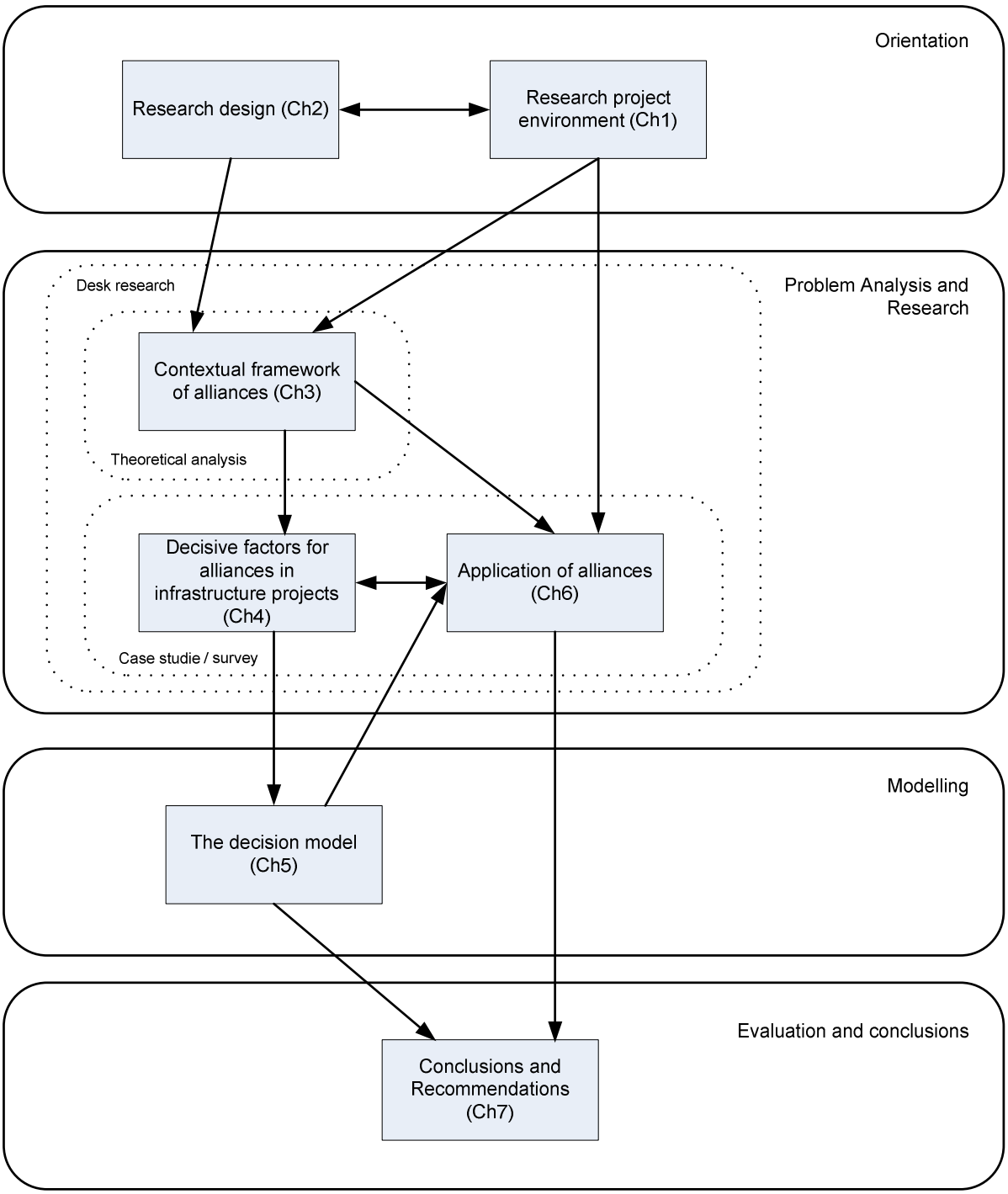

Figure 2.1: Research plan

3. Contextual framework of alliances

Project alliances have been applied in the Netherlands since the early 1990s. The offshore industry introduced the alliance at that time in order to produce oil and gas more cost-effectively. They were forced to do so, since the energy prices were low at that time and therefore profit margins decreased. Since alliances appeared to be successful in this industry, several questions arose, if it was likely that these alliances could be transferred successfully to other businesses (Scheublin, 2001). In the Netherlands this resulted in a pilot project in the railroad sector in 2000 as the first initiative of alliances in the infrastructure market.

This chapter will elaborate on the context of alliances in this industry. First, a definition will be defined on alliances in the infrastructure market and the theoretical framework will be discussed. Then, the infrastructure sector will be analyzed and how alliances can increase project performances. Finally, an investigation of the application of alliances in the Netherlands will be made.

3.1 Alliance definition

In literature many definitions are available of alliances. Table 3.1 provides an overview of definitions by different authors.

Author	Definition
(Gerybadze, 1995)	The client and associated firms will join forces for a specific project, but will remain legally independent organisations
(Kwok and Hampson, 1996)	A cooperative arrangement between two or more organizations that forms part of their overall strategy, and contributions to achieving their major goals and objectives for a particular project.
(Abrahams and Cullen, 1998)	An agreement between entities which undertake to work cooperatively, on the basis of a sharing of project risk and reward, for the purpose of achieving agreed outcomes based on principles of good faith and trust and an open book approach towards costs
(Ross, 2000)	A project alliance is where an owner forms an alliance with one or more service providers (designer, constructor, supplier, etc.) for the purpose of delivering outstanding results on a specific project.
(Clifton and Duffield, 2006)	An agreement between parties to work cooperatively to achieve agreed outcomes on the basis of sharing risks and rewards
(Van Schaik, 2007)	An alliance is a project working method in which cooperation between parties is promoted by creating or using equal interests. This is possible by sharing risks and with financial incentives.

Table 3.1 Alliance definitions in literature

In the presented definition some similarities arise in the description of alliances. Describing these similar aspects might bring up a proper definition which can function as a basis for the research.

In the first place many authors define alliances as an **agreement** between one or more parties. Some call it an agreement (Clifton and Duffield, 2006, Abrahams and Cullen, 1998), others an arrangement or alliance (Kwok and Hampson, 1996, Ross, 2000). This regards in all definitions a formal agreement, to which all involved parties should obey. Gerybadze (1995), regarding the alliance definition, only talks about the joining of forces, emphasizing that the parties will remain legally independent. There is nothing said in this definition about how this relation is given shape. Van Schaik (2007) describes the alliance as working method

in projects, though in other publications from AT Osborne it is said, that a formal agreement is inevitable to commit parties to this working method. It can be concluded that in essence an alliance exists of an agreement.

The second common aspect in the definitions is that the alliance exists for a **specific or particular project** (Ross, 2000, Gerybadze, 1995, Kwok and Hampson, 1996). The other authors provide a more generic definition and do not mention that the alliance applicates for a specific project. When we focus on the relation between client and contractor, this specification needs to be involved. Since European legislation obliges to tender projects above a certain amount of budget, long term alliances are not possible in the infrastructure market between a governmental party and a contractor. Due to this legislation, the alliance contract will last only for the endurance of the particular project. This means all phases within a project, in which client and contractor are mutually dependent and hence requires a recording of the relationship in a contract.

The third aspect, which is remarkable in the definitions by the different authors, is that almost all of them mention the **cooperation** between the parties in an alliance. Van Schaik (2007) defines cooperation as what is promoted in an alliance. The purpose of an alliance can for that reason be stated as cooperation between the client and contractor.

In order to cooperate in a project, the parties create or use **equal interests** (Van Schaik, 2007). Kwok and Hampson (1996) define alliances as a means for achieving major goals and objectives for a particular project for all parties in an alliance. Clifton and Duffield (2006) and Abrahams and Cullen (1998) define the creation of equal interests as agreed outcomes. It can be concluded, that cooperation within alliance will take place when the involved parties have equal interests in the basis.

According to several authors, the creation of equal interests in alliances is achieved by **sharing risks and rewards** (Clifton and Duffield, 2006, Abrahams and Cullen, 1998, Van Schaik, 2007). The other authors do not mention the way in which equal interests are created. In all the examples of alliances however this is achieved by sharing risks and rewards. For this reason this will be included in the definition for this research.

The final remarkable aspect, that is perceived in the definitions, is that the agreement between the parties is based on **principles of good faith and trust and an open book approach towards costs** (Abrahams and Cullen, 1998). Since this approach is crucial for the success of an alliance, this needs also to be involved in the definition.

As a result of the comparison and analysis of the definitions, the alliance definition is formulated as follows for this research

> *An alliance is an agreement between a client and a contractor for the endurance of a specific project, in which they aim for cooperation by creating equal interests through risks and rewards sharing and by principles of good faith and trust and an open book approach towards costs.*

Since the alliance definition has been defined now, the environment in which alliances reside will be discussed. Therefore the theoretical framework will be analyzed that applies for alliances. The theory that can explain the application of alliances is the Transaction Costs Economics Theory (TCE), because alliances aim for a specific treatment of transactions between parties. This theory will lay the foundation for this analysis.

3.2 Theoretical framework of alliances

Transaction Costs reasoning is a theory in economics that focuses on the way in which limited information influences economic allocation processes; this includes also cooperation (Van Ham and Koppenjan, 2002). Possible information problems can be solved by different

contract types, for which actors sign up. Transaction Costs reasoning became most widely known through the book of Oliver E. Williamson called 'the Economic Institutions of Capitalism' which was published in 1975. However it is said that the term 'transaction cost' originates from 1937 by Ronald Coase in his "the nature of the Firm" (Gomes-Casseres, 1999).

As distinct from the neoclassical economics, the TCE does not assume that the price mechanism produces all relevant information for transactions, free of charge. It takes into account the costs made for the preparation, execution and checks of transactions. In all the previous economic theories the firm was treated as a 'black box' in which internal transactions were considered not to be important (Barron, 2006).

Williamson defines transactions as follows:

> *A transaction occurs when a good or service is transferred across a technologically separable interface. One stage of activity terminates and another begins (Williamson, 1981).*

The purpose of the theory is to determine the most optimal way of contracting, in which a relationship between parties is recorded. To determine this optimal point the transaction costs are taken into account. The way of contracting is distinguished by Williamson in two extreme extents on vertical integration of firms. These are market and hierarchy. In the market situation the transactions are executed by an external party. In the hierarchy, the party itself executes the transaction. In between these two different types of execution of transactions, hybrid variants can be distinguished (Williamson, 1981).

On the basis of these possible coordination mechanisms, Williamson makes two assumptions on human behaviour that cause the necessary choice for a contract type. The assumptions are Bounded rationality and Opportunism.

Bounded rationality refers to the fact that people have limited memories and limited cognitive processing power (Barron, 2006). People are often not able to assimilate all information at ones disposal and are therefore not able to take fully deliberate decisions. Besides, the actions of other actors often affect the outcomes, which require the decision maker to take them into consideration. However these actions are not predictable, which makes it hard to take a good decision.

With opportunism is meant that people will act in self-interesting way, which will lead to opportunistic behaviour. Williamson even adds to this that some people act with guile to increase their interests. For this characteristic it is not predictable who will act self-interestingly, at the costs of others, and who is not willing to do so (Parker and Hartley, 2003). These two assumptions form the basis for company decisions to execute transactions in a certain way of contracting. The way contracting takes place is also called the 'governance structure'(Rahman and Kumaraswamy, 2002).

Types of contracting

Three types of contracts can be distinguished, of which organisations should choose in order to manage transactions. These types of contracts are classical contracts, neoclassical contracts and relational contracts. In case of the classical contracts, future developments can be predicted very well and the relation between parties can therefore well be recorded in the contract as well. RAW estimates, in case of simple projects, can be classified as this contract type. The management of transactions between the involved parties in this contract does not require continuous attention, because there can be easily switched to another party in case of defaults, since it regards non specific investments.

Neoclassical contracts are contracts in which uncertainties are present. Nevertheless, these uncertainties and their possible consequences are known, which makes it able to calculate the consequences of these uncertainties and assign responsibility to a party in this contract. An example of this type of contract in the infrastructure market is the D&C contract. Problems that can occur, when using this contract, are different interpretations of the involved parties, according to the equalities of the real life situations and the recorded situations in the contract (Van Ham and Koppenjan, 2002).

The last contract type is the relational contract. This contract is applied when it is very hard to determine what uncertainties arise during the execution. Also when the requirements of the client are not fully clear yet, this contract type offers space to determine these requirements in a later stage. This contract type assumes that in cooperation and trust both parties are able to get the best result, even if uncertainties and their consequences are not clear yet. The success for this type of contract therefore depends highly on mutual trust between the parties. Examples of this contract type are joint ventures and alliances.

Transaction characteristics and matching contract type

For the concerning parties it is important to choose the proper contract type in a given situation. The Transaction Costs theory distinguishes three characteristics of transactions that determine the appropriateness of a certain contract. Transactions can contain frequent or rare characteristics; they can be of high or low uncertainty; and they can be made for specific or non-specific assets (Barron, 2006). For each different combination that can be formed by these characteristics, a specific contract type suits best.

The frequency of a transaction determines in the first place if it will be efficient for a company to integrate a task or process. When the frequency of a certain transaction is very high, it would be profitable to vertically integrate this process in the company, since transaction costs will be higher if it is executed by a third party. On the other hand, when a certain transaction takes place rarely, it would not be efficient to integrate this process or task in the company. The organization costs for the department, to operate this transaction, would be too high according to the usage off this department. In this situation it is more efficient to transfer the task or process to a third party.

Uncertainty exists in a transaction, when it is impossible to predict if and what eventualities will occur during the transaction. An important factor that might increase uncertainty is the time over which a transaction takes place. The longer time it takes to execute a transaction, the more eventualities may occur. In a transaction the two involved parties are dependent on each other and therefore are willing to decrease uncertainty. However on the other side they would like to have a long-term relation in order to be sure of supply or demand and to be able to plan (Barron, 2006).

Bounded rationality and information asymmetries are often obvious present in these situations. None of the parties are able to determine all eventualities that might occur and they are also not willing to share all their information with the other party. This non availability of full information makes it harder for them to take deliberate decisions and increases uncertainty.

A possibility to reduce uncertainty is by integration of the party on who one depends. In that case the information asymmetry can be solved, since the parties will serve the same goals and are willing to provide information to each other. However, before deciding to vertically integrate, one should consider if the transaction cost reductions exceed the additional organization costs accompanying the integration.

Finally, the asset specificity of a transaction influences the proper choice of contract. Asset specificity determines in which extent a certain transaction is specific for a given context. This is the case, when the transferred good or service is somehow unique in the

given situation. If the asset specificity of a transaction will be high, the parties tend to vertically integrate in order to reduce costs of the transaction. The interdependency between the parties will be high if it concerns high asset specificity and therefore there is a threat for lock-in. Organisations can solve this threat by vertical integration.

In figure 3.1 an overview is provided of the efficient governance structure given the values of the different characteristics of a transaction.

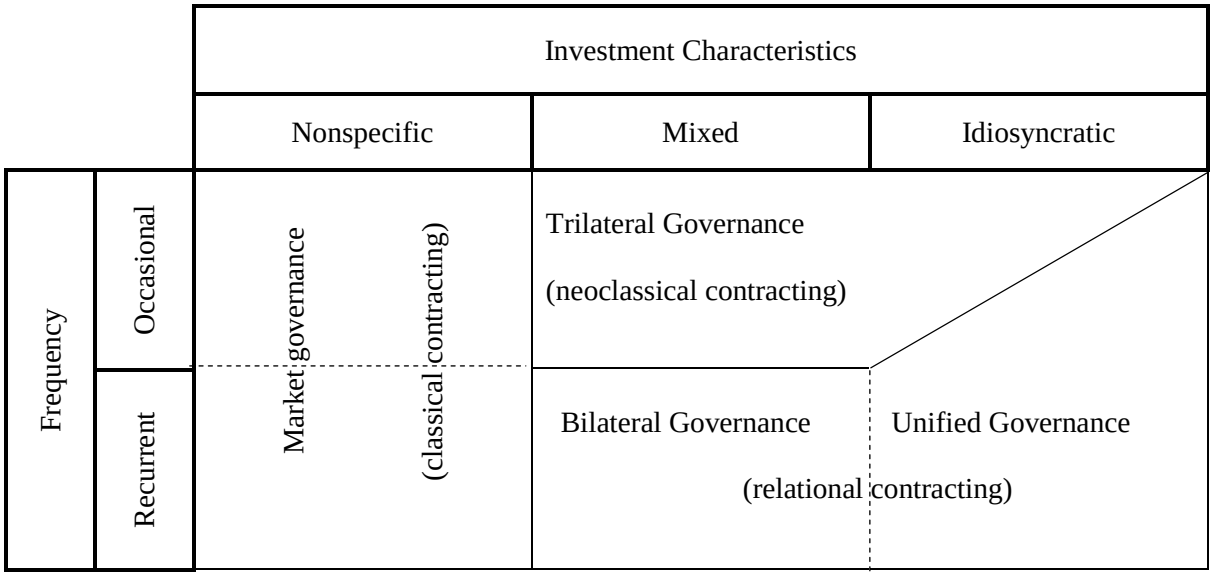

Figure 3.1: Efficient Governance (Groenewegen, 2006)

Application of TCE to infrastructure projects

Now the essence of Transaction Cost Economics theory is clear, alliances can be applied to this theory. This section will elaborate on the application of this theory within the infrastructure market and alliances.

"Transaction Costs in construction include: costs of negotiation and writing contingent contracts; costs of monitoring contractual performance; costs of enforcing contractual promises; and costs associated with breaches of contractual promises." (Rahman and Kumaraswamy, 2002, p. 2) If one analyses the situation in the infrastructure industry and compares it with the construction industry, one can conclude that these industries have the same characteristics, according to the contracts applied. Therefore the same transactions can be assumed. The transactions applied in the infrastructure industry, and the contracts that manage them, will be analyzed.

A characteristic of the infrastructure market, that has an impact on executed transactions, is that all construction and maintenance works are performed in projects. This means in the first place that all the works have a temporary character, although these projects can last for several years and might have a long realisation period.

In the second place, execution takes place in projects, because every work has a unique character in technology, application and/ or size. Therefore all projects require a different treatment and different skills and professionalism. It is concluded earlier that suppliers are not able to standardize the product or the process, due to the unique character of projects and therefore do not supply products to the clients but means of production (Van der Veen and Boensma, 2002).

In the third place, the works are set up in projects, because most clients are obliged to do so by European legislation. Since clients are mainly governmental organisations, they

have to tender works, in order to promote competition and safeguard equal treatment of private parties. Also Dutch policy promotes for the last 15 years to execute as much work as possible by private parties, instead of execution by public organisation, because this would be more efficient and this would result in more creative solutions, initiated by private parties who possess the know-how (Enthoven, 2005).

The fact, that clients most of the time need to outsource and tender the projects in order to find a contractor for execution, brings along that full vertical integration is not possible between the client and the contractor. However, partly vertical integration is possible through cooperation or relational contracting. Therefore the transaction costs theory is also applicable in this industry so far.

Regarding the frequency of transactions in infrastructure projects, we should not focus on the temporary character of projects. It can not be presumed that the frequency of transactions depends on the endurance of contracts. It depends on the frequency of transactions within the period of realisation. If the frequency of transactions is high within this period, vertical integration might reduce transaction costs more than the increase of organization costs. This might be a justification to cooperate or vertical integrate in another way (Rahman and Kumaraswamy, 2004).

In the infrastructure projects a lot of transactions take place between client and contractor during the project. One may imagine all separate monitor and audit moments in a project, which are executed before the contractor is paid. Also quality checks to enforce contractual promises and claims and disputes can be confirmed as transactions. Regarding this, it can be concluded that the frequency of transactions within infrastructure projects is high in case of big projects (Rahman and Kumaraswamy, 2002).

The uncertainty of multidisciplinary infrastructure projects can be stipulated as high, since these projects have a complex character. This complexity often turns out in technical, environmental and managerial aspects of the project. Due to these aspects it is impossible to predict all eventualities or risks that may occur and what will be the impact of these eventualities. However, the involved parties in infrastructure projects want to decrease this uncertainty as much as possible, in order to be able to estimate costs of the projects or to get information about the progress of the project. The choice of a proper contract type will be able to reduce the uncertainty of the transactions within an infrastructure project (Barron, 2006).

Finally, the asset specificity of transactions within infrastructure projects needs to be analyzed. As concluded before the projects have a unique character in technique, application and/or size. Before the client chooses a contractor in the tender procedure, he is able to choose the most optimal partner out of many contractors. However, when execution of a project starts, the contractor executes his own design. The uniqueness of this design can create a lock-in, which makes it impossible to replace the contractor for another (Van Ham and Koppenjan, 2002). Since this uniqueness also requires special attention to each transaction, the asset specificity of infrastructure projects can be considered as idiosyncratic. In order to treat this asset specificity well, normally vertical integration is applied.

Given the three aspects that infrastructure projects often contain high uncertainty; that these projects are idiosyncratic concerning the asset specificity; and that transactions take place recurrently during a project, one would suggest to apply relational contracting in unified governance. Yet, if the current application of contracts in infrastructure projects would be analyzed, it must be concluded that mainly neoclassical contracts are applied. Neoclassical

contracts are contracts for situations in which uncertainties are present, although these uncertainties and their possible consequences are known, which makes it able to classify the consequences of these uncertainties and assign responsibility to a party in this contract. Disputes in this contract type are usually solved by involving third parties. An example of a neoclassical contract is a D&C contracts. For the phenomenon that mainly neoclassical contracts are applied within the infrastructure market, one could bring up several explanations.

In the first place, unified governance is not applied in the infrastructure sector, because governmental organizations want to outsource the execution of works as much as possible to private parties. Furthermore, they are obliged to protect competition and therefore tender projects in order to treat private parties equally (Buur and Pries, 2008a).

In the second place, the projects have become more and more integrated in the last decades. With this increase of the size of projects, also the complexity of the projects became higher. The need for relational contracting nowadays was not directly necessary before. In those times tasks and responsibilities were easier to record and therefore classical or neoclassical contracts sufficed (Koenen, 2004). At this moment still most of the infrastructure projects are executed in neoclassical contracts, in which the assumption rules that all tasks, responsibilities and eventualities can be recorded in advance. For this reason, projects often result in many claims and disputes (Koolwijk, 2006, Mohr and Spekman, 1994, Swan et al., 2002).

In the third place, the Dutch Civil Engineering and Construction industry has been subject to an investigation of parliament that started in 2002, in which several bribe cases were cleared. After that investigation, a lot of distrust and reticence were present in the industry concerning cooperation (Laverman, 2003). All parties avoided acting in any suspicious way that could be interpreted as illegal behaviour. For that reason, relational contracting was not able to evolve in this sector, which requires a basis of trust and cooperation in order to succeed (Abrahams and Cullen, 1998).

Alliances, as a way of contracting, can well be classified in the contract type of relational contracting. It somehow gives shape on vertical contracting, but mainly fits well because of the relational characteristics. As following from the definition of alliances, which is discussed in section 3.1, they only succeed by principles of good faith and trust and an open book approach towards costs (Abrahams and Cullen, 1998). In fact, this is a solution to the information asymmetry problem that exists when the involved parties are separated. Also equal interests are created in an alliance through risk and reward sharing, in order to avoid opportunism (Clifton and Duffield, 2006, Van Schaik, 2007). In this extent of vertical integration, in which even a shared entity can be created, it becomes clear that this inclines to unified governance. However, it might also be seen as a form of trilateral governance with relational contracts elements in it. Overall it can be concluded that alliances are a suitable way of contracting in complex infrastructure projects, from a transaction cost perspective.

3.3 Inefficiencies of the infrastructure market

A reason, why alliances have been introduced in the infrastructure market, should be that it increases performance of the market. Otherwise, this contract type would not be of any value to replace the currently used ways of contracting. Apparently, the currently used contracting methods did not result in a perfect market performance. This section will elaborate on the inefficiencies that are present in the infrastructure market. The extent of this analysis is limited to the scope of cooperation within a project between client and contractor, in which alliances become of value.

Perfect infrastructure market

Before being able to determine inefficiencies in the market, one should first strongly word what is meant by a perfect market, according to the infrastructure market. In a perfect infrastructure market the following results can be assumed:

- The client is able to carry into effect an infrastructure project against minimum costs and with convincing quality.
- The contractor is able to execute the project and gets paid for his efforts for a reasonable price in which a reasonable profit is made.
- All risks are treated against minimum costs and, if necessary, in cooperation with the contractor.
- All changes in preferences as a result of new technological insights, scope changes or other causes are processed against reasonable costs and in cooperation with the contractor.
- The overall approach to the project by client and contractor is to realize the project as efficient as possible and by minimizing disagreements, or solving these disagreements effectively, relying on mutual trust and cooperation.

The characteristics of a perfect infrastructure market will lay the foundation of the analysis of the inefficiencies of the market. The inefficiencies, that are relevant for this research, occur on three areas in the infrastructure industry. The tender procedure brings along some inefficiencies. Furthermore, the priority of interests within a project differs between a client and a contractor, which causes inefficiencies. And in the third place the distribution of responsibilities and tasks is a source of inefficiencies in the infrastructure market. These three areas will be elaborated here.

Inefficiencies as a result of the tender procedure

In the first place the tender procedure is a main source for inefficiencies. The clients, who are mainly governmental organisations, are obliged to tender projects when the budget exceeds a certain amount of money. This means that, especially big integrated projects will be tendered, since these projects always concern a large amount of money. The governmental organisations are obliged to tender projects by European legislation, which prescribes that there should be no preference in the choice of a contractor and that there should be competition. This obligation makes it difficult to cooperate with the contractor in an early stage (Van Ham and Koppenjan, 2002).

In the traditional contracts (RAW), the client designed the work or outsourced the design to a third party. Next, the client tendered the project on the market, which resulted in the cheapest contractor that would build the project. For a lot of single disciplinary projects this has been a successful way of contracting, mainly because this can be executed faster than D&C contracts, which requires a long tender procedure. However, in case of more complex projects, the client does not use the knowledge of the market with this contract (Webb, 1999a). Moreover, the clients are unable to formulate a complete program of requirements in this situation, because projects are subject to a lot of changes technically or due to environmental influences (Morris and Hough, 1987). This results in high cost overruns.

The contractors make use of this failure of the client to formulate a complete scope. The competition on the infrastructure market can be very strong, depending on the availability of work on the market. When the subsequent works are low, contractors are sometimes even willing to tender a work below the production costs. The merit of creating turnover might be more important in this situation, than making profit (Buur and Pries,

2008a). In this scenario the contractors try to get the lowest price and even use failures in the program of requirements of clients to do so. They take into account that they will be able to charge the client with high prices when later on in the project these changes will occur. The contractors are able predict these changes, because they often have more knowledge and are therefore able to describe requirements more accurately (Van der Zwan, 2008). This way of working results in claims and disputes during the project and hence fails as a basis for cooperation.

Clients tried to solve this problem for big integral projects by shifting also design responsibility to the contractor, besides the construction responsibility. In that case, the client only has to formulate functional requirements and will choose the best design that fits to these requirements. This type of tendering makes use of the knowledge of the market and gives them an incentive to optimize the designs in order to preserve low production costs. Examples of these contracts are Design & Construct (D&C); Engineering & Construct (E&C); Design Build Finance Maintain (DBFM) and Design Build Finance Maintain Operate (DBFMO) contracts. The most often used contracts in the infrastructure market are D&C and E&C contracts in case of complex projects.

A problem, coming up in the tender procedure with the D&C contract, is that contractors often do not obtain advantages by creating a good quality design. These projects are usually tendered on lowest price. This fact leads to solutions that can be cheap in building costs, but can be much more expensive when taking into account the maintenance costs. A client could be deceived, assuming that the cheapest solution is indeed the cheapest solution on life-cycle basis. To avoid this problem the clients also need to assess designs on quality. However it is much harder to assess and compare on quality objectively (Heijmans, 2009). Often this leads to a lot of discussion during tender procedures. For this reason in most cases lowest price is still leading in the choice of the contractor (Buur and Pries, 2008b).

Another way, in which quality can be guaranteed in the tender procedure, is by integrating a maintenance contract into the design and build contract. This is applied in the DBFM(O) contracts, in which even financing is integrated. But also a Design Build Maintain contract (DBM) is applied, which basically is a D&C contract with an integrated maintenance contract. These contracts force the contractors to think about cost-efficient solutions on life-cycle basis. Therefore they should integrate a certain quality into the design in order to avoid high maintenance costs. This way of contracting is used more and more in the infrastructure market (Wortelboer-van Donselaar and Lijesen, 2008).

It can be concluded that the tender procedure brings along a lot of discussion and inefficiencies in the infrastructure market. The competition, which is created by this working method, is a source of certain behaviour that does not promote cooperation within the market. Expectations of tendering, that it would provide fixed costs for a project, are proven not to be true. Especially the tender procedure is a source for project cost and time overruns. Although the tender procedure is obliged by European legislation, alliances bring improvements regarding the current outcomes. This will be discussed in the next section 3.4.

Inefficiencies as a result of unequal interests

A second source for inefficiencies within the infrastructure market is the discrepancy of interests within a project between client and contractor. Both parties often have different views on the performance of a project. Generally, the performance is measured by the key performance indicators (KPI) scope, time, quality and costs (Turner, 1993). The desired outcomes of these KPI differ frequently within a project between client and contractor.

Generally a client wants to carry into effect a project against minimum costs and receive highest quality and functionality for this money. Regarding the time, the client wants to get the project realised as soon as possible, in order to engage social advantage of the

project. In advance of the project, the client wants to define the needs and expectations of the project as well as possible. This is the scope of the project. If this scope is complete, future changes will not be necessary which avoids unexpected additional costs (Walker and Keniger, 2002).

On the other hand, a contractor has interests in building a project for minimum quality and functionality, against maximum budget and time. After a contractor wins a tender, he initially has a fixed budget to realize the project. In order to get as much as possible profits from this budget, the contractor tries to realise the project as cost-efficient as possible and therefore will usually never exceed the demanded quality. During the project, the contractor also tries to obtain more budget and time to realise the desired functionality, which is defined in the scope.

This difference of interests in a project causes inefficiencies within the infrastructure market. In the first place it causes disputes about how to treat different things during the project. For example, a client is often willing to involve third parties in the process to get highest social advantage. However contractors don't want to spend time in this involvement and prefers a undisturbed building (Knipping, 2009). Also changes in favour of quality or functionality are often supported by clients, but most of the time are refused by contractors, or are only accepted against very high prices. The optimal result of good quality against reasonable price can therefore not be reached.

Furthermore the KPI quality, cost and time are known as being exchangeable for contractors (Buur and Pries, 2008b). In order to get a low-cost design, they might decide to decrease quality or increase realisation time. Often they are forced to do so in order to win the project in the tender (Van der Zwan, 2008, Van der Werf, 2009). However this is not in accordance with the clients wishes. A result of this situation is that clients are starting to formulate more specific requirements, in order to keep quality controllable. A client might even decide to create the design himself and tender the project in a RAW contract, in order to match with his wishes. For this reason especially municipalities often decide to create designs themselves. Because the projects are in those cases often in intensive populated areas, they desire to have full control on the project. D&C contracts make it harder for them to control the design. A problem, occurring with this situation, is that the knowledge and creativity of the market will not be used. A good cooperation between client and contractor in the design and equalizing interests of both parties could contribute to the solution of this problem (Knipping, 2009).

Inefficiencies originating from distribution of responsibilities and risks

The third source for inefficiencies is the distribution of responsibilities and risks between client and contractor within a project. For clients, and also for contractors, it is advantageous to know exactly, what is expected from each other and what the responsibility of both parties in certain situations is. In this way, the client is able to determine the costs of the project and he can be sure about what quality will be achieved within what time. Contracts try to distribute these tasks and responsibilities as well as possible. However, as concluded before, clients are often not able to describe the complete scope of a project in advance (Webb, 1999b). Moreover these projects are subject to many changes in the environment, which makes it impossible to formulate the requirements in advance (Morris and Hough, 1987).

Regarding risks, it is known that governmental organisations are risk averse. This means that these clients are not willing to carry risks and be responsible for the consequences. For this reason, the client often is trying to shift all responsibilities for risks to the contractor (Webb, 1999a). However, the contractor will ask money to take this responsibility and its consequences. So even if certain eventualities will not occur, it costs the client a lot of money

and basically he lost this money. Furthermore, it is known that integral infrastructure projects are very complex and therefore has uncertain characteristics. This has earlier been defined as not being able to predict eventualities and its consequences. For that reason, it is impossible to shift all responsibility for eventualities/ risks to the contractor, simply because it is not possible to describe all the risks and their consequences. So often when risks occur, contractors will be able to turn responsibility back to the client, because it was not exactly as how it was written in the contract (Koenen, 2004).

Furthermore, especially in RAW contracts, a client might shift execution risks to the contractor. However if the contractor executed the project exactly as it was designed and was not inattentive in its execution and warned the client in case of risk situations, it would be improper to make the contractor responsible for the risk. In that case it was a wrong design and the client still has to cover the risk (Knipping, 2009, Tiedemann, 2009).

On the other hand, when a contractor is not responsible for a certain risk, he would not be encouraged to execute the project carefully in order to lower the risk. There will be no incentive for the contractor to invest in risk reductions, because he will not be responsible for the consequences in this situation (Tiedemann, 2009).

All these situations often result in disputes and claims, in which responsibility for an eventuality has to be assigned to one party. During a project this occurs many times and causes high costs for both parties. The costs for these disputes and claims are often even higher than the profits that can be made of it (Tiedemann, 2009).

In general, it can be concluded that in the distribution of risks and responsibilities a formal method is currently used. In this method, it is tried to record everything in the contract, in order to make costs fully predictable. It is proven that exactly this desire for full recording of responsibilities is a source for cost and time overruns, since incomplete contracts can not be prevented in complex projects. This results in many problems and causes distrust between the parties. The formal system, of assigning responsibilities, effects in formal treatment of eventualities and results in strained relations (Van Haastregt, 2009). Cooperation in the execution of a project and in the distribution of risks and responsibilities might bring good improvements for this problem.

3.4 Alliance opportunities and threats

In the previous section inefficiencies are revealed within the infrastructure market. Regarding these inefficiencies, this section will elaborate on how alliances can reduce these inefficiencies. Furthermore this section will also provide threats that might come with alliances.

Alliances were defined in section 3.1 as an agreement between a client and a contractor for the endurance of a specific project in which they aim for cooperation by creating equal interests through risks and rewards sharing and by principles of good faith and trust and an open book approach towards costs. Van Schaik (2007) distinguishes different types of alliances that have their own advantages and disadvantages. These different types, which are also confirmed by several respondents of the interviews[1], will be discussed in the section 3.5. In this section the alliance will be dealt with in general in order to present opportunities and threats.

Alliance opportunities

Inefficiencies are discussed as a result of the tender procedure and a difference in priority between client and contractor on the KPI scope, cost, quality and time. One of the issues in the tender procedure is that it is impossible to formulate complete requirements in advance,

[1] A list of interviewed persons for the research is presented in Appendix 2.

since during the project a lot of scope changes occur, especially in complex projects. Contractors are often more aware of these failures in the requirements, because they own more knowledge than the clients. These contractors take into account the additional profit they can make with these failures in their tender price. They can charge costs for this additional work, because the client is bound to them when they won the tender. The contractors are forced to act this way, in order to win the tender, because other contractors do the same. The strong competition in the market lays at the basis of this problem, which is also caused by this obliged tendering. Although alliances will not change the tender procedure itself, they can be suitable in situations where the scope is subject to changes from any side. An experiment has been executed though, in which the tender procedure is changed preceding the use of an alliance contract. This is done in the project 'A2 Hooggelegen', which will be discussed in section 3.6. In an alliance, the client and the contractor will cooperate in treating the changes as efficiently as possible, especially when this change is within the scope of the alliance and both parties are responsible for it. At least the contractor will not charge exceedingly prices, because they will have to pay the costs themselves for fifty percent (Buck, 2005).

Alliances also provide improvements to the safeguarding of quality in a project. Since many tenders are still assessed on lowest price, often quality is not guaranteed. In D&C contracts, which are mostly applied in multidisciplinary projects, the client does not want to change the design in favour of quality for two reasons. In the first place, if the client changes the design he will repeal responsibility for the design automatically, which is something for what the contract was not designed. In this contract the client wants to shift responsibility to the contractor. In the second place, the contractor will also charge high prices for these changes, which will lead to much higher costs. Alliances, however, provide space to improve the quality of the project for reasonable prices. Since the client takes also design and build responsibility in an alliance and a contractor takes also responsibility for the program of requirements and the environment (Knipping, 2009, Buvelot, 2008), the responsibility problem is solved. The client will not take more responsibility when the design is changed. Moreover the contractor will not charge high prices for changes outside the scope, but is willing to cooperate in the project to meet the clients' demands for a reasonable price.

Regarding the different interests of the client and contractor in a project, it can be concluded that alliances equalize interests. A contractor is willing to be more aware of quality, in favour of the client and the client will be more aware of costs involved with changes, since these costs are shared. Moreover, the client will provide space for optimizations in the design, in order to save costs. In the normal situation the client sticks to the functional specification tightly. Now they loosen these requirements in order to give space to the contractor to search for optimizations (Van der Werf, 2009). Generally it can be concluded that a proper functioning alliance safeguards both interests for client and contractor, since the incentive structure within the alliance stimulates them to act in this way.

Since it is impossible to distribute all risks and responsibilities in complex projects to one of the involved parties, many projects end up in disputes and claims, causing high cost and time overruns. Keeping responsibility on the client side will not stimulate the contractor to reduce the risk and trying to shift responsibility to the contractor often results in disputes, because of the ambiguity or incompleteness of the contract. The introduction of an alliance is resolving this problem by assigning shared responsibility on risks which can be influenced by both parties on chance of occurrence or consequence (Van der Zwan, 2008). Both parties contribute a part of their budget to the shared alliance fund. From this fund, the shared tasks and risks will be paid. At the end of the project, the shared fund will be split up in accordance with an agreed share (Webb, 1999a).

With this mechanism both parties get an incentive to act in an efficient way concerning the project. Regarding the four KPI, there can be obtained advantage through an alliance for all four of them. The costs for solving disputes and claims can be evaded and the costs for risks within the project will either be reduced, because both parties will strive after risk reduces. Furthermore, the client will not charge high prices for additional work, since he is responsible in an alliance for this risk either and will have to pay a share himself.

The realisation time of the project will be reduced, both because of less disputes and claims and because of effective risk management. Furthermore, decision making within the project can be performed faster, since client and contractor will share the project location in which shared tasks are executed.

Since the basis of an alliance is trust and cooperation, it will be easier for the client to increase quality on the design of the contractor against reasonable prices. Moreover, there is space for involvement of parties in the environment of the project, to integrate their wishes and realize the project with the highest social value. In the same sense of quality the scope indicator can be discussed. If the scope changes, as a result of demands from third parties or because of new insights, there will be space to integrate this into the project for reasonable prices. The client will have to allocate additional budget for this when this change is outside the scope, but he will get higher quality for it in return. Within an alliance, the contractor will not charge high prices for these changes.

Overall it can be concluded, that alliances can solve several inefficiencies in the infrastructure market and therefore should in case of a complex project surely be considered as a contract type. However, alliances might also bring along some threats of which one should be aware when considering an alliance.

Alliance threats

A threat for alliances is that it will become a political instrument to get permission for projects in political decision making. The expectation can be present that alliances itself will guarantee a project being realized within time and budget and with a reasonable quality (Weevers, 2008). However, it is the cooperation within the project and the principles of trust and good faith and an open book approach towards costs that cause the success. When a politician makes promises to apply an alliance, it is often hard to abandon this plan even if an alliance is proven not to be effective for a certain project. A comparable situation occurred in the project N302, in which promises for an alliance were made, before this option was fully considered (Van der Werf, 2009).

Furthermore, alliance implementation is limited by Dutch legislation, regarding formation and participation of governmental organisations in private legal entities. The legislation in which this is recorded is the ‘comptabiliteits law’, ‘Provinces law’ and the ‘Municipalities law’. This legislation prescribes that before governmental parties can participate in an alliance, they should have permission by the Parliament (Kraak et al., 2008, Jansen, 2009, Chao-Duivis et al., 2008). This requirement can hinder the formation of an alliance, since political interference often makes a process more complex and harder to manage. Due to this requirement, until now, it was decided not to establish an alliance as a legal entity, but as an agreement in which an alliance likely cooperation is aimed for. This configuration brings along some disadvantages that restrict the benefits of an alliance.

The infrastructure market has become used with the culture of disputes and claims in the past years. It has become a routine in the execution of projects and is settled down in the behaviour of people. Within an alliance a totally different type of behaviour is required, in order to become successful. It requires mutual trust between the client and contractor, in order to utilize the benefits. The people who will work in an alliance needs to get used to this new type of behaviour, which is a hard process since it is a change a culture. Especially in the

first stage of the project, the trust between the parties might be fragile. Occurrence of eventualities with big consequences in an early stage of the alliance might therefore put pressure on this mutual trust and make parties drop back in the old behaviour (Van der Zwan, 2008, Brandsen, 2009).

In the Netherlands, alliances have in most cases been started as a transformation from tendered RAW or D&C contracts. Often, the intention to convert the tendered contract into an alliance contract is announced in the tender instructions. This transformation process requires many bargaining about the risks that will be shared and the amount of money both parties should provide for the shared fund. Also agreements should be made about processes and behaviour, which is an intense process. This process takes time, which reduces the time to realize the project and may threaten this performance indicator (Tiedemann, 2009, Wagenaar, 2009).

As cooperation is the opportunity within alliances to create benefits, it also brings along a disadvantages. Since, within an alliance, unanimity is pursued in decisions, this might reduce the speed of decision making and result in delays in the project. In the conventional contracts, the parties have their own responsibilities and do not always have to involve the other party in decisions (Van Haastregt, 2009). This guarantees that decisions are made quicker. Furthermore, cooperation within an alliance results in informal relationships between people from client side and contractor side. Regarding cooperation and trust building, this is a good characteristic. However the quality control might be harmed in this situation. The informal relationship might bring people to reduce mutual monitoring and result in loosing focus on the quality of the project. In an alliance special attention should be given to this aspect.

Another disadvantage that might come with alliances is that people within the alliance teams can be forced in representing two contradictory interests. Since in an alliance the project organisation is split up in three parts, namely the client, the alliance and the executive contractor, this can happen with persons for example representing the alliance, but also coming from the contractor. In his communication with the contractor, he will be driven to follow the contractors' interests, but alliance interests might in some cases be contradictory. The same issue can be present for people from the client side, who have besides the alliance a political function. This feature of alliances can bring people in highly complicated situations, which will be hard to handle (Van der Werf, 2009).

3.5 Different alliance configurations

Until now, alliances have been discussed as one type of contract. However, the application of the alliance principle has been executed in many different forms. Van Schaik (2007) has distinguished four main configurations of alliances and many involved people assent to this distinction. Obviously, several combinations and variations on these alliance types can be made, in which sharing will be differently given shape. The different configurations are presented in figure 3.2 and will be discussed in this section.

The table determines for each type of alliance, if it shares in optimisations, risk management and/or organisation of the project and in what extent this share is given shape. Furthermore, the way in which rewards and risks are performed, is shown in the last column. This can be done by a bonus, or by sharing a fund together in treating optimisations and risks.

In the one-day-alliance only some agreements are made on optimisations, mostly in advance of the project. Basically this means that clients will give space to the contractor to optimize the design, in exchange of cost reduces for the client. The contractor will benefit of this optimization by reducing building costs and though getting half of the payment of this work. The rewards for these optimisations will be allocated in each specific case.

Alliance Type	Share optimisations/ opportunities	Share and/ or manage risks together	Shared organisation	Alliance bonus/ fund
One-day-alliance	■□			Bonus
Cruyff-alliance	■□ ←	□□		Bonus
Polder-alliance	■□	■□		Fund
Maximum-alliance	■■	■■	■■	Fund

□□ Occasionally
■□ Partially
■■ Entirely

Figure 3.2: Different types of alliances (Van Schaik, 2007)

The second type of alliance is the Cruyff-alliance. In this alliance, both parties agree on improving the design and sharing the benefits. Besides this agreement, they confirm to search on optimisations in case when a risk occurs. As figure 3.2 shows this only will happen occasionally. When a risk occurs and for example will cause delays, opportunities may rise to optimise the schedule. In this way consequences of risks might be reduced by optimisation possibilities on other aspects. The reason, why this alliance is called Cruyff-alliance, is because of the famous statement of Johan Cruyff, a Dutch ex football player and coach, 'every disadvantage has its benefit'. This principle is applied in an alliance if opportunities can be abstracted from occurring risks.

The polder-alliance is again one step further in the cooperation between client and contractor. In this alliance, the client and the contractor meet regularly during the project, in order to manage optimisations and risks together. Beforehand, a shared fund is created to process and pay off optimizations and risks. At the end of the project, the remaining of the shared fund is split up between the two parties.

At last the maximum-alliance is the most extensive type of alliance. In this alliance cooperation is not limited to sharing optimisations and risks, but also the organisation of the project is shared. The people from client and contractor join in one team to manage responsibilities and risks of the alliance. This shared organisation has its own budget, created by the shared fund. From this fund risks are paid and benefits from optimisations are added to it. At the end of the project, the alliance organisation terminates and the fund is split up between the client and the contractor, in accordance with an agreed share.

The experience in the Netherlands with alliances covers different types of alliances. The application of alliances will be discussed in the next section.

3.6 Application of alliances in the Netherlands

In the infrastructure market in the Netherlands, alliances are applied to a few projects yet. At least as we look at the projects, which are known as being executed in an alliance. The projects, which are known as alliances, are all executed in the polder-alliance or in the maximum-alliance. However the other two configurations are definitely applied as well in the infrastructure market, but these projects are not marked as an alliance. This section will only enclose the projects which are known as alliances. The initiative and the composition of these alliances differ among the projects.

The ‘Waardse Alliantie’

The first alliance applied in the infrastructure market was the ‘Waardse alliantie’ (WA), which is discussed before. This alliance was of the type maximum-alliance in which the organisation of the project is executed together by the client and contractor. The organisation of the alliance is presented in figure 3.3.

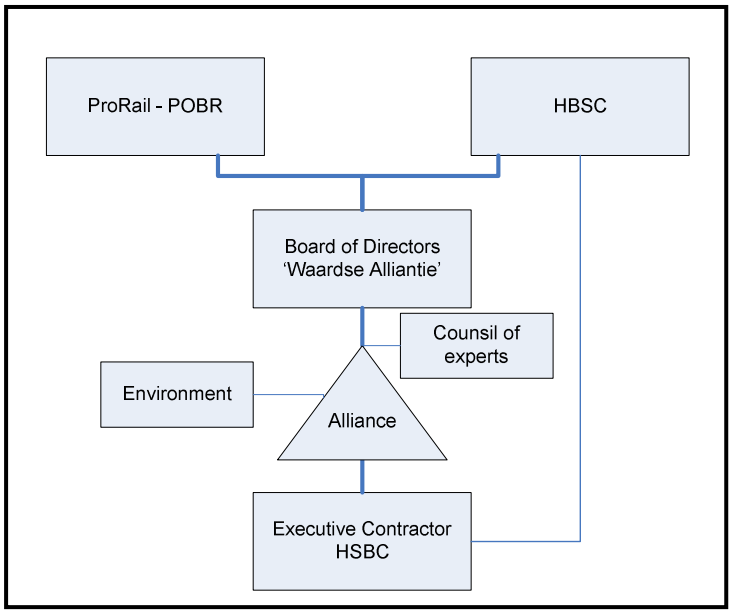

Figure 3.3: Organisation model WA(Van Drie and Unger, 2003)

The client in this project was ProRail, the owner of the railroads in the Netherlands. ProRail established, for the overall project ‘Betuwelijn’, a project organisation, which was called ‘Project Organisation Betuweroute’ (POBR). The contractor was HSBC, which was a syndicate of the contractors Heijmans, Boskalis, Strukton and CFE. Both parties were equally represented in the board of directors of the alliance and the alliance itself. In the organisation two contracts applied. An alliance contract was signed by both parties for the alliance and a separate execution contract was signed for the building of the project. In this latter contract the alliance appears for client to the executive contractor (Buck, 2005). The financial aim and effect of an alliance is presented in figure 3.4.

The client allocates a certain budget to a project. This budget consists of the price of the winning bidder in the tender procedure and the allocated budget for risks that are the responsibility of the client. The contractor, on the other hand, has its tender price as a budget for the project. Allocated budget for risks that may occur in the project are included in this price. In an alliance both parties invest their budget for risk management and some budget for operation of the alliance into the alliance fund. In the project, both parties will search for optimisations by which the project can be realized with less work or more cost-efficiently. Basically, this money comes from the budget of the contractor, since he will not execute certain parts of the work, but will in that case deposit the allocated money for this work in the alliance fund. As a result of shared risk management, parts of the allocated budget for risks can be reserved. Together with the profits of optimisations, a certain budget will remain in the fund at the end of the project. Parts of the budget might be spent on occurring risks and operational costs of the alliance. However overall this will result in more profits through savings on risks and profits on optimisations. The final budget will be split up between client and contractor.

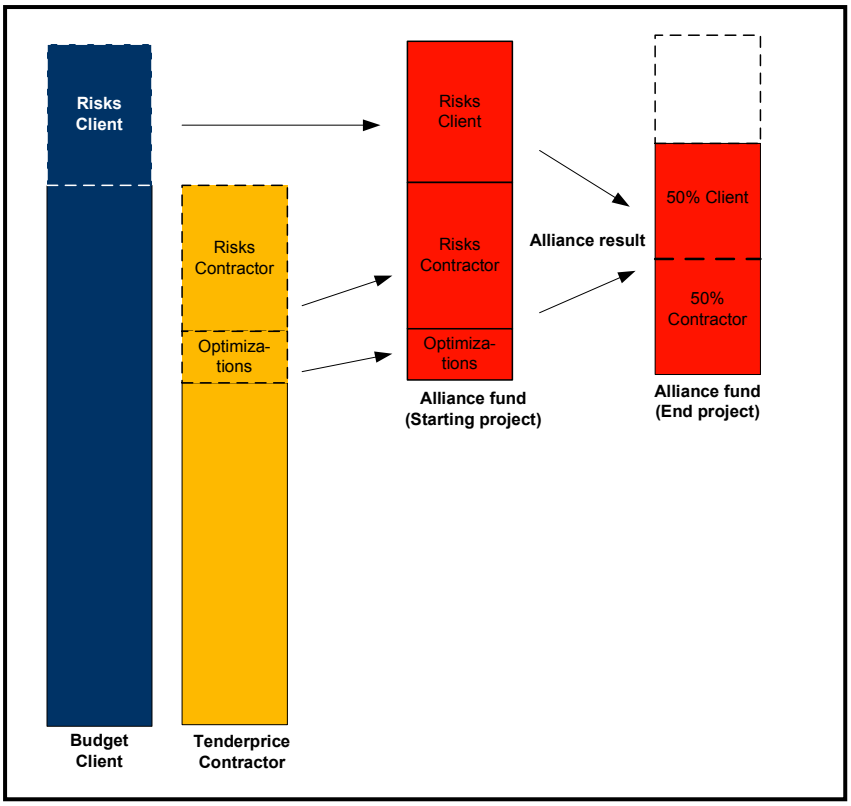

Figure 3.4 Financial effect alliances (Van Schaik, 2007)

The way in which the project organisation of the WA is set up, can be classified as the general way of how an alliance is set up. In Australia, where alliances are most frequently applied, a practitioners' guide is assembled in which the same organisation is assumed (Brumby and Ross, 2006).

Other alliances

The WA has been used as an example for many of the following alliance initiatives. The second application of the alliance in the infrastructure market was in the project N201, in which literally the alliance contract of the WA was used as an example. This alliance was also set up in the maximum configuration, in which besides sharing of optimisations and risks also the organisation of the project is shared. The reason why the use of an alliance was considered in this project was, because some permit procedures were delayed and the project had to start about six months later. This extra time provided room for negotiations and preparations for an alliance (Wagenaar, 2009). The project expressed furthermore several opportunities to execute the project in an alliance.

The same type of alliance is used in a project on the A2 highway. This project 'A2 Hooggelegen' has been set up as a pilot project on the use of alliances by the Dutch institution 'Rijkswaterstaat', which acts as the client for the Ministry of Transport in infrastructure projects. In this project for the first time a project was tendered directly as an alliance. A special assessment took place in this tender in which contractors were assessed on their cooperation abilities. This was also integrated in the appraisal of the different tenders, besides the price they provided. Basically, within this project, designing was just started after the tender procedure together by the client and the contractor. The tender was assessed based on budgets which could be determined by unit prices and architectonic designs (Van Haastregt, 2009). The advantage of this cooperative designing is that the specific skills and knowledge of both parties are integrated in an early stage, which results in a better design

according to the clients' wishes and optimal use of the available knowledge in the market. Currently, this project is in the building phase and is planned to be finished in the year 2010. Even though this alliance is of the type maximum-alliance, the client and contractor are not united in a juridical entity. This is the result of legislation, which limits the possibility to create a juridical entity. This has been discussed in section 3.4.

In Rotterdam, the construction of a parking-lot is also executed in an alliance. This project was initially executed in an RAW contract, in which the design was made by the public works department of the municipality of Rotterdam. During the building process many eventualities occurred, which led to high cost and time overruns. After these failures, the public works department was looking for a solution to avoid eventualities in the rest of the project. It was decided to transform the project into an alliance to limit these eventualities. After negotiations with the contractor, an alliance contract has been created besides the RAW contract. Cooperation in the further execution of the project has been agreed and together they started managing risks and looking for optimisations in the design. A special fund has been created to manage this process. Even the organisation of the project was executed together, which made them work together on the same location. After the start of the alliance, the project has been kept within budget and time planning (Knipping, 2009).

A same kind of origin, as the project in Rotterdam, applied in the alliance of a project in Amsterdam. This was a remediation project of an area, at which a gas factory had been operational. This factory was called the 'Oostergasfabriek'. In this project, which was tendered as a RAW contract, many environmental eventualities occurred. Often the rates of emission of gasses were too high, which forced the contractor to stop the activities. Moreover, a lot of actors were present in the area, who got involved and tried to impose their interests on the project. This led to many obstructions to the process of the project. Al these factors caused time overruns in the project. After three years both parties decided to change the contract into an alliance and join knowledge and skills to handle the problems within the project and to manage the environment. This resulted in a shared organisation (Koenen, 2008).

The last project, which is currently executed in the maximum-alliance configuration, is a railroad project in the city of Houten. This project consists of the renewal of Houten central station; building of a new station in another district and the widening of the railroad in a distance of six kilometres. Though this project is not of big size (40 million euro), the client ProRail encountered this project having complex characteristics, which could be managed better within an alliance (Buck, 2009).

Of the other alliance types, there is only one project known as being an alliance. This concerns the N302 project, which is a project on a provincial road, in which the province Gelderland is the client. The project comprises a detour and widening of the road, including some complex engineering structures in this alignment. In cooperation with the contractor within this project, agreements have been made on sharing risks and opportunities. No shared organisation has been created for this project. The parties meet regularly during the project to manage the shared risks and optimisations. Costs of these risks and benefits of optimisations are shared in the project individually; no shared fund is created. If an optimisation results in a benefit this is split up directly between the client and the contractor. The reason, why in this project the maximum-alliance was not applied, is because of the size of the project and the short realisation time. Since maximum-alliances bring along high costs and a long time for preparations, the advantages of the maximum-alliance would not compensate the costs(Van der Werf, 2009). Also penalty arrangements were in force on the delivery of the project, so the start of the project could not be postponed too much.

Before being able to choose the right contract type and in case of an alliance the right alliance type, one should have insight into a lot of characteristics of the project. Even if one should know all the project characteristics and being able to decide what contract will fit best, success is not guaranteed yet. The success of an alliance also depends on the people, who are part of the alliance and need to cooperate with the other party in the alliance. The next chapter will focus on providing insight in the determining factors for the application of an alliance. This will be the next step in building the desired model.

4. Decisive factors for alliances in infrastructure projects

The factors that contribute to the appropriateness of an infrastructure project for an alliance are many. However, never a full overview of these factors has been provided by any organisation. For that reason this research aims to provide an overview, in which the relevant determining factors are presented.

Based on the TCE theory, which is analyzed in the previous chapter, transactions within a project should meet three requirements, before the transactions within the project can best be managed by relational contracting. Transactions should take place recurrently between the project participants; they should involve high asset specificity; and high uncertainty should be present in the transactions. Relational contracting is based on a long-term treatment of the relationship, in order to create trust and accomplish cooperation. In this way the involved parties protect themselves against opportunism of the other party. Nevertheless, relational contracting also requires commitment of the participants to the relationship with the other party. This means a different kind of thinking as what is usual within the neoclassical contracts. Furthermore the involved parties should be able to provide proper resources, in order to execute relational contracting. If relational contracting requires different or more resources than neoclassical contracting, these resources should be available in order to be able to apply relational contracting. These requirements, for being able to apply relational contracting, are analyzed as well in the search for factors that determine the suitability of projects for alliances.

This research takes the project as a starting point in the research. The aim is to provide an overview of factors within projects that contribute to the success of an alliance. This even involves project characteristics that are less suitable for alliances. In the search for the determining factors within infrastructure projects, four areas of project characteristics can be distinguished. These are characteristics of the project system; the project environment, including the natural and political environment; the project organisation; and the project participants' behaviour.

The factors are presented in three categories. In the first place the technical properties of infrastructure projects that influence the appropriateness for alliances are listed. In the second place, the political context and environment characteristics that contribute to the suitability for alliances are presented as a category. This comprises not only the political environment, but also the political behaviour of the project participants. At last, uncertainties are presented that emerge in the trade-off on the appropriateness of a project for an alliance. These three categories will be discussed in this chapter. The overview of the factors is presented in appendix 4.

In this elaboration on the relevant factors within a project on the suitability for alliances, the use of a maximum-alliance, as discussed in section 3.5, is assumed. This alliance type has been chosen, because this type is the best known in the market as an alliance. All other types are often not directly acceded as an alliance. The organisation of this alliance type has been assumed as used in the WA.

4.1 Technical properties of project

Within the technical properties of infrastructure projects, I distinguish three categories based on the outcomes of the interviews, in order to get the factors structured. These categories are general characteristics; properties regarding risk management and optimisations; and at last human resources within the project. These categories will be discussed separately.

4.1.1 General characteristics of infrastructure projects

The general characteristics of the project that influence the appropriateness for alliances are discussed in this section. These factors are derived from executed surveys, case studies and desk research.

Critical size of the project

The size or budget of the project is important, since alliances require an investment in the preparations. These costs should be earned back in the project by the profits of the alliance in risk reductions or optimisations. Also the process of looking for optimisations and the accompanying engineering brings along additional costs that should be earned back. Changes in the design require calculations to be executed again and this brings along high costs (Rottier, 2008, Tiedemann, 2009, Wagenaar, 2009). The bigger the size of the project, the higher cost reductions can be made generally by proper risk management and the higher profits can be gained from optimisations in absolute terms. Hence, the default engineering and recalculation costs of processing optimisations can easier be turned into profit (Heijmans, 2009).

The exact amount that the budget of the project should be, before it will be suitable for an alliance, is still controversial. Some people say that a project should be at least about 100 million euro in budget, before an alliance with a shared organisation should be considered (Heijmans, 2009, Wagenaar, 2009). They argue that a small alliance team requires at least eight million euro within the fund in order to perform properly. For small projects, eight million euro of the budget will be a huge investment. They assert that this investment should not be greater than ten percent of the budget (Van der Werf, 2009). Others expect a project to be profitable for an alliance already starting from 40 million euro though (Buck, 2009). For example the railroad project in Houten is of this size, which is encountered to perform well as an alliance. Within this smaller project, costs for organisation are saved by confining the non relevant issues, such like a special alliance logo and writing paper (Buck, 2009). The decision maker, who will use this model, should consider what size of the project is expected to be the minimum for an alliance in the specific case.

Minimal duration of project

The duration of the project influences the suitability for an alliance, since the preparations of an alliance take time. Williamson (1987) distinguishes two types of transaction costs. Ex ante and ex post transaction costs. Ex ante transaction costs are costs made, in order to get an agreement. Ex post transaction costs are costs made during the execution of the agreement, for example monitoring and solving disputes. These two types of transaction costs are interrelated, since the costs made for preparations for a proper contract may prevent costs to be made in disputes. On the other hand, when issues are not well defined in the contract, this may lead to costs during the execution. For each contract to be signed up, the extent of ex ante costs should well be considered, since this will impact the ex post costs.

The same principle applies for the time in a project, since time can be converted to costs. In the preparation of an alliance, a contract needs to be signed up and negotiations should take place about the individual shares in the alliance fund. Also the alliance organisation will be assembled. It should be possible in the project to at least compensate the time investments otherwise the benefits of the alliance on the time performance indicator would be negative (Officer of QGCPO, 2008).

Solving time pressure

Projects are suitable for alliances when time pressure is present, as a result of the project risks (Brumby and Ross, 2006). The presence of risks in projects involves uncertainty in transactions, especially when these risks can not properly be assigned to a party. Traditional treatment of these risks will result in disputes and claims, because both parties try to shift responsibility towards the other party (Van Haastregt, 2009). Within an alliance, these risks are shared, which equals the interests and leads to fast treatment of risks. Overall, this will lead to time savings and makes the project realised faster. Time pressure could also be caused by organisational capacity, however this can not be reduced in an alliance (Officer of QGCPO, 2008). One should therefore consider well what the source of the time pressure is (Buck, 2009).

Complexity by number of disciplines and subsystems

The number of disciplines and subsystems determines the complexity of a project. Baccarini (1996) operationalizes complexity in terms of differentiation and interdependence. Differentiation stands for the number of varied elements within a system and interdependence for the degree of interrelatedness between these elements (Baccarini, 1996). The number of disciplines and subsystems contributes technologically to the differentiation within the project. The need for integration of the subsystems within an infrastructure project makes the project hard to manage. An optimal design for one subsystem can, for example, impact the freedoms in design for another subsystem and lead for that subsystem to a suboptimal design. If in a complex projects requirements change for one subsystem, this will also impact other subsystems. The interdependence of disciplines and subsystems is obviously present in infrastructure projects.

Moreover, complex projects are often executed in a syndicate, which means that the disciplines are often distributed over the members of the syndicate. These members want their interests to be safeguarded in the project, which requires integration choices to be made considerately. This brings along risks for the project (Veeneman, 2004). The risks, coming with the integration of the subsystems and disciplines, can better be managed in an alliance, since client and contractor join forces to optimize the integration. Solving of occurring risks will also be executed more efficiently together (Heijmans, 2009, Chao-Duivis et al., 2008). Overall it can be concluded that according as the number of subsystems and disciplines increases within a project, it will be more suitable for an alliance.

Handling uniqueness of project

Large infrastructure projects often have unique characteristics in the technique or the application of the project. Therefore projects can be challenging for technical experts (De Bruijn et al., 1996, Hauck et al., 2004). This brings along higher complexity and more uncertainties. Alliances can manage these risks better than traditional contracts, especially because unique projects own more unknown risks. These risks can not be assigned to a party within the project and can therefore be managed better together (Van Haastregt, 2009). In conventional contracts, these risks often lead to disputes and claims, because both parties try to shift the responsibility to the other party. A project will therefore be more suitable for alliances if it contains uniqueness in technique or application.

Efficient solving scope changes

Scope changes have been classified as being one of the major causes for time and budget overruns, within projects under the traditional contracts (Morris and Hough, 1987). These

changes open up opportunities for contractors to charge high prices. Although these scope changes are often inevitable, within an alliance this risk can be managed better regarding cost and time overruns. Within the WA and the alliance of the project N201, the contractor did not share in the costs for scope changes. However within the projects, scope changes were executed against reasonable prices, because the project participants cooperated in executing these changes (Weevers, 2008, Wagenaar, 2009). For this reason a project will be more suitable for alliances, if the chance on scope changes is high.

Conclusion

From these factors, it can be concluded that alliances require an investment, which projects should be able to earn back in order to become profitable. Apparently, the profits of an alliance are gained on the management of complexity within the project. All the general characteristics, which are required for a project to become suitable for an alliance, contribute to the size or complexity of the project. A minimal budget and duration is required within the project to provide space for earning back the investment for an alliance. The other factors contribute to the complexity of the project, hence to the opportunities for profits. Nevertheless, complexity within a project can often also be indicated by budget and duration of the project. The bigger projects are, the more challenging they are to manage.

Time pressure, based on project risks, increases also the complexity, since this requires good management in order to execute the project in time. The number of disciplines and subsystems is a main factor of complexity, based on the definition of Baccarini. Uniqueness of projects brings along unknown risks, which make the project more complex. At last scope changes are the result of complexity within projects. The more complex the projects, the harder it will be to formulate complete program of requirements. This impossibility will increase the chance of scope changes within a project.

Based on these general project characteristics, it can be concluded that projects should contain complexity before they suit for alliances. This is required to engage the benefits of an alliance and to earn back the investment costs coming with the alliance.

4.1.2 Risk management and optimisations

Besides general characteristics of infrastructure projects, also characteristics of projects regarding risk management and optimisations contribute to the suitability for an alliance. These factors are discussed in this section.

Efficient risk management by joined responsibilities

Within the conventional contracts, the responsibilities are strictly divided between the client and the contractor. For example, the client is responsible for the program of requirements or scope and the environment; and the contractor is responsible for the design and the building of the project. For small projects this configuration can be very effective. In case of complex, multi-disciplinary projects however, this division brings along challenges, if the interfaces between the responsibilities become important. For example, if an actor in the environment of the project can hinder the progress of the project, it is useful to involve this actor including his interests. This may lead to scope changes in the project. So far this only concerns client responsibility. However, these scope changes need to be implemented in the design and to be executed in the project. If the client would be able to involve the contractor in the conversation with the third party, this opens up opportunities to meet the wishes of the environmental actor and also optimize the changes on the design. In this way the losses are minimized. A comparable situation occurred in the WA, in which the municipality Gorinchem claimed a crossing of the railroad with a highway to be redesigned to their

wishes. Cooperation of the client and contractor resulted in an efficient solution, which minimized the consequence of this required change (Buck, 2005).

Within an alliance the responsibilities can be joined and has been proofed as being successful (Buvelot, 2008). The number of tools, for the parties to treat risks, increases in this way and leads to more opportunities for risk reductions in chance, as well as in consequences. If this joined management opens up opportunities to reduce risks within the project, it will be more suitable for an alliance.

Optimizing interdependency

In line with the previous factor, the interdependence between the project participants in a project influences the appropriateness for an alliance. In the previous factor the opportunities for shared management of risks were investigated. In this factor the opportunities for process improvements should be investigated. If the client and contractor depend on each other in executing their responsibilities in a project, a shared organisation might improve the speed and quality of the process (Van Haastregt, 2009).

The number of transactions in a project can be leading in this consideration, including the attention these transactions require, in order to execute them. For example, if within a project many audits are required to check the work of the contractor and this requires to be executed in tight correspondence with the program of requirements, this process can be optimised by a shared organisation. Within the shared organisation, the client and contractor are able to match the design and building to the program of requirements during the process. This prevents unnecessary checks and corrections (Knipping, 2009). If the client and contractor are interdependent in the execution of their tasks, within the project, it will suit better for an alliance.

Sufficient allocated risk budget

Within an alliance, the risks are shared and managed together by the client and contractor. However, before the alliance exists, the parties negotiate about what risks will be managed in the alliance and what money needs to be invested in the alliance for each risk. Therefore both parties should have money allocated to manage the risks. If contractors were forced to offer a bid below the cost price, due to strong competition, they should be willing to invest in the alliance beyond the budget, for the risks they bring into the alliance. Otherwise the client is not willing to cooperate for not covered risks (Buck, 2009).

On the other hand, clients should have budget available for their risks, which might also not be present, because of the politically limited assigned budget. It often happens that clients reduce the request for budget for particular projects, in order to succeed in political decision making (Buur and Pries, 2008b). The presence of budget for risk management is required, in order to make a project suitable for alliances.

Adequate opportunities for optimisation

Within the project, opportunities should be present for optimisations, to make an investment in an alliance feasible. These opportunities can be determined in three aspects. In the first place the abstractness of the program of requirements determines the degrees of freedom in the design and offers room for optimisations (Van der Zwan, 2008). If the client formulated the program of requirements too specific, there will be fewer opportunities for optimisations.

Second, the design choices, made by the contractor for the tender design, can limit the room for optimisations. The contractor optimizes the design, in order to be able to offer a low price to win the tender. Undoing these design choices for other optimisations, resulting from cooperated design with the client in an alliance, can bring along costs. The design choices,

already made by the contractor, can therefore limit opportunities for joined optimisations in an alliance (Heijmans, 2009).

At last, the possible quality improvements inside and especially outside the scope of the project determine the opportunities for optimisations (Van der Werf, 2009). Within conventional contracts, clients do not open up the scope to improve the quality of the project, since contractors would charge high prices for this (Webb, 1999a). Within an alliance though, these quality improvements can be performed against reasonable prices and therefore should be considered. If a project offers many opportunities for quality improvements, this project is more suitable for alliances.

Conclusion

The benefits of alliances regarding risk management and optimisations in the project can evidently be engaged if interdependence is present in the transactions in the project. This involves transactions internally as well as externally. Internally, process improvements can be attained and externally, the risks caused by external parties can be treated better together.

The joined management of risks requires allocated money for the involved risks, in order to make the other party willing to share the risk. This money should be available in order to make the project able to execute an alliance. Apparently, money is necessary to create trust in the alliance by the project participants.

Concerning the factors that determine the opportunities for optimisations in a project, some contradictions emerge. On the one hand clients should not formulate the program of requirements too specific, in order to make the contractor able to involve innovative solutions. The space for optimisations will be reduced by these specific requirements. On the other hand if contractors take too many design choices to reach an attractive bid, the opportunities for optimisations during the project will be minimized. The contractors' room for design choices can be reduced, if clients formulate the requirements more specific. However the client will in that case not fully use the knowledge of the contractors and maybe will not get the optimal bidder.

Another implication which can come with providing space for optimisations is that the process can become incontrollable. For clients, the alliance may feel as an optimal means to involve changes during the project. However, too many changes to the design of the bid may make the project totally unpredictable regarding the costs and planning of the project.

After the tender, the client and contractor should at least search for optimisations outside the scope, in order to prevent loss of opportunities caused by too specific requirements. Nevertheless, the search for optimisations should be limited, in order to keep the project controllable. In the composition of the scope by the client, an optimal mix in abstractness and specificity should be chosen, involving the desired room for optimisations in the alliance.

4.1.3 Human resources

An important requirement for alliances is the availability of proper human resources. Within this category, the following factors can be distinguished:

Sufficient availability and willingness

The human resources in a project should be generally assessed on four aspects, before the project will be suitable for an alliance. In the first place, both parties should investigate, if they are able to provide human resources for the alliance and especially senior representatives, who are essential, in order to make the alliance successful (Buck, 2009). Within an alliance, more human resources are required than in conventional contracts.

Especially the senior representatives will have a more extensive function in an alliance than in conventional contracts. But also other people from their own organisations should occupy the alliance, in order to guarantee a good cooperation between the alliance and the client and executive contractor side (Rottier, 2008, Heijmans, 2009). Often it will be inevitable to employ people from third parties to occupy the alliance, but a substantial part of the people in the alliance should originate from the core organisations. In the project N201, the client was unable to assign people to the alliance, which resulted in hiring from third parties. These people were not familiar with the procedures within the client organisation, which resulted sometimes in struggles in the alliance. Within an alliance, people should know how to arrange issues at the parent organisations, in order to get advantage of the alliance. A tight connection between the alliance and the parent organisations is crucial for a successful alliance (Buck, 2009). Furthermore, people from third parties can have other core interests, than the organisation they work for.
In the second place the client should be able to provide people for a longer term. This depends on how the organisation of the client is set up. If this organisation is set up as a project organisation, like for example RWS and ProRail in the Netherlands, this should be possible. However this might be harder for, for example provinces or municipalities, who often have limited human resources for a specific function (Van der Werf, 2009). The client should be able to do so; otherwise cooperation and trust between the parties can hardly be accomplished. The people should be able to identify themselves with the alliance and with the team (Buck, 2009).

In the third place, according to human resources, one should consider the efficiency of the investment. People can be assigned only once to a project and therefore opportunity costs should be considered. The investment of human resources on another project can result in higher profits. This would mainly be the case for clients who decide what contract type will be used (Brouwer, 2008). If human resources can be applied more efficiently on another project, the client can abandon the plan for an alliance on a project. On the other hand, if a project shows good returns on the investment of human resources the project will be more suitable for alliances.

At last both parties should consider if they both are willing to invest time and people into the alliance. Alliances require more efforts in time and human resources from both parties. However, if both parties are willing to commit to the alliance, this could lead to better results (Weevers, 2008).

Essential equal representation in alliance

The project team within a project should fulfil certain requirements to be suitable for an alliance. Based on the project team, it should be able to represent both parties equally in the alliance team, especially on the key positions within the alliance. For both parties the composition of the alliance team determines how they feel their interests safeguarded within the team. If the project team is not able to represent both parties equally in the team, the confidence of one of the parties in the alliance might be lost, which will lead to bad performance of the alliance (Wagenaar, 2009, Heijmans, 2009). A comparable situation occurred in the alliance of the project N201. Since the client was not able to provide human resources to the alliance, external human resources were employed. The contractor though, who had many human resources at his disposal, was represented by own people. Therefore the contractor was over represented in proportion to the client. This resulted in distrust of the client, who perceived the alliance like, if it was a contractor organisation. This limited the performance of the alliance. If it is possible within a project to represent both parties equally in an alliance, this project will be more suitable for an alliance.

Creating team spirit

The project team should be able to create team spirit in the project, in order to take advantage of an alliance. If team spirit can be reached, synergy will apply by the knowledge and skills of the client and the contractor. Project teams are only able to create team spirit if all the people in the alliance team can be present on a full time basis. This will lead to better performance of the team and a better cooperation (Buck, 2009, Wagenaar, 2009). If team spirit can be created in the team, the project will suit better for alliances.

Committed highest responsible managers

The highest responsible managers in the project, from both client and contractor side, should be fully aware of the alliance principle and also support it, in order to make the project suitable for an alliance. If these managers do not understand the meaning of an alliance, this will lead to old behaviour within the alliance. Support of the principle of cooperation and pain and gain sharing is essential, since these managers are able to disturb the performance of alliances, if they are not in favour of the working method (Knipping, 2009, Buck, 2009). The traditional working method within conventional contracts will definitely fail within an alliance. If the managers do not support the principle of the alliance, the project is less suitable for an alliance.

Competent alliance manager

Within the project team, a competent person should be present to lead the alliance management team, in order to make the alliance successful. This is the most crucial role in the alliance, since this person should represent both client and contractor interests. A person in the project team should besides being independent also have high management qualities at his exposal (Heijmans, 2009, Weevers, 2008). This function should not be performed by an external person since that person may have other interests than suitable for the alliance (Buck, 2009). External persons may for example have an interest in a longer duration of the project, which does not correspond with the alliance interests. If a competent alliance manager is not present, the project suits less for an alliance.

Representing contradictory interests

The project team should consist of people, who are able to wear two hats during the project. If these persons are not present, the project will fail in an alliance. Members of the alliance board and the alliance management team (AMT) should be able to represent contradictory interests, since this will happen in alliances. The alliance board or alliance leadership team (ALT) determines the goals of the project and creates the vision of the alliance. The AMT is responsible for the daily management of the project. If problems could not be solved in the AMT, this is shifted to the ALT. Also high level stakeholder issues are managed by the ALT. These people should not only pursue their own interests, but should also be able to see things from the other party's perspective. Otherwise the alliance will result in old adversarial behaviour (Tiedemann, 2009). Apparently project parties are able to pursue their own interests in an alliance. An alliance is unable to annul this behaviour. Therefore this requires a kind of monitoring of the commitment of AMT and ALT members to the alliance (Weevers, 2008).

Conclusion

Human resources are an essential aspect in projects that determines the appropriateness for an alliance. The availability of human resources to assign to the alliance is one important aspect.

Confidence in the alliance is inspired by a good representation of the client and the contractor in the alliance. Their core values are protected by the human resources they provide in the alliance. Besides the availability of human resources, also the quality and support of the human resources is essential. Alliances require a different way of thinking, of which the employees should be aware. They should be able to represent interests, which may not be in favour of the parent organisation. Especially, because alliances are not frequently applied yet and therefore this new thinking is not the usual way of working yet, this will be one of the most decisive factors on the appropriateness of a project for an alliance.

4.2 Political context and environmental characteristics

The second category of factors that influence the suitability of a project for an alliance are the political context of projects and the environmental characteristics. The factors have been grouped in three categories: the environmental characteristics; the political context; and political behaviour by alliance participants. These will be discussed separately here.

4.2.1 Environmental characteristics

Environmental characteristics, which are determined to influence the appropriateness of a project for an alliance, are the following:

Involvement key stakeholders within project

The environmental complexity within an infrastructure project is mainly determined by the number of key stakeholders. Key stakeholders are defined as parties, whose support is essential to perform the project. Examples of these key stakeholders can be municipalities, provinces or water authorities. Since infrastructure projects often involve line infrastructures, the project area contains more stakeholders. Even point infrastructures, like for example railway stations and harbours, often bring along multiple stakeholders like companies and municipalities and will therefore not be generally less complex in that sense. Statistics prove that projects are often delayed under conventional contracts, due to counteracting key stakeholders. Alliances though have proven that they are more able to manage an environment with multiple key stakeholders (Van Drie and Unger, 2003). Changes to the design are possible, in order to concede to the wishes of these key stakeholders, for a reasonable price in cooperation with the contractor. In conventional contracts, the contractor used these changes to charge high prices. This limited the possibilities for the client to involve key stakeholders in the design choices. Since alliances are able to involve key stakeholders more efficiently within the project, a project suits better for alliances if these advantages can be engaged.

Managing hindrance of other stakeholders

Besides key stakeholders also other stakeholders are present within a project, bringing along their own interests. Although these stakeholders are not directly crucial for the performance of the project, they could still cause delays in the project by starting legal procedures or other actions. The consequences resulting from these delays can be high for the client. Within conventional contracts, the contractor stops the work and charges costs at the client for the time it was unable to execute the project (Tiedemann, 2009). The contractor does not directly benefit of a fast solving of the delays in conventional contracts. Within an alliance, the risks coming from stakeholders can be involved in the fund. In this mechanism, the interest of the contractor will be equalized to the client, since he is also responsible for the consequences. If hindrance occurs, the client and contractor will together search for measures in order to reduce the consequences, for example by starting other work somewhere else. The client and

contractor may also choose in the alliance to involve the stakeholders and their wishes (Buck, 2005). Generally a project is suitable for an alliance if many stakeholders are present that may hinder the project performance.

Involving contractor in public interests

In infrastructure projects the success factors may for clients not only be determined by a fast delivery or low costs, but also public interests. Especially if a project affects the public area, other performance indicators may be present. For example the hindrance of the project in public might be a project success factor. In conventional contracts, contractors are not willing to take these interests into account, since they are not responsible for it. They benefit of a fast delivery of the project. If the contractor does not take these interests into account, this can lead to problems though. An example is the remediation project 'Oostergasfabriek'. In this project the neighbourhood often complained about a bad smell and hindrance of trucks in the area. The client had to interrupt the project repeatedly, which led to charges of the contractor. This inconvenience in the project for the neighbourhood became a main cause to delays and resulted in cost overruns. Halfway the project, the client and contractor decided to manage this issue together in an alliance. Together they were able to create proper and fast solutions to this hindrance and they both benefit from it, since they shared the costs (Koenen, 2008). Alliances align the interests of client and contractor and will therefore be suitable in those cases where public interests are important (Dekker, 2009, Van Haastregt, 2009).

Reducing difficulties in gaining permits and land

Within infrastructure project permits and land needs to be gained. These procedures have been a source for many delays in the projects. Within the WA, it has been proven several times that approaching these concerning parties for permits or land from the alliance led to faster solving of these problems. This was because the client and contractor could not be played off against each other. This frequently happens in conventional contracts (Rottier, 2008, Heijmans, 2009). For example, the permit for moving of piping and conduit normally is requested by the client. The contractor carries out the plan and has to arrange the permit with the administrator. This sometimes leads to different interpretations of the arrangement and causes delays (Rottier, 2008). By joined management of the environment, the conditioning of the project fits better to the preparations of the execution of the project (Van Drie and Unger, 2003).

In the WA, another benefit resulted from the alliance, according to the gaining of permits. The client, who normally had to request for a permit to move a pipe at the water authority, had a bad relationship with this party. This was because of conflicts in other projects, regarding the crossing of water supplies with railroads. For this reason, the water authority was not very cooperative to the client. The alliance decided to send people from the contractor to request the permit. This resulted in fast provision of the permit without conflicts (Heijmans, 2009, Rottier, 2008). If gaining of permits and land may become difficult in a project, the project is more suitable for an alliance, since this will reduce the risks.

Managing complex natural environment

The natural environment of an infrastructure project can increase the complexity of the project. For example the presence of explosives, archaeological items or protected flora in the ground is a cause for delays in projects. Some areas in the Netherlands are more subject to the presence of these items than others and therefore projects differ in natural complexity. Other causes in the natural environment for delays are the soil characteristics, which especially in the Netherlands are sources for claims, and the piping and conduit that comes across the

project (Buck, 2009). The soil characteristics in the Netherlands are known as hard to handle and often require unexpected changes. In conventional projects this often leads to charges of the contractor, after which both parties are trying to shift responsibility to the other party (Rottier, 2008, Tiedemann, 2009). This often leads to losses on both sides, because of the costs resulting from the legal actions. In an alliance, the consequences of these risks can be reduced, since the contractor will share in this risk and cooperate to reduce it instead of stopping the work and charge high costs. If the natural environment shows high complexity within a project, it is more appropriate for an alliance.

Opportunities for additional income

Within an alliance, income can be gained by performing work for third parties in the direct area of the project. Because of the presence of the executive contractor in the area, this can be performed more cost-efficiently. Because of the closer involvement of parties in the area within an alliance, more opportunities open up to execute work for these parties. Within an alliance more room is provided by the client for this additional work, since clients will also take advantage of this income in an alliance (Heijmans, 2009). In conventional contracts, the client does not cooperate for this advantage of the contractor, because he does not benefit of it and it may bring along risks for the main project. Nevertheless the opportunity for additional income makes the project more suitable for an alliance.

Conclusion

Regarding the environmental characteristics of projects it turns out that complexity within a project is highly suitable for alliances. All the factors, except additional income, contribute to the complexity of the environment of the project. And all the factors need to increase the complexity, in order to become suitable for alliances. Apparently alliances are highly suitable for complex environments in projects. Alliances are better able to involve environmental parties and their interests in the project than conventional contracts and they are also able to reduce consequences that environmental risks bring along. At last alliances provide opportunities for both client and contractor to benefit from work for third parties.

4.2.2 Political context

The suitability of a project for an alliance is influenced by some political aspects that are present in the environment of infrastructure projects. The extent of this presence may influence the suitability of the project for an alliance. The following aspects can be distinguished:

Handling political attention

The political attention to the project influences the suitability of the project regarding alliances in three ways. In the first place the general political attention to the project may be a reason to start an alliance, since in that case the client and contractor can stand out as one party and contradictory messages can be avoided. If the political attention is high, the project parties may for example be forced politically to blame the other party for failures. Otherwise, the public attention may lead to a bad image of one of the parties. Within an alliance, both parties will automatically be responsible and therefore no blame culture will arise. The political attention increases the complexity of the project distinctly and can lead to many claims and disputes. By an alliance, the political attention can be managed better than in conventional contracts (Knipping, 2009). Political attention to a project will therefore increase suitability of a project for an alliance.

In the second place, projects may not be appropriate for alliances if political attention is paid to special risks in the project. For example, within the project of the "Museumparkgarage" in Rotterdam, politicians from the municipality wanted to know who was responsible for the displacement of a hospital, which was beside the project and they requested an investigation. The outcomes of this investigation might have blown-up the relation of the project parties, who already started an alliance at that moment (Knipping, 2009). Political attention can in this sense force the project participants to think in the conventional way of distribution of responsibilities. If politicians have an interest in clear assigned responsibilities in case of risks, the project will be less suitable for alliances.

In the third place, the desired distance between the contractor and the political representatives is determining on the suitability of the project for an alliance. If the political attention is high and the contractor does not want to get involved in this responsibility an alliance may not be suitable. It is impossible to exclude political attention to a project from the application of an alliance, since political attention involves often all the aspects of the project. If trying to do so, this may lead to difficulties and disputes in the alliance. Within an alliance the contractor needs to share the consequences of politics with the client (Buck, 2009). A contractor should be willing to share the consequences of the political attention, in order to make the project suitable for an alliance.

Acceptance uncapped planning and costs

In the Netherlands most alliances are started after the tender procedure. Only one project has yet been tendered directly as an alliance. The winning bid contains an initial planning and budget. However, if this project is executed in an alliance, this planning and budget is not maintained. Both parties invest in the alliance fund and the costs and planning will be uncapped. Politicians may not accept the uncapped planning and costs within an alliance. This may lead to a political obstruction to the alliance. Although politicians are able to prevent the use of an alliance in this way, it basically is an undifferentiated statement, assuming that the original budget and planning in conventional contracts are fixed. Statistics show that, especially in complex projects this is not the case and the costs and planning is often exceeded. However, sometimes politicians do not follow this reasoning (Officer of QGCPO, 2008). The political acceptance of this uncapped planning and budget should therefore be investigated. If they do not accept this characteristic of alliances for a specific project, the project will be less suitable for alliances.

Acceptance of high profits

If an alliance is very successful and many optimisations apply, it may gain high profits in the alliance fund. Half of the final amount of money in the fund will be allocated to the contractor and the other half will be turned back to the client. Although high profits will prove the success of an alliance, it may also be interpreted by politicians as being cheated by the contractor. They might not always explain this as a successful alliance, especially when the budget for the project was allocated under firm negotiations. Therefore the political acceptance of these profits should be investigated before an alliance is set up (Knipping, 2009). If they will not accept the chance on high profits for the contractor, the project will be less suitable for an alliance.

Undesirable unclear responsibilities

Within conventional contracts, the responsibilities are strictly divided between the client and contractor and as far as possible recorded in a contract. Although this often leads to discussions and disputes, in political sense this is a clear presentation. Within an alliance,

many responsibilities are shared between the client and the contractor and are therefore not clearly assigned for politicians (Knipping, 2009). The political acceptance for this 'unclear' assigned responsibility needs to be taken into account. If politicians require during the project a responsibility for one of the parties, the project will be less suitable for alliances.

Legal restrictions

At this moment still legal restrictions are active on the use of alliances, since in an alliance public money participates in risk-bearing operations and might therefore be interpreted as profit seeking operations by governmental organisations. This participation in risk-bearing operations has been tightened since the 'Ceteco-affair' in 1999, in which public money was lost because of the participation in risk-bearing operations aiming for profit. For this reason alliances require now permission from the parliament before it can be started (Kraak et al., 2008). This procedure has been avoided up till now, because clients fear the projects becoming subject to political discussions. This will make the project far more complex.

Up till now alliances has been formed in the infrastructure market without being registered as a legal entity. It was in all cases called an alliance-likely cooperation. This solution brings along difficulties in executing the alliance though. Not all advantages can be engaged in this way. Some procedures from conventional contracts, like auditing, should still be followed in the usual way. This formal treatment of audits does not correspond to the trust relation assumed within alliances and therefore does not engage all advantages (Dekker, 2009). If politicians stick to the legal restrictions of an alliance and other solutions will not be allowed, the project will be less suitable for an alliance.

Conclusion

Political issues within a project can better be managed within an alliance as explained in this section. However, politicians can easily prevent the use of alliances, if they stick to current legal restrictions or to the unclear assigned responsibilities within alliances. Also the argument of uncapped planning and costs of a project in an alliance can be used to prevent an alliance. The political aspects need to support an alliance; otherwise a project will not succeed with an alliance. On the other hand should the contractor also be willing to share in the consequences of political attention to a project, otherwise it will not succeed as well.

4.2.3 Political behaviour by project participants

Within an infrastructure project the political behaviour of the participants influences the suitability for an alliance. This category elaborates on this behaviour and what should be considered before applying an alliance.

Essential long-term view on relationship

Although projects have a temporary character, the view on the term of the relationship between project participants should not be for the endurance of the project, in order to suit for an alliance. If an alliance is considered by a party in the sense of getting more profit for oneself in this specific project, it will be less suitable for an alliance. Parties should aim for a shared success and assist in successes to the other (Knipping, 2009, Rottier, 2008). This long-term view on the relationship will affect choices when two contradictory interests may be present (Aengevaeren, 2009). Pursuing only the own interests in decisions will fail the alliance after all. If the attitude of the participants is based on a long-term view on the relationship, the project will lend itself more to alliances.

Crucial empathy capacity

Following from the previous point, the ability or willingness to see things from the other parties' perspective is of importance to be able to cooperate in an alliance. In some cases losses need to be taken by a party in an alliance, which can be in the interest of the other party. However within alliances it will also happen the other way around(Van der Zwan, 2008, Weevers, 2008). The ability and willingness to see things from the other parties' perspective should be the attitude of both client and contractor in a project, before it can be advantageous for an alliance.

Good relationship in other projects

The relationship with the alliance partner in another project may affect the attitude and behaviour in an alliance. Examples are present of projects, in which the plan for an alliance was abandoned, because of a conflict situation in another project. An example is the project for the entrance roads to the "Westerscheldetunnel". In this project an alliance contract was planned. However, the client had many disputes and claims in another project with the same contractor and therefore chose to stop the alliance initiative (Rottier, 2008). The relationship between the client and contractor in other projects can be a determining factor for the appropriateness of a project for an alliance and should therefore be considered.

Good personal relationship between members ALT

Within the alliance leadership team most decisions are taken unanimously. The ALT determines the goals of the project and creates the vision of the alliance. Also high level stakeholder issues are managed by the ALT. The senior representatives, who settle in the alliance leadership team, should be able to take decisions unanimously. For that reason, these persons should also personally have a good relationship. They should disseminate the cooperative culture that is aimed for in the alliance. If the personal relationship between the members of the ALT is bad, this will affect the performance of the alliance (Heijmans, 2009). A strained relationship between senior representatives may even lead to a failing of the alliance. The personal relationship between the senior representatives within the project should be good, in order to make the project suitable for an alliance.

Commitment to participation in risks beyond control

Within an alliance some risks may be beyond the control of one of the participants. Nevertheless he will be responsible for this risk if it is shared in the alliance. This requires confidence in the other project participant to accept the risk. Within an alliance this situation may occur frequently. As a result of political behaviour, a project participant can decide not to be willing to participate in these risks. Nevertheless this is required in order to make an alliance successful. Trust is the core principle that applies in an alliance. Participants should consider the circumstances that come with alliances and decide if they are willing to participate in these risks (Brumby and Ross, 2006). If the project parties are willing to participate in the risks beyond control, the project will suit more for an alliance.

Willingness for money investment

Alliances require an investment in the alliance fund from both client and contractor. These investments are estimated at about ten percent of the budget. This budget is also allocated to risks from the other party. This means that both parties are loosing control over their money somehow. Both parties should be willing to invest the money in the alliance even if this requires more than the allocated budget for all the risks (Buck, 2009, Tiedemann, 2009). This

investment will be based on the thought that alliances will provide higher returns than conventional contracts. If one of the parties is not willing to invest money in the alliance, the project is unable to perform an alliance successfully.

Conclusion

The political behaviour of project parties is important for the suitability of a project for alliances. It may be clear based on these factors that opportunistic behaviour of parties will fail the alliance. Based on the transaction cost theory, relational contracting should be applied in the proper environment, in order to prevent opportunistic behaviour. These factors show that opportunism can even be present if relational contracting is applied. Trust and a good relationship can be mentioned as a summary of these factors contributing to the suitability of projects for alliances.

4.3 Uncertainties in alliances

Even if according to the technical requirements and the political context and environment a project suits for an alliance, still some uncertainties emerge. This third category of factors will be presented in this section. The aim for this overview is to make the involved parties becoming aware of these factors and make them able to monitor these uncertainties during the project. The uncertainties are grouped in three categories. These are trust control; environment and occasions.

4.3.1 Trust control

In the alliance the presence of mutual trust is essential to perform well (Volery and Mensik, 1998). Nevertheless, uncertainties emerge in the alliance, concerning trust between the participants. These uncertainties will be discussed here.

Inability monitoring contractors' expenses

Within the alliance both parties have an incentive to minimize the risks since both parties will pay a share of it. However, if a risk occurs and will result in additional work, the executive contractor may still have an incentive to charge high prices. He would gain more profits by these high prices, than he would get if he would charge normal prices and at the end of the project get half of the alliance fund. For this reason, it is important that the client is able to monitor the charged costs of the executive contractor, in case of additional work. The client is often not able to monitor these costs though, because of information asymmetry between the parties (Van Winden, 2008).

Compared to conventional contracts the alliance is better able to handle this problem, since in these contracts cooperation is not pursued and therefore contractors can charge high prices for additional work, because lock-in applies. Compared to contracts, in which even financing is shifted to the contractor, like for example DBFM contracts, the alliance is less able to handle this problem. Within these contracts, the contractor is even responsible for the financing of the project and gets paid by the client for the availability of the infrastructure. This makes the contractor unable to charge high prices for additional work.

As the definition of alliances in section 3.1 explains, an alliance is an agreement for cooperation, which is based on an open book approach towards costs. This is essential within a project, in order to make the alliance become successful. A project is therefore more suitable for an alliance if the client will be able to monitor the charged costs of the contractor.

Inability monitoring risk estimations

The client as well as the contractor shift risks to the alliance and provide a budget for these risks in the alliance fund. The required budget for these risks is often based on estimations by the party who shifts the risks to the alliance. However, the reliability of this information is not guaranteed and both parties are unable to fully monitor the estimations of risks by the other party (Tiedemann, 2009). This again is an issue of information asymmetry within an alliance. For the alliance participants it can be advantageous to estimate the risks lower than the real values. This may require them to provide a lower budget into the alliance fund and save costs for them in the alliance. The extent in which the project participants are able to monitor the estimations of the other party determines the impact of this uncertainty on the success of an alliance in a certain project. This should well be considered, in order to determine if a project suits for an alliance. Within conventional contracts this ability to monitor the risk estimations is less important, since each party is responsible for his own risks and therefore will themselves encounter the consequences of bad estimations. The fact that in an alliance the risks are shared makes this mutual monitoring important.

Strained relationship due to low profit margin on bid

Dependent on the available projects in the infrastructure market, the profit margin of bids differs within tenders. If a lot of works are at hand in the infrastructure market the contractors can raise the margins, since the available means of production will be limited, compared to the demand for these means of production. However, if the available projects are low in the market, the contractors are forced to lower the profit margin on the bid, in order to win the tender. In extremely strong competition they may even be forced to bid below the cost price, in order to prevent resources to be out of work.

If the profit margin is low in the concerning project, this may affect the relationship between the client and contractor if an alliance is started. Especially if disappointments occur in the project, the contractor may easily fall back to the old behaviour. This may threaten the mutual trust and lead to bad performance of the alliance (Wagenaar, 2009). If this applies for the concerning project, for which an alliance is considered, this should be taken into account.

Attitude in pay-off risks and optimisations

The attitude of the project participants in the pay-off of the risks and optimisations in the project can contribute to the success of an alliance within a project. Both parties can in specific cases put higher priority to their own interests than the alliance interests, which may threaten the alliance performance (Weevers, 2008). This is possible, since not all responsibilities in the project are shared in and shifted to the alliance. If the occurrence of a risk or an optimisation regards a large amount of money, the parties might try to shift the responsibility to the client side or the executive contractor side. Often an occurring risk can not be clearly assigned to one entity in the project. This results in discussions about the pay-off of the risk or optimisation, in which both parties can show risk-avoiding and rent-seeking behaviour. These discussions take time, which will cost money and may also threaten the mutual trust in the alliance (Wagenaar, 2009).

The extent of presence of this attitude contributes to the suitability of the project for alliances. Although the possible consequences of this attitude are clear and it definitely took place in practice, this behaviour never led to a failing alliance. Nevertheless, this factor should be taken into account in the consideration of an alliance for a project.

Risk averse attitude of client

Governmental organisations are known as being risk averse (Witteveen, 2009, Rottier, 2008). Within an alliance the client will beside his own risks also be responsible for part of the risks of the contractor. This does not conform to the risk averse attitude of clients. If the attitude of the client in a project is risk averse and they are not willing to share the risks of the contractor as well, the project can not be executed in an alliance. In fact this is a lack of trust in the opportunity of alliances in joined risk management by the client and contractor.

On the other hand if an alliance is applied the risk-averse characteristic of clients might also influence the choices made in the alliance. The difference in attitude toward risks between client and contractor may lead to troubles in decision making and harm the mutual trust (Van der Werf, 2009). This possible difference of attitude towards risks needs to be taken into account, if it needs to be decided if an alliance will be applied in a project.

Conclusion

The uncertainties regarding mutual trust within a project appear in different aspects. In the first place it has been proven that the information asymmetry within projects can be reduced by alliances; yet it can not be fully annulled. The cooperation, which is aimed for in an alliance, provides space to minimize the information asymmetry between the client and the contractor. Nevertheless, it is still possible to cover information for the other party which is an uncertainty for a project to be suitable for an alliance. The extent in which this information asymmetry applies within the project determines the ability to monitor each other in charged costs or estimated risks. This contributes to the suitability of a project for an alliance.

In the second place mutual trust can be harmed if the profit margin is low on the budget of the contractor. It may feel to the contractor to be forced to cooperation after a strong competition in the tender procedure. This low profit margin may lead to strained relationship in the alliance. The exact influence of this factor is not clear and therefore regards an uncertainty in a project influencing the suitability for an alliance.

In the third place the trust within an alliance is dependent on the extent in which the parties pursue their own interests instead of the alliance interests. This emerges mainly in the pay-off of the risks and optimisations in the project. Although this can be understood as a threat for an alliance, it also regards the initial attitude of the project participants, which contributes to the suitability of the project organisation for an alliance. If this attitude is not willing to share pains and gains within the project, the project is less suitable for an alliance.

At last the difference in thinking towards risks between client and contractor affects the trust in a project. Contractors often dare to take more risks within decisions, whilst clients are known as being risk averse. This attitude towards risks of clients may even hinder the use of an alliance in a project. This difference in treating risks brings along uncertainty towards the suitability of a project for an alliance.

4.3.2 Environment acceptance

Regarding the environment in an infrastructure project one uncertainty is distinguished. This uncertainty is the acceptance of the alliance by the stakeholders in the environment. Especially key stakeholders might not accept the alliance as new entity to negotiate with. Examples showed that some stakeholders just claimed to only negotiate with the client, because it felt to them like if the client and contractor conspired against them. It was not clear for them what they could hold the alliance responsible for and therefore they claimed the traditional party to handle the procedures (Buck, 2009). In that case the advantage of the alliance might be lost, concerning the involvement of that stakeholder. Although this behaviour of stakeholders can never be predicted the chance of this behaviour could be

reduced by good explanation of the responsibilities and tasks of the alliance to the stakeholders in the environment (Buck, 2009). Nevertheless this acceptance of the environment appears as an uncertainty on the suitability of a project for an alliance.

4.3.3 Presence unknown risks

Within a complex project, unknown risks are always present. However since they are unknown the number and size of these risks can not be predicted. On the one hand the expected presence of unknown risks within a project can be a reason to consider an alliance. Alliances are able to handle situations, in which the outcomes can not be predicted. If unknown risks occur in an alliance, the client and contractor will search for an optimal solution, because both parties feel the consequences in the alliance fund. For this reason projects are more suitable for alliances if the chance of unknown risks is high.

On the other hand if the number of unknown risks within the project is exceedingly high, this can put pressure on the relationship of the alliance participants. If the project encounters a lot of disappointments by unknown risks, the project parties may feel they suffer for the risks, which would be the responsibility of the other party in the normal situation. These risks can therefore put pressure on the alliance performance and may lead to a change of behaviour of the participants. The expectance of unknown risks within the project makes a project more suitable for alliances on the one hand, but the presence of unknown risks should not be too high, in order to keep the parties committed to cooperation.

4.4 Analysis of the meaning of the factors

In the previous sections, the determining factors have been discussed that contribute to the appropriateness of a project for an alliance. Based on these factors some generic requirements for projects can be concluded, in order to be suitable for alliances. These will be presented in this section

Size requirement

In the first place a minimal size in budget and time is required before an alliance can be profitable. Alliances require an investment in money and time, which can easier be earned back in bigger projects. The risk reductions and optimisations that can be accomplished in these projects are much bigger than in small projects. All optimisations and measures for risks require a certain amount of money for engineering, which can easier be turned into profits if the optimisations and risk reductions are on higher scale. It has become clear that alliance opportunities mainly lie in the risk reductions and optimisations that can be achieved. For this reason projects also require a certain extent of complexity to which risk reductions can be applied. This brings along the second generic requirement of projects in order to become suitable for alliances.

Complexity requirement

The complexity within a project needs to be high, in order to make the alliance profitable. This complexity can come from many aspects of the project. Alliances seem to be able to handle complexity better than conventional contracts. By joined management of risks by the client and contractor, the occurrence of risks can be minimized or the consequences can be reduced. In the first place complexity originates from the technical properties of the project, like the number of subsystems and the uniqueness of the project. But also the interdependence of the project participants in executing their tasks contributes to this complexity. Within alliances it has been proven that process improvements can be accomplished and therefore problems coming from interdependence within the project can be

reduced. An uncertainty that emerges, in the technical complexity regarding the appropriateness of a project for an alliance, is the number of unknown risks present in the project. Alliances are better able to manage unknown risks than conventional contracts. The presence of unknown risks is often even one of the main reasons to start an alliance. Clients can reduce the consequences of unknown risks when an alliance is applied compared to the conventional contract. However, this only applies until a certain size and number of unknown risks. If many unknown risks occur in the project, which is executed in an alliance and one of the alliance participants may feel like it costs him more than it would cost him under conventional contracts, it may harm the relationship between the client and contractor and lead to a failing of the alliance. This may be the case if most of the occurring unknown risks would be the responsibility of the other party if the project was executed in a conventional contract. The party may feel frustrated in the alliance. For clients it may feel that alliances are the ideal contract if probably many unknown risks are present in the project, for example if the project is innovative and unique. However, this proves that many unknown risks can also lead to a failing of the alliance. If an alliance is considered within a project, this issue should be paid additional attention. The precise number of unknown risks within a project is not clear yet, in order to be suitable for an alliance. This can be proposed for additional research.

In the second place complexity turns out in the environment of the project. This regards the number of involved actors in the environment as well as the complexity of the natural environment. The actors in the environment can better be involved in an alliance, because changes can be applied more efficiently to the design than in conventional contracts. Within alliances, the contractor is involved in negotiations with the environmental actors and therefore changes to the design can be optimised. Furthermore the contractor does not charge the client with high prices if changes occur to the design due to environmental parties. An uncertainty emerging in the environment is the acceptance of the alliance by the environmental parties. If they don't want to cooperate with the alliance, benefits can be lost. The natural environment has proven to be an important factor for cost and time overruns under conventional contracts, because this contributes strongly to the complexity of projects. Especially the soil characteristics in the Netherlands are known as being complex. Within alliances the project participants join forces in reducing the consequences of the risks coming with this complexity.

The third source of complexity in projects is the political context in which projects operate. This can be seen as one of the major threats for alliances. Projects with high political attention can benefit from the use of an alliance on the one hand. On the other hand the use of an alliance can easily be hindered by political parties in the environment. Issues like uncapped planning and costs in alliances and unclear responsibilities can be used to obstruct the use of an alliance. Also legal restrictions still apply to the use of alliances. The complexity originating from the political context can therefore be a reason to start the alliance, but can also hinder the use of an alliance in a project.

Project organisation requirement

The third generic requirement regards the project organisation. Within projects, proper human resources should be available in order to become suitable for alliances. Alliances require more human resources than conventional contracts. Moreover it requires special resources, like senior representatives and competent managers, on a regular basis. These human resources should be present in the project organisation; otherwise an alliance will not succeed. Both client and contractor should be able to provide human resources on full time basis to get advantages of the alliance. These human resources should be aware of the principles of cooperation and trust in an alliance, in order to make the project suitable for it.

Finally the parent organisations should be willing to invest in the alliance and fully support the principles of the alliance

Political behaviour requirement

The final generic requirement for projects regards the political behaviour by the project participants. Both parties should be committed to the alliance and its principles of trust and cooperation. This means pain and gain share with the other project party and wishing success for the other party. This requires trust between the client and contractor. The trust requirement within projects to become suitable for alliances brings along uncertainties as well. Especially the disability to monitor each other, because of information asymmetry, brings along uncertainties to the success of an alliance in a project. Furthermore the possibility to pursue own interests instead of alliance interests in particular situations can reduce the success of an alliance and therefore can make a project less suitable for an alliance. At last the different attitude of client and contractor towards risks can harm the mutual trust, because decisions should be taken unanimously within an alliance.

Measuring difficulties

If the factors resulting from the empirical research are analyzed, we discover that these factors are extremely hard to measure and sometimes even impossible to quantify. Hence no critical values can be allocated to it that determines the suitability for an alliance. Even if values can be assigned to the factors, like for example the budget of the project, these values are still subject to debate. There is no common understanding in the infrastructure market about the minimum size of the project, before it can be suitable for an alliance.

Because of this inability to measure and the debatable critical values, no judgement can be made on the factors, whether they comply with the desired values for the application of an alliance or not. The complexity of the factors is too high, in order to get caught in a model. And even if we would be able to quantify the factors and assess them, the dynamic character of infrastructure projects and their environment will reduce the validity of the outcomes. If, based on the factors, a project will be suitable for alliances today, it might be inappropriate later on in the project, when factors are changed due to the dynamic character of projects.

Overall it can be conclude that the desire for a decision model is hard to accomplish, due to the complex and dynamic characteristics of infrastructure projects. Nevertheless this overview can provide insight in relevant factors on the suitability of projects for alliances. As a merit of this research, the importance of the different factors can be assigned, which provides a relevant insight to these factors. These weights can be assigned by experts in the infrastructure market. The further development of the model will be described in the next chapter.

5. A supportive model

As concluded in chapter four, it is impossible to create a decision model based on the factors, in which the suitability of a project for an alliance can be determined. The decision following from the desired model would always be a controversial one, due to the complex and dynamic characteristics of infrastructure projects. These characteristics make the model unable to take a decision, which would be valid for the endurance of the project. Nevertheless, the factors of the previous chapter can not be perceived as useless. They still can provide valuable insight in relevant factors that determine the appropriateness of a project for alliances.

This chapter will elaborate on how these factors can be used as a supportive model within the infrastructure market, in the decision, whether or not an alliance should be applied within a specific project. First the goal of the final model will be discussed, after which the mutual contribution of factors will be elaborated. This will be based on weighing of the factors by experts in the infrastructure market and an analysis of this allocation of weights. Next this chapter will discuss when and how this tool should be applied in the infrastructure market. At last this chapter will finitely deal with the implementation of the tool within the organisations in the infrastructure market. This is inspired by some principles of the eight-step model for successful change of Kotter (Kotter and Cohen, 2005).

5.1 Goal of the supportive model

In chapter two, the objective of the research was formulated as follows:

> *"To provide insight into assessment of infrastructure projects on relevance and efficiency of alliances by determining the factors that exert an influence on this and combining these factors in a supportive decision model for decision makers."*

Since the assessment of projects has been proven to be controversial, in the sense that the validity of an assessment can always be questioned, due to the complex and dynamic characteristics of projects, the desire for an assessment tool resulting in a decision should be abandoned. This does not mean that the overview of factors, derived from empirical research of chapter four, is useless. The decision, whether or not to apply an alliance, should still be taken by client and contractor in case an alliance is considered in a project. An overview of determining factors that influence the suitability of a project for an alliance can therefore be useful anyway.

The decision about the application of an alliance should be based on the factors. However, the number and difference of the factors will make the decision-making complicated. A classification in the factors based on the importance of the factors, would make the decision-making easier for client and contractor. Therefore a distinction should be made in the factors, which factors are critical and which factors contribute to the suitability of a project, but are less important. The goal of the model can therefore be described as providing an overview of determining factors within a project on the suitability of projects for alliances and ranging these factors on importance. This will make client and contractor able to discuss the appropriateness of a project for alliances and take a deliberate decision cooperatively.

The research focuses on the exploration of a supportive model for decision making and will deliver this model as a result of this research. The final tool of this research can be classified as exploratory, since it is the first investigation on such an overview. The quality of the tool should therefore be tested in practise and may require improvements later on as a

result of new insights on the subject. The validation of the model can therefore be proposed for further research.

5.2 Valuing the factors

The factors derived from the empirical research need to be ordered on importance to support clients and contractors in their decision, whether or not to apply an alliance, based on all the factors. The factors have been presented to experts in the infrastructure market on both client and contractor side. The approached experts are listed in appendix three. These experts were asked to value the factors on importance, regarding the contribution to the suitability of projects for alliance. For each factor they needed to assign a value between one and five, in which five stands for a critical factor and one for a futile factor, in order to make a project suitable for an alliance.

When the assigned values are analyzed, some remarkable courses can be distinguished. This section will first generally elaborate on the differences in importance between the project characteristics, whereupon some remarkable differences in weighing between client and contractor will be discussed. At last the critical factors of projects will be discussed that contribute most to the suitability of a project for an alliance.

Main lines in importance of factors

If the categories and sub-categories of factors are analyzed on their assigned weights, some general courses can be distinguished. The mean of the assigned weights is presented in appendix 7.

The emphasis of the high scores on factors, determining the suitability of a project for an alliance, seems to lie on the technical properties of the model. Almost all the factors in this category score above three in weight, which can be classified as high, compared to the other categories. Especially the subcategories containing the general characteristics of projects and the human resources are weighed high by the experts. Within the subcategory risk management and optimisations, the assigned weights prove that the main benefits of alliances lie in the management of risks. The factors that regard the optimisations in this subcategory score significantly lower than the factors involving risk management. Hence the emphasis of the goal of alliances seems to lie in reduction of risks and not on the benefits of opportunities

The fact that the technical properties chiefly determine the appropriateness of projects for alliances is comforting, since these factors can well be assessed in advance. Compared to for example the political environment within project, these factors can be investigated much easier. The factors in the second category, political context and environmental characteristics, score considerably lower on the weights. Especially the subcategory political context has low assigned weights. Apparently the political attention in projects has never been a big hindrance to the alliance. And the advantages that can be accomplished in an alliance regarding the political attention are apparently not that big that it influences the suitability of a project for an important part.

In the second category of factors, the political behaviour by the project participants is the most important subcategory. These factors get a relatively higher score than the other subcategories. The ability and willingness of the project participants to operate in the new type of culture that is pursued in an alliance is proven to be important in order to make the project suitable for an alliance. The conventional attitude in projects will definitely harm the success of an alliance.

Regarding the subcategory environmental characteristics, the scores do not directly imply that the environment is very important in a project, in order to become suitable for an alliance. If the mutual scores are compared in this subcategory, it shows that when difficulties or complexity applies in a factor, it becomes more important. Hence it can be concluded that

projects do not directly fit well for alliances if many stakeholders are present, but it mainly gets advantage from alliances if difficulties or complexity comes from these stakeholders or the environment.

Compared to the second category of factors, the uncertainties get a relative high score. This can be a matter of concern, regarding the ability to determine the suitability of a project for an alliance. The factors in the category uncertainties can not be estimated in advance or the consequences of these factors are not clear. Nevertheless it is important for client and contractor to be aware of these factors. The assigned weights by the experts to these factors prove that these factors are important for the success of an alliance in a project. These factors require process arrangements between the project participants, in order to reduce the possible hindrance of these factors to the success of an alliance.

Differences on importance between client and contractor

Some of the factors, which are weighed by the experts, show a remarkable difference in assigned weights between the people from the client and the contractor. From these differences some valuable conclusions can be drawn. They will be discussed here. The people from the client and contractor will be called respectively client and contractor in singular to maintain readability of the text.

In the general technical properties of projects, the client weighs the presence of multiple subsystems and disciplines and the uniqueness of the project substantially lower than the contractor. This can have two different explanations. The risks coming from these factors normally can be assigned to the contractor within projects. For clients it may therefore not be necessary that these factors apply, in order to make the project suitable for an alliance. Under conventional contracts they would get less involved to these risks than in alliances. However, this explanation presumes that the client assigns weights based on his own interests and not on the shared interests of client and contractor which is basically what the alliance aims for. The other explanation may therefore fit better. The fact that the client weighs these factors lower than the contractor can be caused by the arrears in knowledge by the client compared to the contractor. The contractor is better able to estimate the risks coming with the technical system than the client since he owns more knowledge on this aspect than the client. The client may therefore underestimate the risks coming from these factors and hence the relevance for a project, in order to become suitable for an alliance.

The interdependence between the project participants during the execution of the project tasks is considerably more important to the contractor than to the client. Apparently the contractor encounters more inconvenience by this factor under conventional contracts than the client and hence gets more benefits in an alliance. The process improvements that can be achieved in an alliance are probably more important for the contractor than for the client.

The availability of budget for the management of risks is valued a higher importance by the client than by the contractor. The availability of this budget can be threatened on both client and contractor side. At the contractor side, this budget can be limited due to strong competition in the tender, which forced the contractor to lower the bid and reduce budget for risks. On the side of the client this budget can be limited due to political decision making. Often the request for budget for a project is lowered, in order to make the project succeed in political decision making. However, if during the project a budget shortage occurs, usually this budget will become available for clients quite easy. The reason, why the client weighs the importance of the availability of risk budget higher than the contractor, is probably because of their anxiousness about a possible shortage of budget at the contractor side. A shortage in budget for risks at the contractor side has been a reason to abandon the plan of an alliance in the past, because the client was not willing to share risks for which no budget was

available originally. In fact they are unable to control and look over this shortage in budget. This experience can be an explanation of this difference in weighing between the client and contractor.

The availability of human resources and especially senior representatives is of considerable higher importance to the client than the contractor. Based on the experiences with alliances, the client has frequently difficulty with the provision of human resources in an alliance. If the client can not be represented well in the alliance, it may feel that their interests are not safeguarded. This may make the client lose confidence in the alliance. For the client, this factor can therefore be a greater threat than for the contractor, regarding the success of an alliance.

In alliances the members of the ALT and the AMT sometimes need to represent contradictory interests. This requires special skills from the human resources in the project organisation. The client values this requirement substantially higher than the contractor. No direct explanation can be assigned to this phenomenon. A possible explanation can be that the contractor just underestimates the importance of this skill for the members of the ALT and AMT. Probably the contractor did not experience losses due to this in the past.

In the environmental characteristics of projects the presence of public interests in the project success factors has been weighed differently by the client and the contractor. This factor has been assigned a higher importance by the client than by the contractor. This can easily be explained, since public interests need often to be safeguarded by the client. Within alliances this can better be achieved in cooperation with the contractor. However, for the contractor this will not be an important requirement to projects for the application of an alliance, since in conventional contracts he does not directly have to take into account these interests. This factor makes a project more suitable for an alliance from the view of the client and therefore is higher weighed by the client.

The desired distance between the contractor and political representatives is valued significantly higher by the client than the contractor in its contribution to the suitability of a project for an alliance. If the contractor does not want to get involved in political issues, an alliance will be hard to accomplish. This is explained in section 4.2.2. Probably the client is more aware of this than the contractor, since the client knows what falls within the scope of political attention. For the client it is clear that this can involve all the areas of the project and therefore the contractor needs to get involved in order to become suitable for an alliance. This factor is assigned a relatively high score compared to the other factors determining the political attention to projects. Therefore this can be interpreted that the factor is underestimated by the contractor. This may require special attention in the preparations for alliances.

From the category of uncertainties that contribute to the appropriateness of projects for alliances only one factor displays a difference in weighing between the client and the contractor. This concerns the clients' attitude towards risks in the project. The client assigns a considerable higher weight to this factor than the contractor. Apparently the client expects that a wrong attitude of themselves towards risks will badly impact the success of an alliance. In fact the client should be better able to estimate this factor than the contractor. Hence the possible consequences of this attitude may be underestimated by the contractor. Special attention should therefore be paid to this attitude of the client and may require process arrangements to avoid excessive risk averseness.

Critical factors

This section has discussed the important categories of factors that contribute to the suitability of a project for an alliance. Next the differences between the client and the contractor in their view on the importance of factors have been elaborated. This showed that some factors can be underestimated by one of the project participants and therefore may require special attention in the decision, whether or not to apply an alliance. At last a list of critical factors will be formed for the decision within a project. This subsection will discuss the critical factors, which definitely should apply in order to make a project suitable for an alliance. These critical factors are derived from the mean of weights that are assigned by the experts. An overview of the assigned weights for all the factors is presented in appendix 7. The boundary value that has been used for critical factors is 3,5. All factors, which are assigned a mean weight above this value, are classified as critical. The list of factors is presented in table 5.1.

Factor	**Weight**
General	
Size/ Budget of the project	4,0
Duration project	3,6
Time pressure as a result of project risks	4,0
Uniqueness of project in techniques or application	3,6
Probability of scope changes	3,7
Risk management and optimisations	
Possible risk reductions by joined management	4,7
Availability of budget for risk management	3,9
Abstractness of Program of Requirements	3,6
Human resources	
Availability of human resources and especially senior representatives	3,9
The wish to invest time and people in the alliance	4,7
Possibility for equal representation of both parties in alliance	4,0
Ability to create team spirit in alliance team	4,0
Knowledge and support of alliance principle by highest responsible managers	4,7
Competent person for function of alliance manager	4,7
Political behaviour by project participants	
Willingness/Ability to see things from other parties' perspective	4,1
Trust control	
Priority of alliance interests against own interests in specific cases	3,6

Table 5.1: Critical factors

Following on the previous subsection, about the differences in weighing of factors between client and contractor, this list of critical factors may differ for client and contractor. Hence separate lists of critical values can be applied for client and contractors individually. The advantages seem to lie on different aspects in projects for client and contractor. The separate lists with critical factors are presented in appendix 6. Based on these lists the client and contractor can determine if a project suits for an alliance, based on their demands. This research will focus on the shared critical factors.

As concluded before, the emphasis of the critical factors lies in the technical properties of projects. Only two factors are originated from the other categories. It can be classified as comforting that many of these critical factors are from the technical properties of the project. These factors are quite easy to determine objectively within projects and therefore will not directly lead to many disputes between the client and contractor. However, the boundary values are not known for all of these factors and therefore it can not be determined whether they suffice for an alliance or not. These boundary values are still controversial among people within the infrastructure market. In general the following conclusions can be made regarding the critical factors within a project for the application of an alliance.

The project needs to have a minimum size in order to earn back the investment for an alliance. The project needs to contain a certain complexity that manifests itself into project risks. If these risks can be managed better together within the project, this can be a source of profits within an alliance and contribute to the earning back of the investments. However, sufficient budget should be available to manage these risks and make the parties committed to the alliance. Furthermore, adequate opportunities for optimisations should be present as a second source of profits. This is mainly determined by the abstractness of the program of requirements. The more abstract the program of requirements is, the more opportunities exist for optimisations. However if the abstractness is too high, this may make the project incontrollable, because of changes during the whole project.

In order to engage the profits of an alliance, proper and enough human resources should be present. This determines mainly the successful application of an alliance in a project. At last both parties should put aside their own interests and pursue the shared interests in an alliance. This commitment for reducing opportunistic behaviour is required to get successful and realize mutual confidence within the alliance.

In this conclusion on the critical factors, the desire for critical values of the factors can be sensed. For this reason further research should be proposed to determine the critical values of the factors within the infrastructure market. These critical values may be determined by a broad research among the clients and contractors in the infrastructure market and thorough case studies of executed alliances.

5.3 Application of the model

Now the model is ready to be used within the infrastructure market, a description is required on how it should be used. Hence this section will elaborate on how, when and by who this model should be applied.

The application of alliances has in almost all projects been initiated after the tender procedure. Within these projects, it was stated before the tender that the use of an alliance was intended. These projects were initially tendered under other contract types, for example RAW or D&C. This way of working is applied, because there is no standard procedure for direct tendering of alliances yet. Only in the project ‘A2 Hooggelegen’ a pilot has been executed on a direct tender of an alliance. Until now, this type of tendering is facing some difficulties though and hence will not frequently be applied in the near future. The difficulties emerge on the formulation of selection criteria of contractors. This should not only be based on technical properties like price and design, but also on cooperation criteria. These criteria are very hard to measure and to assess objectively. For this reason the application of the model will be presented in both situations; during the tender procedure as well as after it.

Alliance negotiations after tender procedure

If the alliance negotiations will start after the tender procedure, the client should decide in advance of the tender procedure if an alliance will be considered. This is necessary, because the contractor, who will execute the project, is not selected yet. Clients are known to be less

able to estimate the characteristics of projects, because they own less knowledge than the contractor, especially on the technical characteristics. Therefore a quick scan should be applied in the decision if an alliance will be considered. The list with critical factors may be leading in this decision. After the tender procedure, the client can determine in cooperation with the selected contractor if the project suits for an alliance. The cooperation with the contractor will involve more knowledge and create a clearer view on the project characteristics. The final decision, whether to apply an alliance or not, can therefore best be taken in cooperation with the contractor.
During the process, in which the client and contractor should cooperatively determine if the project is suitable for an alliance, both parties need to share information which would possibly not be shared under conventional contracts. For example allocated budgets for risks and costs of production can be mentioned. Hence if negotiations will be started about the application of an alliance, both parties should be convinced already that an alliance is a serious option in the project. Otherwise they might not be open in the negotiations, which is required to create mutual trust. For this reason both parties should consider in advance if in their opinion the project suits, in order to get committed to the negotiations about the application of an alliance.

When during the negotiations the project seems to fit for an alliance and mutual trust grows between the project participants, both parties can discuss the uncertainties of the project influencing the appropriateness for an alliance. Process arrangements can be proposed to diminish the uncertainties in the project. If both parties will get convinced about the benefits of an alliance in the project, they will easier agree with arrangements to reduce political behaviour. After all this will lead to a deliberate decision in which both parties will support the alliance principle and in which a clear view is provided on what is expected within the project.

Direct tendering of alliance

If an alliance is directly tendered, the use of the model will be more complicated. The contractor, who will win the tender, will be bound to the application of an alliance. Hence an early commitment to the alliance is required in order to get successful. Basically the client decides beforehand if an alliance will be applied in this situation. This runs the risk that the decision will be based on less information than it would be if it would be decided together with the contractor. The client should therefore be very cautious before the application of an alliance is decided. Furthermore the client may base the decision on his own critical factors and avoid the interests of the contractors.

The advantage the model can bring in this situation is on the one hand providing insight in the relevant factors to the client. Because the involvement of the contractor is difficult before the tender, it may be hard to cooperatively come to a decision. European legislation provides one way in which the contractor can be involved before the winning bid is selected. This is the competitive dialogue, which is designed to provide clients the possibility to formulate the requirements of the project in cooperation with the contractors. In this way the knowledge of the contractor can be used in an early stage. However, the application of this competitive dialogue is only allowed by European legislation if the projects contain a certain complexity and the client alone is not able to find a technical solution or to specify the legal and/ or financial conditions. This is recorded in directive 2004/18/EG. This is required in order to guarantee maximum competition, because otherwise a contractor may take advantage of this dialogue at the cost of other contractors.

Before the tender, the only opportunity can be found in the competitive dialogue, in order to cooperatively use the model in the decision about the application of an alliance. This is not directly inconvenient for the application of the model, since projects require a certain

complexity as well in order to become suitable for an alliance. Therefore this requirement for the competitive dialogue may also function as a first scan on the suitability of the project for an alliance. Within the competitive dialogue the client can agree with the contractors on what is required for an alliance and come to a decision if it will be applied. Moreover special assessment criteria can be added to the requirements for the bids of the contractors, in order to suit for the alliance. Examples can be the cooperation capabilities of contractors and the involvement of public interests in the designs. Within the project 'A2 Hooggelegen' the contractors were also assessed on their cooperation capabilities by an assessment, which was included in the final decision of the winning contractor.
This process may even be better than making the decision after the tender procedure. However it will be more time-consuming since the client should negotiate with all the contractors. Nevertheless the selection criteria can be better in this way.

Using the model

The previous subsections discussed when and by whom the model should be applied. Two different possibilities of tendering were presented in which the model can be used. This subsection will propose a step-by-step manual for the model how it needs to be used, in order to get full advantage of the model. The model that should be used during the process is presented in appendix 7. Figure 5.1 shows the process of assessing a project on the suitability for an alliance, making use of the model.

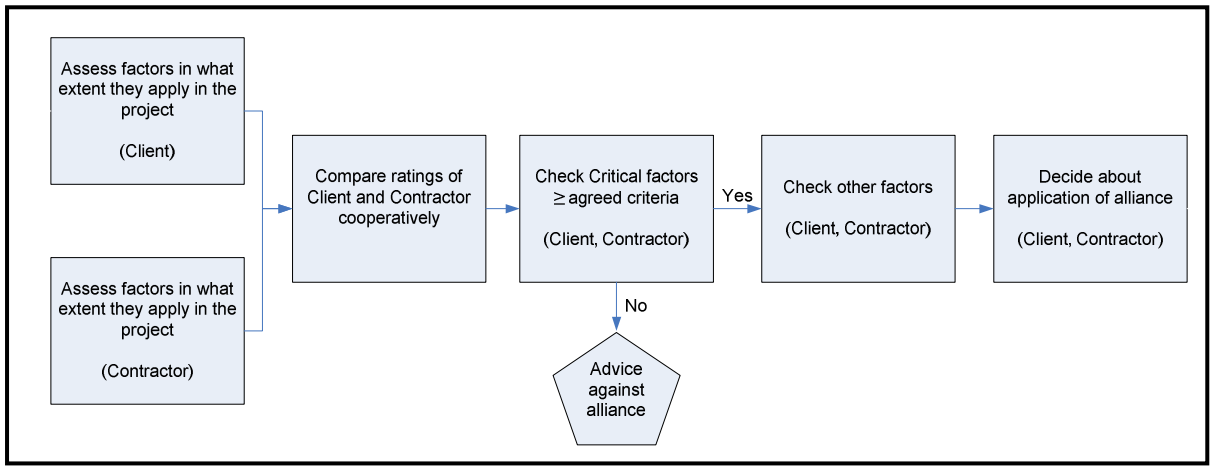

Figure 5.1: Assessment process for projects using the model

The model uses a qualitative type of measuring, since the quantification of the factors and their critical values have been proven to be very hard if not impossible. For each factor the client and contractor should determine to what extent it applies in the project. The consideration about this extent should be based on information about the factors provided in chapter four and on the experience of the decision makers. The information in chapter four provides information about how factors need to be assessed and possibly in what range boundary values may lie.

I have chosen to express the extent of application in the model into a number between one and five, in which one stands for 'does not apply' and five for 'fully applies'. This can be characterized as a rating of the factors and therefore seems to be a quantitative method. I have chosen this method though, in order to facilitate future developments in the market. At first these ratings will mainly be based on qualitative assumptions of the client and contractor, because they even can not quantify the factors. However, if more experiences have been

applied with alliances, these persons will more and more be able to give a quantitative rating to these factors. They will acquire routine in the assessment of projects.
At first the client and contractor need to assess the factors individually, based on their opinion in what extent the factors apply within the project. This prevents the possibility of one party dominating the other party, if the factors would be assessed together. After both parties assessed the factors, they should cooperatively compare the outcomes. Factors, which show a substantial difference in the rating, need to be discussed, in order to improve the assessment of the factors. The factors that were assigned a different weight between client and contractor in the model may require a discussion anyway. This difference in weighing of the factors is displayed in the last column of the model if it applies. The arrows determine if the client or contractor assigned a substantially higher or lower weight to the factor. The abbreviations 'Cl' and 'Co' stands for client and contractor. Together the client and contractor should come to a final judging of the factors.

Some of the factors have been formulated differently in the model in appendix 7 than in the proposed factors in appendix 4 and 5. In the initial formulations these factors were negatively worded, regarding the suitability for an alliance. So if these factors would fully apply, the project would be less suitable for an alliance. For this reason these factors are formulated positively, in order to preserve an unambiguous assessment.

Next to the cooperative rating of the factors, the critical factors should be assessed. These factors are classified as 'high' in the final column of the model, in which the importance of factors is displayed. The client and contractor can together determine criteria for the decision on the critical factors. For example a boundary value for the critical factors can be set to be at least three in the extent these factors apply in the project. If all these factors equal or are greater than three, the project participants can continue in the process. The client and contractor can also make a compromise that some of the critical factors are allowed to be under this value. Other assessment criteria can be based on the mean of the assigned rates of the critical factors. They can agree on a minimum value for this mean. If the critical factors do not fulfil the agreed criteria an alliance should not be considered, because the project does not fit for it.

If the critical factors fulfil the requirement of application in the project, the project parties should continue with the assessment of the other factors. These factors may be decisive for the final decision, for example if many critical factors score a value above three. Anyway, the other factors should apply in a considerable extent, in order to make a project suitable. Otherwise the application of an alliance in the project should still be questioned.

After the check of the other factors the client and contractor should cooperatively decide whether or not an alliance will be applied in the project. Based on the model, which provides an overview of the relevant factors, this decision can be made deliberately. Furthermore the mutual trust between the project participants can grow by using this model and providing insight into information, which should not be available under conventional contracts.

5.4 Implementation

Since the model has been completed, the application of the model should be considered. In order to get the tool used by organisations within the infrastructure market, it should be implemented in a proper way. This section elaborates on the implementation of the model in the infrastructure market.

The available implementation theories in literature are limited. Especially literature on the implementation of models in decision-making is not present. However general implementation theories are developed by for example Kotter and Cohen (2005). They focus on leading large-scale changes within companies or even markets. Their theory is not fully

applicable to the implementation of this model into the decision-making of organisations within the infrastructure market. Nevertheless the literature is used to collect some principles for the implementation of this model, for some of these principles can be very useful in this particular situation.

Kotter and Cohen (2005) distinguish eight steps to be taken for successful large-scale changes. These eight steps are presented in table 5.2.

Step	Action	New Behaviour
1	Increase urgency	People start telling each other, "Let's go, we need to change things!"
2	Build the guiding team	A group powerful enough to guide a big change is formed and they start to work together well.
3	Get the vision right	The guiding team develops the right vision and strategy for the change effort.
4	Communicate for buy-in	People begin to buy into the change, and this shows in their behaviour.
5	Empower action	More people feel able to act, and do act, on the vision.
6	Create short-term wins	Momentum builds as people try to fulfil the vision, while fewer and fewer resist change.
7	Don't let up	People make wave after wave of changes until the vision is fulfilled.
8	Make change stick	New and winning behaviour continues despite the pull of tradition, turnover of change leaders, etc.

Table 5.2: Eight steps for successful large-scale change (Kotter and Cohen, 2005)

At first sight on the eight steps, directly one becomes aware of the large-scale of these changes. Such a large plan will not be necessary for the implementation of the model in the decision making. However, the first three steps of the plan can be applied to the model.

In the first place the urgency should be increased. The urgency of a good consideration about the application of an alliance in a project needs to be established within the infrastructure market. Focussing on the consequences of an improper use of alliances may make parties become aware of this. On the other hand, the benefits of alliances should be presented for suitable projects. In this way attention can be paid to the urgency of the supportive model by discussing the possible failures if another contract is applied. This process can be initiated by Heijmans within the infrastructure market. If Heijmans, with the most experience in alliances, presents itself as the pioneer on alliances, this can be achieved. For example organisations like "Bouwend Nederland" and "PSI Bouw" can be contacted by Heijmans to inform the infrastructure market. "Bouwend Nederland" is the association for construction and infrastructure companies. Within this association practices and knowledge is shared. "PSI Bouw" was a program stimulating innovators and innovations. This program has been shut down in the end of 2008. Certain programs start in different manners and different times and can be used to inform the infrastructure market and create urgency on the use of the model.

The second step is to create a guiding team for the implementation of the model in the market. As presented in the research plan in chapter two, this research has aimed for a broad involvement of parties from the infrastructure market in the research. Therefore from several different companies people have been interviewed and involved in the research. An overview

of these people is presented in appendix 2. These people are from both client as well as contractor side of the infrastructure market. All these people operate on key positions within the companies, which make them suitable for the guiding team to implement the model.

The third step is creating a shared vision on the change to be executed. In this specific case of implementation of the model, this shared vision can only be one. This is the use of the model within the infrastructure market, in order to support the making of a deliberate decision whether or not to apply an alliance in a given project. Another part of the vision could be the improvement of the model if new insights emerge or if the model can be evaluated after the finish of projects, at which the model is applied.

The crucial factor for successful implementation of the model within the infrastructure market is the commitment of the guiding team, existing of people operating on key positions in the market. This commitment can be reached by creating a sense of urgency about the model at these people. Furthermore their trust in the quality of the model will be crucial in their commitment to it.

6. Application of alliances

Following on the use of the model it may turn out a project to be suitable for an alliance as delivery contract for the project. In this advice even the uncertainties can be involved that emerge on the suitability for alliances. However the suitability of a project for an alliance contract will not directly guarantee a successful performance of the alliance within the project. The performance depends on the use of the alliance which is performed by the project team. This chapter discusses points of interest in the application of the alliance in a project. These points of interest are divided into behavioural and managerial points of interest. These will be discussed successively in the following sections.

6.1 Behavioural points of interests

A successful application of the alliance depends strongly on the behaviour of the participants in the project. Although some behavioural issues could be intercepted in the model others need to be taken into account during the operation of the alliance. The points of interest regarding the behaviour will be discussed here.

In general the project participants need to be aware that an alliance will not as a rule lead to good project performances. The alliance needs a good commitment and attitude of the project participants in order to engage the benefits. The project parties need to point and talk each other on the aim and their contribution to the alliance in order to invigorate their attitude towards the alliance (Weevers, 2008).

Clients should not use the alliance as a means for solving bad preparations of the project or compensating self-imposed delays. The opportunity within an alliance to realise scope changes for a reasonable price may not lead to limited preparations. The attitude of the contractor towards the alliance may be harmed in this way. Likewise alliances should not be violated, in order to create more time for political decision-making on the project, in the expectance that the alliance will compensate these delays. This results in frustration in the project if these high expectations can not be met (Officer of QGCPO, 2008).

Overall the project participants should agree on arrangements for behaviour in the project in order to guarantee commitment to the alliance. These arrangements on the conduct can simply be integrated in the alliance contract (Brumby and Ross, 2006). A crucial rule on behaviour in the alliance is that all participants should consider decisions always as ‘best for project’ (Ross, 2000). This rule has been recorded in all the alliance contracts that have been applied up till now in the Netherlands.

The preparation of the alliance consists of agreeing on the alliance contract; bargaining about the composition of the alliance responsibility and the shared fund; and agreeing on the behaviour and processes within the alliance. This process takes a long time and can be hard (Chao-Duivis et al., 2008). Especially the shift of risks and the allocated budget towards the alliance can result in violent discussions. The relationship between the project participants can become strained due to these violent discussions. The project parties should prevent that these awkward negotiations will lead to a failing alliance. It may even be necessary to allocate people to the alliance who were not involved in the negotiations if the relation has grown strained (Wagenaar, 2009, Tiedemann, 2009).

Alliances aim for good cooperation between client and contractor in the project. This cooperation will lead to many benefits during the project. However cooperation between the client and contractor brings along a threat on the quality of the project. Due to the good cooperation within the project the relationship between the persons from the client and the contractor may grow informal. This informal relationship may result in the phenomenon which is called ‘groupthink’ (Janis, 1972). This means that the performance of the group will decrease because of group processes in which conflict avoidance is attempted. Especially

mutual monitoring may falter in this case (Ross, 2000). On its turn this may result in making mistakes which brings along costs. All alliance members should therefore be aware of this 'groupthink' threat.

One of the benefits of an alliance is the possibility to increase quality of the project for a reasonable price. However this opportunity brings along a threat. Clients can use this opportunity to keep improving the project. Contractors though are used to taking efficient decisions on increasing quality, considering the costs and time necessary for improvements. Clients are usually less aware of these costs and therefore may desire improvements continuously (Van der Werf, 2009). Disputes about the application of an improvement may result in a strained relationship within the alliance. Proper arrangements should therefore be drawn up about improvements on the project.

6.2 Managerial points of interests

In addition to the behavioural requirements in the application of alliances, the success is also determined by managerial skills. Some of the managerial requirements have been covered already in the model, because these requirements can be checked in advance of the project. However some other essential principles should be taken into account by the managers of the alliance. These principles will be discussed in this section.

In the first place alliances provide an open culture for cooperation in the design and execution of the project. Within the alliance team, the decisions are most of the time taken unanimously. The room for discussions within alliances and the desire for unanimous decisions bring along the disadvantage that the speed of the process may be threatened. Managers should therefore protect the speed of the process within alliances, which may involve deciding on majority instead of unanimous decision making (Wagenaar, 2009, Van Haastregt, 2009). This may require special process arrangements.

In the second place managers should monitor the interfaces within the project between the parties. The distance between the alliance and the client organisation on the one side and the executive contractor on the other side should be and stay small during the project. Communication and cooperation should take place continuously between these teams (Heijmans, 2009, Brandsen, 2009). A tight cooperation between the executive contractor and the alliance will result in good optimisations. If cooperation will falter the executive contractor might become frustrated about decisions taken within the alliance and attitude may change. Likewise a gap between the alliance and the client should be prevented.

The presence of three separate teams within the project organisation brings along challenges for the pay-off of risks and optimisations. The distribution of the costs or profits can lead to awkward discussions, since the share in the costs or profits differ in each team for the client and the contractor. Responsibility for risks and optimisations can often not be clearly assigned to one of the three teams. Therefore the teams enter into discussion, aiming for a shifting away of risk responsibility and claiming optimisation responsibility (Wagenaar, 2009, Weevers, 2008). In case of risks the client and executive contractor will try to shift it to the alliance, since their responsibility just counts for 50 percent there, instead of 100 percent in their own team. The opposite reasoning applies for optimisations, where in the alliance just 50 percent of the profit can be gained and in their own team 100 percent can be gained. These mechanisms within the alliance require proper management in case of risks and optimisations. Good arrangements in advance could also prevent big troubles.

In deciding on optimisations managers should be aware of the costs that are involved in applying an optimisation. Experiences in executed projects have proved that these costs are often underestimated (Rottier, 2008, Wagenaar, 2009, Tiedemann, 2009). The engineering costs for carrying out an optimisation are high, since the calculation and design should be redeveloped. These calculations and this design need to be executed in high detail, since the

yield should also be determined, in order to be able to distribute it to the alliance (Tiedemann, 2009, Wagenaar, 2009). Deciding on the application of an optimisation should for this reason carefully be considered by managers.

Regarding the environment in projects, alliances provide challenges for managers as well. The change in working method within an alliance and the change in accountability may not be clear for actors in the environment. The environmental actors may become suspicious and feel if the client and contractor conspire against them. If the aim of the alliance is not preconcerted clearly in advance with the environmental actors, this may lead to troubles during the execution of the project. These actors should know where they could hold the alliance responsible for and should feel their interests as well protected within the alliance as without the alliance (Buck, 2009).

Benefits in environmental management are one of the advantages which can be engaged in an alliance. The involvement of environmental actors in the design choices prevents hindrance by these parties. These advantages also jeopardize the success of the alliance though, and require managerial attention. The involvement of environmental actors and their desires runs the risk of ending up behind schedule. Moreover the changes in the design bring along high costs in engineering and processing (Weevers, 2008, Van Haastregt, 2009). Overall it can make the project incontrollable regarding time and costs. Proper measures should be taken in order to avoid these delays and high costs. Different systems have been used in the past to protect the speed and costs of the project.

Measures against incontrollable projects

A first measure that is applied, in order to reduce costly and timely changes, is to require approval of the changes by the client, who will determine what change is necessary. The external parties need to present their wishes to the client organisation, if they want to deviate from the original scope. A financial contribution of the external party is further expected to realise their wishes. This system is applied in the alliance N201 (Weevers, 2008).

Another way to protect the speed of the process is to create two teams within the project. One team will be responsible for the execution of the original scope and will not take up with the treatment of request for changes. Another team will process all the changes and wishes of external parties. This team checks whether changes could be applied regarding the proceedings of the original planning. As long as external parties state their wishes in time it will be considered for processing. Otherwise the changes will be rejected. This system has been applied in a rearrangement project of railway station of Utrecht (Weevers, 2008).

A final managerial point of interest is the demobilisation of the alliance at the end of the project. The added value of the alliance at the end of the project reduces rapidly. Since the alliance is responsible for the design; and opportunities for optimisations mainly occur in the beginning of the project, the alliance may become superfluous. The moment of demobilisation and the way of mobilisation should therefore well be considered by the managers of the project. This may avoid making unnecessary costs on the alliance organisation (Wagenaar, 2009).

Occasions requiring managerial attention

In the previous part managerial points of interest are discussed concerning general matters or issues, which will definitely apply during the project. This subsection discusses possible occasions within the project which require special managerial attention and have a reasonable chance of occurrence.

Within a project, the alliance may perform well and at the same time the executive contractor may perform badly. This is possible since it concerns two different contracts within the project and the three project parties existing of client, alliance and executive contractor are separate teams. The executive contractor may for example have disappointing purchase costs on materials. This usually is not the responsibility of the alliance. Even though the teams are separated, this may influence the attitude of the contractor representatives in the alliance. If the executive contractor becomes frustrated in the project, this may harm the relationship between the client and contractor and fail the performance of the alliance. Hence the project parties may return to old adversarial behaviour (Weevers, 2008). From the management of the alliance, proper measures should be taken to prevent these consequences. Even if the executive contractor is performing badly, the alliance management should disseminate among the project team that cooperation will lead to best performance and may even realize loss reduces at the executive contractor side. Returning to old adversarial behaviour may even lead to worse performance.

An advantage of an alliance is that team spirit is created, which leads to benefits in the execution of the project, by cooperation between the client and the contractor. However, the project team may change during the project, because of for example resignation of a person or other reasons. The replacement of people within the alliance team may influence the culture in the alliance and in some cases threaten the performance (Wagenaar, 2009). Good cooperation within the alliance is also based on personal relationship between the alliance team members. For this reason changes should be minimized within the alliance team if it performs well, in order to minimize the chance on changing culture. This can be achieved if people do not have to change in function during the project within the parent organisations. However, it is impossible to bind people to the parent organisations for the endurance of the project and hence team changes may occur. The alliance contract has been signed up between the parent organisations and not between the people of the organisations (Van Haastregt, 2009). In the composition of the alliance team, this issue should be considered. If a change occurs during the project in the alliance team, a critical selection should be applied for the new person, in order to prevent failing of the alliance.

7. Conclusions

In this thesis, the desired insight has been provided in the determining factors on the appropriateness of infrastructure projects for alliances. In this chapter the conclusions will be drawn up for the research. In section 7.1 these conclusions will be discussed regarding the research questions. Subsequently, section 7.2 will provide a reflection on the research and propose recommendations to the parties in the infrastructure market.

7.1 Conclusions

The research has been executed, aiming for providing an answer to the main question. The main research question was formulated as follows:

> ***How can the appropriateness of infrastructure projects for alliances beforehand be assessed in a decision model and how should this be implemented?***

Transaction Cost Economics theory has been proven to fit well for the application of alliances. The treatment of transactions within a project is reason why alliances are considered. The special characteristics of transactions within complex multidisciplinary project make the consideration for alliances valuable. Based on the Transaction Cost Economics theory, alliances in the infrastructure market are proven to be suitable in case of high uncertainty; idiosyncratic investment characteristics and mostly recurrent transactions. Since alliance can be classified as a type of relational contracting, these characteristics of transactions fit best for the alliance. These characteristics are quite generic though, and therefore are further specified for being able to assess specific projects. This required an elaboration on the factors determining the uncertainty, idiosyncrasy and the frequency of transactions. Furthermore factors are deducted from requirements for the execution of relational contracting.

Project characteristics, that exert an influence on the appropriateness for alliances, are divided in three categories: technical properties; political context and environmental characteristics; and uncertainties. This distinction has been made to create overview in the factors and to simplify the decision making.

The technical properties are again divided into general characteristics; human resource characteristics; and characteristics regarding risk management and optimisations. General characteristics are factors like size of the project; number of subsystems; and duration of the project. These properties mainly influence the uncertainty and the idiosyncrasy of the transactions in the project.

The human resource characteristics mainly focus on the requirements for the execution of relational contracting. Relational contracting requires special attention to human resources that should be present in the project organisation. Risk management and optimisation characteristics focus on the way, in which uncertainty can be reduced by alliances and what gains can be acquired, by shared risk management and optimisations.

The political context and environmental characteristics, which influence the suitability of an infrastructure project for an alliance, mainly focus on opportunistic behaviour and the extent of uncertainty in projects. The environmental characteristics consist of the complexity of the social and natural environment. These characteristics contribute to the uncertainty in the project. The political context is determined by political behaviour within the project team and

outside of the project. This contributes to the opportunistic behaviour within contracts and contributes to the success of the alliance.

At last the uncertainties within infrastructure projects determine the suitability of a project. These factors originate mainly from the presence of information asymmetry between the project parties. Furthermore the factors in this category are determined by the sustainability of the relationship within the alliance.

The determining factors are proven to be hard if not impossible to quantify. The allocation of boundary values, in order to become suitable for an alliance, is also open to debate. Besides the dynamic characteristics of infrastructure projects make valid decision making impossible for the endurance of the project. This changed the aim of the model to facilitation of decision making instead of making decisions by the model. The thesis focused on this goal in the design of the model.

Weighing of the factors, by experts, has provided a valuable insight on the importance of factors in the decision if an alliance should be applied in the project. This resulted in an overview of critical factors on the appropriateness of projects for alliances. As a first basic step, this is provided for the assessment of projects.

A difference is present within the infrastructure market between client and contractor regarding the critical factors. Both parties seem to have different interests in alliances. If the decision about the application of an alliance within a project will not be made cooperatively, the party who decides needs to be aware of this difference. The research provides an overview of critical factors for client and contractor separately.

Furthermore the research has provided a way in which the factors can be assessed cooperatively by the client and contractor. Describing when, how and by whom the model should be applied, this thesis gives answers to the main question. Furthermore a finite plan for implementation of the model in the infrastructure market is proposed, relying on persons on key positions in the infrastructure market.

Overall it can be concluded that the Transaction Cost Economics theory fits well for alliances. The theory functioned as a basis for the research and finally resulted in a model, which is able to facilitate the decision making in projects, regarding the application of an alliance. However the requirements on transactions for relational contracting, including alliances, are still hard to be assessed. The presence of high uncertainty and idiosyncratic investments within projects, which are required to be suitable for relational contracting, can hardly be quantified. At least the determining factors within infrastructure projects, and their mutual importance, have been determined in this research, which provides an answer to the main question. As a result a method has been proposed to assess projects on the suitability for alliances.

7.2 Reflection and recommendations

This section will provide a reflection on the research and recommends steps to be taken by other researchers or actors within the infrastructure market. An elaboration will be made on the contribution to the research field and the practices in the market. Also the limitations of the research will be discussed.

Research contribution

The theoretical contribution to the research field is provided in the discernment in the characteristics of infrastructure projects that exert an influence on the appropriateness of

projects for alliances. This overview of characteristics is mainly based on empirical data obtained by interviews. The interviewees come from both sides of the infrastructure market; from the client side as well as from the contractor side. Hence, no finite sources have been consulted.
In the second place the results of the research contribute to the practices in the infrastructure market. It provides a model and method by which the appropriateness of a project for alliances can be determined. The characteristics of the project that influences this appropriateness are provided and weighed on importance. An overall assessment model has been provided to clients and contractors, which makes them able to assess projects cooperatively.

Limitations of the research

The results of the research include some limitations which should be mentioned. In the first place the model is not validated in this research. In designing the model, the research had an explorative character. Therefore validation should be executed after the model has been used for a number of projects. The outcomes of these projects will determine if the model was a valuable contribution and if the right decision has been made about the contract type.

In the second place alliances are not frequently applied yet in the Netherlands and therefore limited materials were available as a source for the case studies. This runs the risk that not all relevant factors are involved in the model. Hence the model should be evaluated and possibly extended after more projects have been executed in alliances.

The third limitation in the research emerges in the use of the model. Within the model a qualitative method of measuring is applied, because quantification of factors has been proven to be hard if not impossible. In the applied qualitative measuring method no clear boundary values are provided to determine if a factor suffices within a project for an alliance. These boundary values are guessed in this research or are proposed to be determined jointly by the client and contractor within the project. However a broad research on these boundary values may provide a more clear vision for the model. Until now the proposed method in the thesis should be applied

Further research proposals

Following on the previous point, further research can be recommended. Additional research in the first place needs to be executed on the validation of the model. Especially the boundary values for factors, in order to suit for alliances, require further research. Also improvements based on new insights in alliances may be necessary in the future.

During the research some general subjects are faced, which can be recommended for further research on alliances. During an interview the question arose, if the contractor may provide different solutions in execution, design or techniques, given the fact that an alliance will be applied in a project (Van der Zwan, 2008). The contractor will in this case have more tools for risk management and may therefore take other decisions. For example the contractor may decide to apply innovative techniques. If this change in proposed solutions by contractors would be the case, the possible positive or negative consequences should be investigated to project performances.

Direct tendering of an alliance has been applied in the project ‘A2 Hooggelegen’. This process encountered still some difficulties and needs to be optimized. Especially the comparison on the quality of cooperation of contractors turned out to be difficult. Hence, a research on the proper execution of direct tendering of alliances is desirable in the infrastructure market. This may prevent the costly process of turning a D&C or RAW contract into an alliance.

A discussed phenomenon in the infrastructure market is the unsolicited proposal (UP). An UP means that a contractor provides a proposal for a new project, including the design and contract type. The application of alliances can possibly increase, if UP will be applied more. At this moment no procedural framework is present for this, but in the future this might become common practice. Further research on a procedural framework for UP can therefore be recommended.

Recommendations

Based on the research, recommendations can be made for Heijmans and the other parties within the infrastructure market. In the first place the application of the model needs to be recommended if an alliance is considered for a project. If competitive dialogue is applied in a project, Heijmans may propose the use of the model to determine if it fits for an alliance. Heijmans can exhibit the results of the model to clients if they did not consider the appropriateness of an alliance yet for a project. Also the integral use of the model in the market should be advanced. This could be achieved by presenting the research to "Bouwend Nederland", which is an association of construction and infrastructure companies. They are able to distribute the knowledge within the infrastructure market.

Heijmans should present itself as the pioneer of alliances in the infrastructure market. Since Heijmans is the contractor with the most experience in alliance contracts within the Netherlands, this statement can be founded. The distribution of this research may underpin this statement. Furthermore this statement fits in the core values of Heijmans, which list to perform innovative entrepreneurship and being reliable and transparent. These two values are realized in an alliance.

The legal restrictions, which are currently present on alliances as legal entity, may hinder the performance of alliances. The formation of the alliance as a legal entity brings along advantages within the execution, which in fact should be engaged. The required permission of the parliament has been a reason to avoid formation of a legal entity. Political involvement within projects makes them often unpredictable and therefore was not desirable. However it is recommended to test this permission process in a pilot project. Possibly no problems may be experienced and more advantages may be engaged on alliances.

Alliances are proven to be no temporary hype in the infrastructure market. The working method in alliances seems to be the new paradigm in the infrastructure market. The parties within the infrastructure market should therefore adapt to this new way of working. This means also a change in culture and thinking of the organisation towards the other party in a project (Buck, 2009). In the transition period towards this new way of working, people can be involved in different projects with different types of behaviour. This can be very hard for employees to operate in different cultures if they are working on more projects (Witteveen, 2009). Therefore it is recommended to make separate teams for alliances to concentrate the knowledge and skills and to provide the employees one type of working environment.

At last a recommendation is made to assess bids in the tender on 'EMVI' criteria. EMVI means the economical most attractive bid. This means that not only the price determines the winning tender, but the bids will also be assessed on the quality of the design and other criteria. This provides a better basis for cooperation, than the tenders, which are based on lowest price only. The distribution of weights between the different criteria within EMVI requires special attention though; otherwise undesired bids may win the tender.

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Appendix 1: Abbreviation List

ALT	Alliance Leadership Team (Board of directors of alliance)
AMT	Alliance Management Team
D&C	Design and Construct
DBFM	Design Build Finance Maintain
DBFMO	Design Build Finance Maintain Operate
DBM	Design Build Maintain
E&C	Engineer and Construct
EMVI	Economisch Meest Voordelige Inschrijving (economical most advantageous bid)
HIGP	Heijmans Infra Geïntegreerde Projecten
HI	Heijmans Infra
HBSC	Syndicate in the "Waardse Alliantie" existing of Heijmans, Boskalis, Strukton and CFE.
KPI	Key Performance Indicator
MCDA	Multi-Criteria Decision Analysis
POBR	Project Organisatie BetuweRoute
QGCPO	Queensland Government Chief Procurement Office
RAW	Rationalisatie en Automatisering in de grond-, water-, en wegenbouw
RC	Relational Contracting
TCE	Transaction Cost Economics
WA	"Waardse Alliantie"

Appendix 2: List of interviewees

Mr. R. Aengevaeren (Rijkswaterstaat)	Director Operations infra department
Mr. P. Brouwer (ProRail)	Tender manager
Mr. P. Buck (ProRail)	Project director 'Betuweroute' and member ALT in WA
Mr. R. Buvelot (Quooste)	Developer alliance contract WA
Mr. L. Dekker (Rijkswaterstaat)	Project manager A2 A'dam-Utrecht
Mr. E. van Haastregt (van Hattum en Blankevoort)	Alliance manager A2 Hooggelegen
Mr. M. Heijmans (Heijmans)	Director business unit HIGP and ALT member N201 alliance and involved in WA.
Mr. T. Knipping (Gemeentewerken Rotterdam)	Project director "museumparkgarage"
Mr. J. Rottier (Heijmans)	Involved in WA and N201 Alliance
Mr. M. Tiedemann (Heijmans)	Involved in WA and N201 Alliance
Mr. P. Wagenaar	Member AMT N201 alliance
Mr. P. Weevers (AT Osborne)	Representative for Client in N201 project
Mr. S. van der Werf (Heijmans)	Director business unit HIGP and involved in alliance N201 and N302
Mr. H. Witteveen (BAM)	Director business unit PPP Bam
Mr. M. van der Zwan (Heijmans)	Director business unit PPP Heijmans

Appendix 3: List of experts approached for weighing

Mr. C. Brandsen (Rijkswaterstaat)	Chief Engineer Director infra department.
Mr. P. Buck (ProRail)	Project director 'Betuweroute' and member ALT in WA
Mr. E. van Haastregt (van Hattum en Blankevoort)	Alliance manager A2 Hooggelegen
Mr. M. Heijmans (Heijmans)	Director business unit HIGP and ALT member N201 alliance and involved in WA.
Mr. T. Knipping (Gemeentewerken Rotterdam)	Project director "museumparkgarage"
Mr. M. Tiedemann (Heijmans)	Involved in WA and N201 Alliance
Mr. S. van der Werf (Heijmans)	Director business unit HIGP and involved in alliance N201 and N302

Appendix 4: Determining factors on suitability for alliances

Technical properties

General

- Size/ Budget of the project
- Duration project
- Time pressure as a result of project risks
- Number of subsystems and disciplines
- Uniqueness of project in techniques or application
- Probability of scope changes

Risk management and Optimisations

- Possible risk reductions by joined management
- Dependence on other party during execution of tasks within project
- Availability of budget for risk management.
- Opportunities for optimizations in the project
  1. Abstractness of Program of Requirements (Degrees of freedom in program of requirements)
  2. Restricted room for optimisations due to design choices of contractor in bid.
  3. Possible quality improvements inside and outside scope

Human Resources

- Human Resource
  1. Possibility: Availability of Human Resource and especially Senior Representatives to participate in alliance.
  2. Fit: Is the client organization set up adequately to operate in projects and assign people on a fulltime basis.
  3. Effectiveness: Opportunity costs to invest human resource on project.
  4. Will: The wish to invest time and people in the alliance.
- Possibility for equal representation of both parties in alliance; especially on key positions.
- Ability to create team spirit in alliance team.
- Knowledge and support of alliance principle by highest responsible manager at both sides.
- Competent person for function of alliance manager
- Ability to wear two hats by proposed members of ALT and AMT

Political context and environmental characteristics

Environmental characteristics

- Number of key stakeholders in the project
- Number of other stakeholders in the project
- Public interests in project success factors
- Expected difficulty in gaining permits and land for the project
- Complexity natural environment (explosives, archaeological items, protected flora, condition of soil, piping and conduit)
- Opportunities for income from third parties

Political context

- Political attention to project
    1. General
    2. To specific risks (e.g. displacement hospital Rotterdam; Vijzelgracht)
    3. Desired distance between contractor and political representatives
- Political acceptance for uncapped planning and costs of project
- Political acceptance in case of high profits by alliance.
- Political acceptance of no clear assigned responsibilities.
- Legal restrictions on alliances

Political behaviour by project participants

- View on term of relationship with project partner.
- Ability/willingness to see things from other parties' perspective
- Current relationship with other party in other projects.
- State of relationship between members of Alliance Leadership Team.
- Willingness to participate in risks beyond control.
- Willingness to invest money in alliance.

Uncertainties

Trust Control

- Ability of client to monitor charged costs by executive contractor in case of additional work.
- Ability to monitor estimation of shared risks executed by other party.
- Strained relationship due to low profit margins for executive contractor in bid.
- Priority of alliance interests against own interests in specific cases (e.g. pay-off in case of optimisations and risks)
- Clients attitude towards risks

Environment

- Acceptance of the alliance by stakeholders in environment.

Unknown risks

- Number and size of unknown risks.

Appendix 5: Rephrased factors as applied in model

Technical properties

General

- Sufficient size/ budget of the project?
- Sufficient duration of the project?
- Time pressure as a result of project risks present?
- Multiple subsystems and disciplines?
- Unique project in techniques or application?
- High probability of scope changes?

Risk management and Optimisations

- Substantial risk reductions by joined management?
- Dependence on other party during execution of tasks within project?
- Available budget to manage risks?
- Opportunities for optimizations in the project
  1. Sufficient abstractness of Program of Requirements? (Degrees of freedom in program of requirements)
  2. Restricted room for optimisations due to design choices of contractor in bid?
  3. Possible quality improvements inside and outside scope?

Human Resources

- Human Resource
  1. Possibility: Availability of Human Resource and especially Senior Representatives to participate in alliance?
  2. Fit: Is the client organization set up adequately to operate in projects and assign people on a fulltime basis?
  3. Effectiveness: Opportunity costs lower if the same human resources are invested on other project?
  4. Will: Is the wish present to invest time and people in the alliance?
- Possibility for equal representation of both parties in alliance; especially on key positions?
- Ability to create team spirit in alliance team?
- Knowledge and support of alliance principle by highest responsible manager at both sides?
- Competent alliance manager present?
- Ability to wear two hats by proposed members of ALT and AMT?

Political context and environmental characteristics

Environmental characteristics

- Multiple key stakeholders in the project?
- Multiple other stakeholders in the project?
- Public interests present in project success factors?
- Difficulties expected in gaining permits and land for the project?
- High complexity of natural environment? (explosives, archaeological items, protected flora, condition of soil, piping and conduit)
- Opportunities present for income from third parties?

Political context

- Political attention to project
    1. General attention present?
    2. To specific risks? (e.g. displacement hospital Rotterdam; Vijzelgracht)
    3. Distance desired between contractor and political representatives?
- Political acceptance for uncapped planning and costs of project?
- Political acceptance in case of high profits by alliance?
- Political acceptance of no clear assigned responsibilities?
- Legal restrictions on alliances?

Political behaviour by project participants

- Long-term view on relationship with project partner?
- Is ability/willingness present to see things from other parties' perspective?
- Good relationship with other party in other projects if this applies?
- Good relationship between members of Alliance Leadership Team?
- Willingness to participate in risks beyond control?
- Willingness to invest money in alliance?

Uncertainties

Trust Control

- Is the client able to monitor charged costs by executive contractor in case of additional work?
- Is the ability expected to monitor estimation of shared risks executed by the other party?
- Expected strained relationship due to low profit margins on bid for executive contractor?
- Expected priority of own interests in specific cases against alliance interests? (e.g. pay-off in case of optimisations and risks)
- Clients' attitude expected as being risk-averse in alliance?

Environment

- Acceptance of the alliance by stakeholders in environment expected?

Unknown risks

- Substantial number and size of unknown risks expected?

Appendix 6: Critical factors for Client and Contractor separately

Factor
General
Size/ Budget of the project
Duration project
Time pressure as a result of project risks
Multiple subsystems and disciplines
Uniqueness of project in techniques or application
Probability of scope changes
Risk management and optimisations
Possible risk reductions by joined management
Dependence on other party during execution of tasks within project
Abstractness of Program of Requirements
Human resources
Availability of human resources and especially senior representatives
The wish to invest time and people in the alliance
Possibility for equal representation of both parties in alliance
Ability to create team spirit in alliance team
Knowledge and support of alliance principle by highest responsible managers
Competent person for alliance manager function
Political behaviour by project participants
Willingness/Ability to see things from other parties' perspective

Table A6.1: Critical factors for Contractor

Factor
General
Size/ Budget of the project
Duration project
Time pressure as a result of project risks
Probability of scope changes
Risk management and optimisations
Possible risk reductions by joined management
Available budget to manage risks
Abstractness of Program of Requirements
Human resources
Availability of human resources and especially senior representatives
The wish to invest time and people in the alliance
Possibility for equal representation of both parties in alliance
Ability to create team spirit in alliance team
Knowledge and support of alliance principle by highest responsible managers
Competent person for alliance manager function
Ability to wear two hats by members of ALT and AMT
Political context
Desired distance between contractor and political representatives
Political behaviour by project participants
Willingness/Ability to see things from other parties' perspective
Trust control
Strained relationship due to low profit margins for executive contractor in bid
Priority of alliance interests against own interests in specific cases
Clients' attitude expected as being risk-averse in alliance

Table A6.2: Critical factors for Client

Appendix 7: Supportive model
Technical properties

Factor	Weight	Extent to which factor applies					Importance factor/ difference in weighing
General		1	2	3	4	5	
Sufficient size/ budget of the project?	4,0						high
Sufficient duration of the project?	3,6						high
Time pressure as a result of project risks present?	4,0						high
Multiple subsystems and disciplines?	3,0						Cl ↓ Co↑ medium
Unique project in techniques or application?	3,6						Cl ↓ Co↑ high
High probability of scope changes?	3,7						high
Risk management and Optimisations							
Substantial risk reductions by joined management?	4,7						high
Dependence on other party during execution of tasks within project?	3,3						Cl ↓ Co↑ medium
Available budget to manage risks?	3,9						Cl ↑ Co↓ high
Opportunities for optimizations in the project							
1. Sufficient abstractness of Program of Requirements? (Degrees of freedom in program of requirements)	3,6						high
2. Room for optimisations due to limited design choices of contractor in bid?	2,4						low
3. Possible quality improvements inside and outside scope?	2,9						medium
Human Resources							
Human Resource							
1. Possibility: Availability of Human Resource and especially Senior Representatives to participate in alliance?	3,9						Cl ↑ Co↓ high
2. Fit: Is the client organization set up adequately to operate in projects and assign people on a fulltime basis?	3,1						medium
3. Effectiveness: Opportunity costs higher if the same human resources are invested on other project?	1,7						low
4. Will: Is the wish present to invest time and people in the alliance?	4,7						high
Possibility for equal representation of both parties in alliance; especially on key positions?	4,0						high
Ability to create team spirit in alliance team?	4,0						high
Knowledge and support of alliance principle by highest responsible manager at both sides?	4,7						high
Competent alliance manager present?	4,7						high
Ability to wear two hats by proposed members of ALT and AMT?	3,4						Cl ↑ Co↓ medium

Political context and environmental characteristics

Factor	Weight	Extent to which factor applies					Importance factor/ difference in weighing
Environmental characteristics		1	2	3	4	5	
Multiple key stakeholders in the project?	2,9						medium
Multiple other stakeholders in the project?	2,4						low
Public interests present in project success factors?	2,1						CI ↑ Co↓ low
Difficulties expected in gaining permits and land for the project?	3,0						medium
High complexity of natural environment? (explosives, archaeological items, protected flora, condition of soil, piping and conduit)	2,9						medium
Opportunities present for income from third parties?	1,9						low
Political context							
Political attention to project							
1. General attention present?	1,8						low
2. Limited attention to specific risks? (e.g. displacement hospital Rotterdam; Vijzelgracht)	2,8						medium
3. Consent of contractor involvement in political issues?	3,0						CI ↑ Co↓ medium
Political acceptance for uncapped planning and costs of project?	2,3						low
Political acceptance in case of high profits by alliance?	2,0						low
Political acceptance of no clear assigned responsibilities?	2,3						low
Limited legal restrictions on alliances?	2,3						low
Political behaviour by project participants							
Long-term view on relationship with project partner?	3,0						medium
Is ability/willingness present to see things from other parties' perspective?	4,1						high
Good relationship with other party in other projects if this applies?	2,6						low
Good relationship between members of Alliance Leadership Team?	3,0						medium
Willingness to participate in risks beyond control?	3,3						medium
Willingness to invest money in alliance?	3,1						medium

Uncertainties

Factor	Weight	Extent to which factor applies					Importance factor/ difference in weighing
Trust Control		1	2	3	4	5	
Is the client able to monitor charged costs by executive contractor in case of additional work?	3,0						medium
Is the ability expected to monitor estimation of shared risks executed by the other party?	3,3						medium
Sustainability relationship expected in case of low profit margins on bid for executive contractor?	3,2						medium
Expected priority of alliance interests against own interests in specific cases? (e.g. pay-off in case of optimisations and risks)	3,6						high
Clients' attitude expected as not being risk-averse in alliance?	3,4						Cl ↑ Co↓ medium
Environment							
Acceptance of the alliance by stakeholders in environment expected?	3,3						medium
Unknown risks							
Limited number and size of unknown risks expected?	3,2						medium