How to allocate risks?
Research into the allocation of risks between public and private organisations for large infrastructure projects in the Netherlands

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Research into the allocation of risks between public and private organisations for large infrastructure projects in the Netherlands

by

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Summary

Introduction

In the Netherlands, large infrastructure projects are realised through a cooperation between public and private organisations. Cooperation refers to both behaviour that benefits all parties and the process of interacting. A good cooperation between organisations is an important factor leading to project success. Large infrastructure projects are subject to risks. For this research, a risk is defined as any uncertainty that, if it occurred, would have a negative impact on the achievement of one or more objectives. Adequate management of risks is prerequisite for a project to be successful.

Risks can be born by both the public and the private organisations. Recent research revealed that in current practice, a realistic and clear risk allocation structure is missing, resulting in risk transfer from public to private organisations (Koppenjan, Broekhans, Steenhuisen & Cremer Eindhoven, 2012). Insights in the consequences hereof with regard to the cooperation, the effectiveness and efficiency of risk management, and ultimately project performance, have not been researched yet. Insights in the causes for the current course of events have not been researched yet either. This research aims to fill this gap. In addition, this research aims to make recommendations to allocate risks in a manner that ultimately supports project performance. Therefore, the central question of this research reads as follows:

*How to allocate risks between public and private organisations for large infrastructure projects in the Netherlands in order to support the cooperation, the effectiveness and efficiency of risk management, and ultimately project performance?*

For this research, a case study strategy is chosen. Three cases are selected, namely project ZuidasDok, project Afsluitdijk, and project Haak om Leeuwarden. Because the first two cases were still in the plan development phase, for these cases, only the allocation of risks between the public organisations and the engineering companies is investigated.
For the third case, also the allocation of risks between the public organisations and the contractors is investigated. For the realisation of these projects, for each case, the public organisation established a project organisation, which was responsible of the execution of the project, and a steering group, which was responsible for the steering of the project organisation. For all cases, data is obtained through interviews with respondents from the steering group, the project organisation, and the private organisation.

Results and conclusions

For all three cases, the allocation of risk was not always fully accepted and clear. This affected the behavioural element of the cooperation on project management level, which in turn affected project performance (value for money) through claims and lesser quality. In addition, risks were not always allocated to, and managed by, the organisation which was best able to control the risk chance of occurring and manage the risk in case of occurring. As a result, the effectiveness and efficiency of risk management, and therefore project performance, were not optimal. For this course of events, the following five causes are found:

1. The handing of contracts and risks by the public organisations.
2. Insufficient understanding of the principles of risk allocation.
3. Separately identifying risks, analysing risks, and determining control measures.
4. The strong bargaining power of the public organisations.
5. Strategic behaviour by both public and private organisations.

In the following paragraphs, these causes are explained.

Public organisations underestimated the influence of the contract, and associated allocation of risks, and the handling of risks, on the cooperation with private organisations. Respondents from public organisations acknowledged the importance of a good cooperation. However, the handling of contracts and risks (top-down control) resulted in allocations of risks which were not fully accepted and clear, which was counterproductive to a good cooperation.

In all cases, the contract for the engineering works was determined by the project organisation. The allocation of risks was not explicitly discussed, but the public organisation’s preferred allocation of risks was made part of the contract and imposed upon the private organisation. The contract type for the construction works was, in all cases, established in the steering group. The decision to opt for a certain contract type was based on political considerations, financial considerations, and maintenance management.
considerations. For project Haak om Leeuwarden, although explicitly discussed with the contractors, the project organisation determined its preferred allocation of risks (within the frameworks of the contract type) which it imposed upon the contractors.

The decision making with regard to the control of top risks was conducted by the steering groups. In two cases, respondents from the project organisation indicated that it was difficult to transfer the management of a risk to the steering group. With the input by the private organisations, little was done. This mechanism stimulated risk transfer.

Respondents from both public and private organisations understood the concepts of risk allocation insufficiently in order to allocate risks properly. In literature, different sets of risk allocation criteria are listed. The most specific and complete set consists of seven criteria. Respondents only mentioned one criterion, which reads as follows: ‘A risk can best be allocated to the organisation which is best able to manage the risk.’ The interpretation of this criterion was ambiguous.

Although it was considered best to identify risks, analyse risks, and determine control measures jointly, public and private organisations conducted these activities mostly separately. Risks were listed in separate risks registers, which were not (or only partly) shared. In two cases, this resulted in differing perceptions of the project’s risk profile, thus affecting the clarity of the allocation of risks. In one case, unilaterally determining control measures resulted in risk transfer. Respondents indicated that jointly identifying risks, analysing risks, and determining control measures, results in the most complete and highest quality risk registers, and the most effective and efficient control measures. A possible explanation for the difference between current practice and the desired situation is the expectation that the counterpart organisation acts strategically.

During procurement, the strong bargaining power of the public organisations contributed to risk transfer. To illustrate, a respondent from a private organisation, when asked why the private organisation agreed to an unfavourable risk allocation, indicated that it was a matter of ‘take it or leave it.’ This mechanism put pressure on the revenues by the private organisations, and hence on the acceptance of the risk allocation.

Strategic behaviour by both public and private organisations influenced the allocation of risks. The goal of strategic behaviour is to raise one’s profits. In the context of risk allocation, public organisations can act strategically by toning down the magnitude of risks, allowing for beneficial risk transfer. In turn, private organisations can act strategically by exaggerating the magnitude of risks, raising their compensation for taking on risks. In the cases, it is observed that both public and private organisations did not always
share complete relevant information timely. Respondents indicated that this influenced the allocation of risks.

**Recommendations**

In order to support the cooperation, the effectiveness and efficiency of risk management, and ultimately project performance, the allocation of risks should be generally accepted and clear, and risks should be allocated to the organisation which can manage them most effectively and efficiently. Therefore, the following is recommended:

1. Public and private organisations could best identify risks, analyse risks, allocate risks, and determine control measures as much as possible during procurement, because this will enhance the clarity of the allocation of risks.

2. Public and private organisations could best share and discuss complete relevant information regarding risks with each other, because this will enhance the clarity about the risks to be allocated.

3. Public and private organisations could best share and discuss complete relevant information regarding control measures with each other, because this allows for the determination of the most effective and efficient control measures.

4. Public and private organisations could best allocate risks in consultation, because this will reduce adverse risk transfer and increase the acceptance of the allocation of risks. In addition, a risk could best be allocated to the organisation which best meets the following criteria (Lam, Wang, Lee & Tsang, 2007):

   (a) Whether the party is able to foresee the risk.
   (b) Whether the party is able to assess the possible magnitude of consequences of the risk.
   (c) Whether the party is able to control the risk chance of occurring.
   (d) Whether the party is able to manage the risk in case of occurring.
   (e) Whether the party is able to sustain the consequences if the risk occurs.
   (f) Whether the party will benefit from bearing the risk.
   (g) Whether the premium charged by the risk receiving party is considered reasonable and acceptable for the owner.

Allocation based on these criteria will yield the highest acceptance of the allocation of risks, and the most effective and efficient management of risks.
5. Public organisations could best enable their adaptive capacity by applying administrative leadership (top-down control), adaptive leadership (bottom-up control), and enabling leadership (management of entanglement between administrative and adaptive leadership) alternately, because this allows for the allocation of risks in consultation (recommendation 4).
Preface

This thesis is the result of my research into the allocation of risks between public and private organisations for large infrastructure projects in the Netherlands. I conducted this research as part of my graduation project for the master Construction Management and Engineering at Delft University of Technology.

I would like to thank my graduation committee. Marcel Hertogh, thank you for supervising this research, and for your valuable feedback during meetings. Leonie Koops, thank you for the good supervision, and the many interesting discussions we had. I wish you all the best in completing your PhD research. Martijn Leijten, thank you for your insights with regard to strategic behaviour and risk management. And finally, Hans van Daele, thank you for your energy, your involvement, and facilitating this research on behalf of Witteveen+Bos.

In addition, my thanks goes out the the many respondents who took the time to help me and to provide the data for this research. Without their contributions, this research would not have been possible.

Erik Jan Moll

Delft, January 2015
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Introduction

In 2009, the realisation of project Spoorzone Delft was started. The project comprised a railway tunnel, an underground station, an underground parking garage, and urban development. The contracting authority, and hence the risk bearing party, was the municipality of Delft. Leading up to the realisation, the municipality of Delft indicated that it had insufficient support to bear the responsibility, and associated risks, for the project any longer. This brought the project in jeopardy. Therefore, the Minister of Infrastructure and Environment agreed to take on the estimated risk of €45 million, enabling the project to proceed (Rijksoverheid, 2008).

The above anecdote illustrates the subject of this research: the allocation of risks. More specifically, the subject of this research is the allocation of risks between public and private organisations for large infrastructure projects in the Netherlands. In the following sections, the research context, the problem definition, a review of current literature, the research objectives and questions, and the reading guide, are described.

1.1 Research context

Research on infrastructure projects has shown that in terms of costs, these projects do not perform as promised. Flyvbjerg, Skamris Holm and Buhl (2003) stated that worldwide, 9 out of 10 infrastructure projects suffer from cost overruns with an average cost overrun of 28% (with a standard deviation of 39%). Average cost overruns for large infrastructure projects in the Netherlands are 16.5% (Cantarelli, 2011), which is less
than the worldwide average but still far from optimal. Project performance thus needs to be improved.

Research on project performance revealed a great variety of factors which are critical to project success (Chan, Scott & Chan, 2004). In the context of this research, two of these factors are of importance. The first factor is the cooperation between organisations involved. In the Netherlands, large infrastructure projects are realised through a cooperation between public and private organisations. Within this cooperation, public organisations, such as the national government, provinces, and municipalities, act as client, and private organisations, such as consultants, engineering companies, and contractors, act as contractor. The cooperation between public and private organisations is a critical factor leading to project success (Phua & Rowlinson, 2004). Unfortunately, cooperation in the construction industry is ‘beset by disputes’ (Brooker & Lavers, 1997).

The second factor is the management of risks. Large infrastructure projects are subject to risks. Hillson and Simon (2012) defined a risk as ‘any uncertainty that, if it occurred, would have a positive or a negative effect on the achievement of one or more objectives.’ Large infrastructure projects are typically faced by nine types of risk, namely technical, construction, operating, revenue, financial, force majeure, regulatory/political, environmental, and project default risk (Grimsey & M. K. Lewis, 2002). Adequate management of these risks is a prerequisite for a project to be successful. Based on research by Cooke-Davies (1998), Hillson and Simon (2012) stated that ‘risk management is the single most influential factor in project success.’

Cooperation and risk management are thus critical factors for a project to be successful. The manner in which the allocation of risks relates to these factors, and the problems encountered with the allocation of risks, are explained in the following section.

1.2 Problem definition

The preliminary emergence phases of a project, called the front-end development (Morris, 2011), have a major influence on project performance, offering the greatest opportunity for creating value (Edkins, Gerald, Morris & Smith, 2013). During the front-end development of large infrastructure projects, many decisions are made concerning what will be built and how actors involved cooperate. Koppenjan et al. (2012) labelled this set of decisions, agreements and orders, which collectively determine the conditions for the realisation of a large infrastructure project, the Consent Decision. They stated that characteristics of a good Consent Decision are the absence of interference by politics, a clear task, role and risk allocation, distinct desired behaviours and principles for the
exchange of information.

According to Koppenjan et al. (2012), for large infrastructure projects in the Netherlands, a realistic and clear risk allocation structure is missing. As a result, public organisations often shift (unanticipated) risks to private organisations. Private organisations can respond by including a contingency in the price to cover the risks, increasing construction costs and weakening its competitive position, or by not including a contingency in the price, risking financial problems if a risk eventuates. In both cases, the relationship between the public and private organisations is put under stress, which can harm the cooperation through disputes (Jannadia, Assaf, Bubshait & Naji, 2000). Furthermore, improper allocated risks can lead to ineffective and inefficient risk management (Abednego & Ogunlana, 2006).

### 1.3 Research on risk allocation

Current literature on the allocation of risks in construction is primarily focussed on researching preferred risk allocations between public and private organisations, such as the researches by Bing, Akintoye, Edwards and Hardcastle (2005), Shen, Platten and Deng (2006), Grimsey and M. Lewis (2007), El-Sayegh (2008), Ke, Wang and Chan (2010) and Hwang, Zhao and Gay (2013). Ng and Martin Loosemore (2007) stated that the models (preferred risk allocations) these researches present, can be useful for both public and private organisations, but that it remains very important to understand the limitations of such models and that risks must be analysed and managed on a project-by-project basis. These models thus provide only limited help in determining risk allocations. Exceptions to this general trend in research on risk allocation are the research by Lam et al. (2007), in which a decision making model for risk allocation using fuzzy logic is described, and the research by Ng and Martin Loosemore (2007), in which the rationale behind decisions about risk allocations between public and private sectors and their consequences are described. Research into the factors that influence the problems currently encountered with the allocation of risks between public and private organisations, and the consequences hereof with respect to the cooperation, the effectiveness and the efficiency of risk management, and ultimately project performance, for large infrastructure projects in the Netherlands, has not been conducted.
1.4 Research objectives and questions

This research aims to contribute to theory by providing insight in a) the risk allocations between public and private organisations for large infrastructure projects in the Netherlands, b) the consequences hereof with regard to the cooperation, the effectiveness and the efficiency of risk management, and ultimately project performance, and c) the factors that influence the manner in which these risk allocations are established. In addition, a contribution to practice is aimed for by making recommendations to public and private organisations to allocate risks in a manner that supports the cooperation, the effectiveness and the efficiency of risk management, and ultimately project performance. In order to achieve these objectives, this research is focussed on the following main question:

1. How to allocate risks between public and private organisations for large infrastructure projects in the Netherlands in order to support the cooperation, the effectiveness and the efficiency of risk management, and ultimately project performance?

To answer the main question, insights in risk allocation in practice, its consequences, and factors by which it is influenced, are required. Therefore, the following three sub questions are formulated:

1.1 What insights in the risk allocation criteria, process and outcome can be derived from practice and literature?

1.2 What insights in the influence of the risk allocation on the cooperation, the effectiveness and the efficiency of risk management, and ultimately project performance, can be derived from practice and literature?

1.3 What insights in the factors that influence the risk allocation can be derived from practice and literature?

Because it is expected that public organisations, in their role as client (or contracting authority), have a major impact on the allocation of risks, for sub question 1.3, special attention is given to the manner in which public organisations handle risks.

1.5 Reading guide

This research is divided in six chapters. In chapter 2 (Theoretical framework), current theory on the concepts of project performance, cooperation, risk management, risk allocation, and organisation, is described. In chapter 3 (Research methodology), the research
perspective, the research strategy, and the research design are explained, followed by the selection and introduction of the projects to be examined. The findings with regard to the allocation of risks for two projects, are elaborated in chapter 4 (Exploration). Consecutively, in chapter 5 (Analysis and verification), these findings are analysed, on the basis of which proposition are derived. In addition, findings with regard to these propositions for a third project are described. Finally, in chapter 6 (Conclusions and recommendations), conclusions are drawn and recommendations are made.
Theoretical framework

In the previous chapter, the research perspective was introduced, as illustrated in figure 2.1. In this chapter, the relevant concepts, and their interrelations, are further explored. In section 2.1, the concept of project performance is discussed. In section 2.2, the concept of cooperation is defined, and the relation between cooperation and project performance is elaborated. A definition of risk, different types of risk, and the process of risk management, are described in section 2.3, followed by a review of current literature on risk allocation in section 2.4. Finally, in section 2.5, the organisational structure of public organisations, and theory on leadership, are described.

Figure 2.1: Conceptual model

2.1 Project performance

‘There are a few topics in the field of project management that are so frequently discussed and yet so rarely agreed upon as the notion of project succes’ (Pinto & Slevin,
Traditionally, a project was considered a success if performance goals (quality), time and budget were met (Chan, Scott & Lam, 2002). However, this view does not consider the impact of projects beyond these goals, and this view does not take into account that different stakeholders can have different perspectives on project success. In this section, dimensions of project performance, perspectives on project performance, a model to express project performance and factors that influence project performance are described.

Shenhar, Dvir, Levy and Maltz (2001) developed a multidimensional framework for assessing project success. They distinguished four dimensions of project success. The first dimension, ‘project efficiency’, is concerned with meeting time, budget and requirements goals. The second dimension, ‘impact on the customer’, addresses the importance placed on customer requirements and meeting their needs. ‘Business and direct success’, the third dimension, relates to the impact the project may have on the organisation through profits, market share and other related business results. The fourth and final dimension, ‘preparing for the future’, refers to the issue of preparing the organisational and technological infrastructure for future opportunities. Shenhar et al. (2001) stated that the relative importance of these four dimensions depends on the timeframe and the technological uncertainty of a project, as illustrated in figure 2.2.

![Figure 2.2: Relative importance of the dimension of project success (Shenhar, Dvir, Levy & Maltz, 2001)](image)

Mintzberg (1980) distinguished five basic parts of an organisation, namely the strategic apex, the middle line, the operating core, the technostructure and the support staff. The latter two are not part of the ‘line’ structure (the core business of the organisation), and are therefore in this context of no further importance. The strategic apex, also referred to as strategic level, comprises of an organisation’s general management, and
is concerned with long-term goals. The middle line, or tactical level, consists of managers in direct line between the strategic apex and the operating core, and is concerned with medium-term goals. Finally, the operational core, or operational level, includes all employees engaged in the production of the basic products or the provision of the basic services, and is concerned with short-term goals. Combining these organisational levels with the dimensions of project performance, it follows that the operational level is concerned with project efficiency and impact on the customer; the tactical level with impact on the customer and business success; and the strategic level with business success and preparing for the future.

Public and private organisations hold different views on what constitutes project success. Van Loenhout (2013) researched the success determination of construction projects by public organisations at operational level by interviewing a total of twenty-eight public project managers. Nineteen criteria used to determine project success were identified. These are illustrated in figure 2.3. Based on the relative importance the different public project managers assigned to the success criteria, Van Loenhout (2013) identified three perspectives (holistic and cooperative leadership, socially engaged ambiguous manager, and execution of top-down imposed assignment) held by public project managers. From this, it follows that the success determination by public organisations at operational level differs. Furthermore, the success determination by public organisations at tactical and strategic level is lacking. A critical note by the research by Van Loenhout (2013) is that it can be argued that project managers also act at tactical level.

<table>
<thead>
<tr>
<th>Delivered on time</th>
<th>Efficient use of available resources</th>
<th>Fit for purpose</th>
<th>Learning opportunities for client organisation</th>
<th>Personal growth and development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profitability for contractor</td>
<td>Quality</td>
<td>Safety</td>
<td>Satisfies needs of project team</td>
<td>Satisfies needs of stakeholders</td>
</tr>
<tr>
<td>Satisfies needs of users</td>
<td>Within budget</td>
<td>Effect on the professional image of client org.</td>
<td>Good working relationship with contracting partners</td>
<td>Impact on the environment (sustainability)</td>
</tr>
<tr>
<td>Right process if followed</td>
<td>Continuation of client organisation</td>
<td>Project specific political or social factors</td>
<td>Satisfies needs of shareholders</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2.3: Success criteria for public project managers (Adapted from Van Loenhout, 2013)

Al-Tneemy, Abdul-Rahman and Harun (2011) researched the success determination of building projects by contractors, which resulted in a multi-dimensional framework consisting of thirteen success criteria. The framework includes three dimensions, covering the short-, medium-, and long-term. The first dimension, concerned with the short-term, was labelled project management success. Criteria to determine project management success are adherence to quality targets, adherence to schedule, and adherence to budget. Criteria to determine product success, the second dimension, concerned with the medium-
term, are customer satisfaction, functional requirements, and technical specifications. Finally, market success, the third dimension, concerned with the long-term, is determined by means of the criteria revenue and profit, market share, reputation, and competitive advantage. The framework is illustrated in figure 2.4. The framework offers insight in the success determination by private organisations at operational, tactical and strategic level.

**Figure 2.4:** Success criteria for building projects for contractors (Al-Tmeemy, Abdul-Rahman & Harun, 2011)

De Ridder (2013) expressed project performance as the ratio between value and cost. Value is the project outcome, which in turn is the sum of the perceptions of the stakeholders of the project output, taking the four dimensions of project success into account. Cost refer to all expenses made in order to realise the project output. Maximum project performance is achieved through maximisation of the ratio between value and costs. Both value and cost are subject to lower and upper boundaries. The value-cost model is illustrated in figure 2.5. For this research, in order to express project performance, the value-cost model by De Ridder (2013) is adopted.

**Figure 2.5:** Value-cost model (Adapted from De Ridder, 2013)
Chan et al. (2004) developed a conceptual framework, describing five major groups of independent variables, namely project-related factors, project procedures, project management actions, human-related factors, and external environment, which were identified as critical to project success. Therefore, these independent variables were labelled critical success factors. The conceptual framework is illustrated in figure 2.6. It can be observed that many of the critical success factors in the group human-related factors, although not explicitly named, relate to the cooperation between client and contractor, and that many of the critical success factors in the group project management actions, relate to the management of risks. It follows that the cooperation and the management of risks are critical to project success. In the following two sections, these concepts are further explored.

Figure 2.6: New conceptual model for factors affecting project success (Chan, Scott & Chan, 2004)

2.2 Cooperation

In construction management literature, cooperation is loosely defined (Anvuur, 2008). The English Oxford Dictionary defined ‘cooperation’ (2014) as ‘the action or process of
working together to the same end.’ In the context of construction management, Anvuur (2008) explained this definition as follows: ‘ [...] the concept of cooperation refers to **behaviour** that benefits all parties. In construction, this often involves/implies problem-solving, creating new value together or striving for win-win scenarios. Cooperation is also a **process** and emphasises the pattern and quality of interactions, activities and social relations.’ Cooperation takes place on both individual and organisational level. Cooperation is often confused with collaboration. The English Oxford Dictionary defined collaboration as ‘the action of working with someone to produce something.’ Anvuur (2008) illustrated the difference between both concepts by stating that every construction project typically involves collaboration between – amongst others – clients, designers and constructors, but that cooperation, or goal congruence, is rather an aberration. For this research, the definition of cooperation by Anvuur (2008) is adopted. Furthermore, cooperation refers to inter-organisational cooperation.

Phua and Rowlinson (2004) researched the influence of cooperation on construction project succes, by quantifying explicitly the extent to which cooperation, in relation to other factors, determines construction project succes. It was concluded that cooperation is perceived as vital to construction project succes, and that intra-organisational cooperation is regarded as more important than inter-organisational cooperation. A cooperative approach between construction organisations increases project performance through the establishment of trust and commitment-induced efficiency, and better resource allocation and utilisation.

### 2.3 Risk and risk management

Hillson and Simon (2012) distinguished three views with regard to the definition of risk. The first view considers an uncertainty with negative impacts as a risk, and an uncertainty with positive impacts as an opportunity. This view holds that risks and opportunities should be treated separately. The second view considers risk as an uncertainty, which can have negative impacts (threat) or positive impacts (opportunity). Both threats and opportunities should be treated together. The third and final view considers risk as an uncertainty whereby it is of no importance whether the impacts are negative or positive. Based on these views and on an extensive literature review, Hillson and Simon (2012) defined risk as ‘any uncertainty that, if it occurred, would have a positive or a negative effect on the achievement of one or more objectives.’ Generally, risk is expressed as the multiplication of the probability of occurrence \( p \) and the impact \( i \) (which can be expressed in terms of both value and costs) (M. Loosemore, Raftery,
Reilly & Higgon, 2006). For this research, uncertainties with negative consequences are indicated with ‘risks’ and uncertainties with positive consequences are indicated with ‘opportunities’.

Infrastructure projects are faced by many risks. Ng and Martin Loosemore (2007) classified risks into two main groups, namely project risks and general risks. Project risks ‘arise from the way a project is managed or from events in its immediate environment’, such as natural, technical, materials, organisational, manpower, contractual and environmental problems. General risks ‘arise from natural, political, regulatory, legal and economic events in the general macro-environment surrounding the project.’ Grimsey and M. K. Lewis (2002) distinguished nine categories of risk, namely technical risk, construction risk, operating risk, revenue risk, financial risk, force majeur risk, regulatory/political risk, environmental risk, and project default. Miller and Lessard (2001) distinguished three main groups of risks, namely market-related risks (demand, financial and supply risks), completion risks (technical, construction and operational risks), and institutional risks (regulatory, social acceptability and sovereign risks). From this it follows that, although classified differently, infrastructure projects are faced by different types of risks.

Figure 2.7: Stages of the risk management process, and the risk management process through the project life cycle (Hillson & Simon, 2012)

Hillson and Simon (2012) stated that, although a number of standards documents – such as the Project Management Body of Knowledge and the Project Risk Analysis and Management Guide – offer different approaches to the risk management process, their contents are generally agreed upon and differences are limited to terminology. Hillson and Simon (2012) described the risk management process in terms of eight stages. The first stage, initiation, aims to define project objectives. The second stage, risk identification, relates to identifying all knowable risks and initial risk responses. Risk
assessment, the third stage, is concerned with prioritising risks for further attention. Appropriate responses to identified risks are developed in the fourth stage, risk response planning. The results of these first four stages are reported to key stakeholders in the fifth stage labelled reporting. In the sixth stage, implementation, the agreed actions are implemented. The seventh stage, review, is concerned with monitoring challenges to keep information up to date. Finally, the eighth stage, labelled post-project review, aims to learn lessons for the future. The risk management process needs to be carried out throughout the project life cycle. The stages of the risk management process, and the risk management process through the project life cycle, are illustrated in figure 2.7.

Smith, Merna and Jobling (2013) stated that the risk management process is an iterative process with loops back to previous stages to secure verification and project team ownership. Furthermore, Smith et al. (2013) stated that risk identification and risk assessment can best be conducted by groups of key stakeholders and experts, because group judgements are mostly more accurate than individual judgements, and because groups have a wider range of knowledge compared to individuals, making their judgements more realistic.

### 2.4 Risk allocation

Risk allocation is the definition and division of responsibility associated with a possible future loss or gain (Uff & Odams, 1995). A risk allocation in which the differing (and conflicting) needs of organisations involved are satisfied, is a prerequisite for a project to be successful (Grimsey & M. K. Lewis, 2002). The ultimate goal of proper risk allocation is to maximise project performance (Irwin, 2007). Improper risk allocation can result in costly work disputes, the delivery of low quality work and litigation of contractual claims upon completion (Lam et al., 2007).

![Figure 2.8: Concept of proper risk allocation (Adapted from Abednego & Ogunlana, 2006)](image)

Abednego and Ogunlana (2006) described a concept of proper risk allocation as an iterative process consisting of four aspects (figure 2.8). The first aspect is concerned with the risks to be allocated; the second with the willingness and ability of a party to accept risks; the third with the right time to allocate the risks; and the fourth with best strategies to prevent / minimise the consequences.
accept risks; the third with the right time to allocate risks; and the fourth with the best strategies to prevent or minimise the consequences. In order to allocate a risk to the organisation which is both able and willing to carry the risk, risk allocation criteria have been established. In literature, different sets of risk allocation criteria are described. Four sets of risk allocation criteria from recent and widely cited papers and books are summarised here. According to Irwin (2007), a risk should be allocated based on each party's ability to:

1. Influence the corresponding risk factor.
2. Influence the sensitivity of total project value to the corresponding risk factor.
3. Absorb the risk.

According to Ng and Martin Loosemore (2007), a risk should be allocated to a party which:

1. Has been make fully aware of the risks it is taking.
2. Has the greatest capacity (expertise and authority) to manage the risk effectively and efficiently (and thus charge the lowest risk premium).
3. Has the capability and resources to cope with the risk eventuating.
4. Has the necessary risk appetite to want to take the risk.
5. Has been given the chance to charge an appropriate premium for taking it.

Based on previous works by Ward, Chapman and Curtis (1991), Edwards (1995) and Flanagan and Norman (1993), Abednego and Ogunlana (2006) identified the following five risk allocation criteria:

1. Risks should be allocated to the party with the best capability to control the events that might trigger its occurrence.
2. Risks must be properly identified, understood and evaluated by all parties.
3. A party must have the technical/managerial capability to manage the risks.
4. A party must have the financial ability to sustain the consequences of the risk or to prevent the risk from occurring.
5. A party must be willing to accept the risk.

Finally, based on previous works by Thompson and Perry (1992), Casey (1979), Knesel (1979), Barnes (1983) and Abrahamson (1984), Lam et al. (2007) identified the following seven risk allocation criteria:

1. Whether the party is able to foresee the risk.
2. Whether the party is able to assess the possible magnitude of consequences of the risk.
3. Whether the party is able to control the risk chance of occurring.
4. Whether the party is able to manage the risk in case of occurring.
5. Whether the party is able to sustain the consequences if the risk occurs.
6. Whether the party will benefit from bearing the risk.
7. Whether the premium charged by the risk receiving party is considered reasonable and acceptable for the owner.

From these enumerations, it follows that, although all sets of risk allocation criteria are concerned with the ability and willingness of a party to accept a risk, consensus with regard to a specific set of risk allocation criteria is lacking.

Figure 2.9: Framework for the process of negotiation for risk allocation (Adapted from Bing, Akintoye, Edwards & Hardcastle, 2005)

The concept of proper risk allocation by Abednego and Ogunlana (2006) does not comprise a framework for the process of negotiation for risk allocation. Such a framework was described by Bing et al. (2005) (figure 2.9). In this framework, the public organisation proposes a preferred risk allocation to the private organisation. Subsequently, the private organisation prices the risks. The public organisation can accept the bid if it considers the bid to be reasonable, or the public organisation can reject the bid and start renegotiation, until the risk allocation is agreed upon. This framework shows that public organisations should offer private organisations room for negotiation, and that risk allocation should be discussed explicitly, until an allocation is agreed upon.

To conclude this section, some remarks on factors that influence risk allocation. Fig-
Figure 2.10: Factors influencing payment choice (Smith, Merna & Jobling, 2013)

ure 2.10 shows that the contract type, which determines the payment mechanism, influences the allocation of risks. In practice, risk allocation is often more influenced by economics, commercial requirements, debt financier’s requirements, bargaining power, and company culture and policies, than by the criteria listed above (Ng & Martin Loosemore, 2007). In addition, Medda (2007) stated that risk allocation can be influenced by strategic behaviour and moral hazard problems. Because this research is focused on the influence of the public organisation on the risk allocation, this factor is further explored in the following section.

2.5 Organisation

In the Netherlands, the government is responsible for the management of the national infrastructure, and for the execution of infrastructure projects. In this section, the organisational structure of the government (or public organisation) is explained, followed by theory on the management of organisations dealing with rapidly changing complex problems.

The government assigns infrastructure projects to Rijkswaterstaat, which is the executive organisation of the government, and which acts as contracting authority towards the private organisations. The government and rijkswaterstaat combined, are referred to as public organisation. Within the public organisation, a distinction can be made
between the line organisation, and project organisations. The line organisation is responsible for the management of the national infrastructure, while the project organisations are responsible for the execution of infrastructure projects. The organisational structure of the public organisation is illustrated in figure 2.11.

Uhl-Bien, Marion and McKelvey (2007) stated that leadership models of the last century, which are mostly concerned with simplifying and rationalising strategies through top-down control, are well-suited for physical production, but not for the current knowledge economy. It is argued that, in order to deal with the new context of rapidly changing complex problems, knowledge-producing organisations need to enable their learning, creative and adaptive capacity, by enabling the dynamics of complex adaptive systems (CAS). CAS are defined as an aggregate of interacting agents whose behaviour is emergent as opposed to predetermined, whose history is irreversible, and whose future is unpredictable. Furthermore, in CAS, ‘agents, events, and ideas bump into each other in somewhat unpredictable fashion, and change emerges from this dynamic interactive process.’ In order to enable the learning, creative, and adaptive capacity of CAS, Uhl-Bien et al. (2007) developed Complexity Leadership Theory (CLT). CLT is comprised of three entangled leadership roles, namely adaptive leadership, administrative leadership, and enabling leadership. Adaptive leadership is defined as ‘an emergent, interactive dynamic that is the primary source by which adaptive outcomes are produced in a firm.’ Administrative leadership is defined as ‘the actions of individuals and groups
in formal managerial roles who plan and coordinate organisational activities.’ Finally, enabling leadership ‘serves to enable adaptive dynamics and help manage the entanglement between administrative and adaptive leadership.’ The three leadership roles are illustrated in figure 2.12. It is concluded that all three leadership roles should be applied alternately.

CLT applies to large infrastructure projects, because both public and private organisations involved in large infrastructure projects can be considered knowledge-producing organisations, and because large infrastructure projects can be considered rapidly changing complex problems.

**Figure 2.12**: Complexity leadership theory: administrative, adaptive, and enabling leadership (Own illustration for Uhl-Bien, Marion & McKelvey, 2007)
Research methodology

In this chapter, the research methodology is described. The chapter is divided in four sections. In section 3.1, the research strategy – case study research – is explained. The research design, which addresses the research quality, the research questions, the case study design, data analysis and data gathering, is described in section 3.2. In section 3.3, the concepts from the conceptual model, for which the theoretical framework does not provide a definition, are elaborated. Finally, in section 3.4, the cases to be investigated are selected and introduced.

3.1 Research strategy

When conducting research, many different research strategies – such as an experiment, a survey, an archival analysis, a history or a case study – can be used. Yin (2014) distinguished three conditions that determine the decision to opt for a certain strategy. The first condition is concerned with the form of the research question. Different types of research questions are – among others – ‘who’, ‘what’, ‘where’, ‘how’ and ‘why’ questions. In general, ‘who’, ‘what’ and ‘where’ questions are of an exploratory nature, and therefore favour the use of a survey or an archival analysis. ‘How’ and ‘why’ questions have a more explanatory nature, making an experiment, a history or a case study a more suitable research strategy. As described in chapter 1, the main question of this research is: ‘How to allocate risks between public and private organisations for large infrastructure projects in the Netherlands in order to support the cooperation, the effectiveness
and the efficiency of risk management, and ultimately project performance?” Therefore, an experiment, a history or a case study are the most suitable research strategies. The second condition is concerned with the degree of focus on contemporary as opposed to historical events. When historical events are subject of investigation, a history research strategy can be applied. If contemporary events are subject of investigation, an experiment or a case study research strategy is preferred. This research is about the allocation of risks in infrastructure projects in current practice, therefore excluding the history research strategy. The third and final condition is concerned with the extent of control over behavioural events. If control over behavioural events is required, an experiment research strategy should be applied. For this research, no control over behaviour events is required. Therefore, a case study strategy is chosen.

3.2 Research design

The quality of research designs can be judged on the basis of the four criteria, namely external validity, construct validity, reliability, and internal validity. External validity is concerned with establishing the domain to which a study’s findings can be generalised. Construct validity relates to establishing correct operational measures for the concepts being studied. Reliability is concerned with demonstrating that the operations of a study can be repeated with the same results. Finally, internal validity relates to establishing a causal relationship, whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationships (Yin, 2014). External validity, construct validity, reliability and interval validity are addressed in this section.

Yin (2014) distinguished four case study designs, namely holistic single-case designs, embedded single-case designs, holistic multiple-case designs and embedded multiple-case designs. In a single-case design, one case is investigated. A single-case design can be applied if the case is critical, extreme/unique, representative/typical, revelatory or longitudinal. Arguments against single-case designs are the limited strength of the conclusions in comparison with multiple-case designs and the limited external generalisability. In a multiple-case design, two or more cases are investigated. A multiple-case design can be applied to increase the robustness of the findings in comparison to single-case designs, by making use of replication logic. Replication logic comprises the replication of findings from different cases, either through literal or theoretical replication. Literal replication predicts similar results for each case; theoretical replication predicts contrasting results for each case for predictable reasons. Arguments against multiple-case designs are its time and resource consuming nature. In a holistic design, within a single case, one unit
is analysed. In an embedded design, within a single case, several units are analysed. In order to increase the external validity, and because the research is comprised of several units of analysis, an embedded multiple-case design is chosen.

3.2.1 Research questions

The research questions are drafted on the basis of the five levels of research questions distinguished by Yin (2014). The questions on level 5 and 4 are already introduced in section 1.4 as the main question and the sub questions. The questions on level 3 are formulated as follows:

1. How are risks allocated in practice?
2. What are the consequences of the risk allocation in practice with regard to the cooperation and the effectiveness and efficiency of risk management?
3. Which factors influence the risk allocation in practice? How?

The questions on level 2 and 1 are described in the case study protocols, which are included in appendices A and B.

3.2.2 Data gathering and analysis

This research is divided in six steps. These six steps, their inputs, the questions they answer, and the chapters in which they are described, are illustrated in figure 3.1. Internal validity is enhanced through explanation building and cross-case synthesis.

<table>
<thead>
<tr>
<th>Step</th>
<th>Theoretical exploration</th>
<th>Exploration</th>
<th>Analysis</th>
<th>Verification</th>
<th>Synthesis</th>
<th>Recommend.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>Literature</td>
<td>Case 1 and 2</td>
<td>Results from exploration</td>
<td>Propositions and case 3</td>
<td>Results from A&amp;V and theory</td>
<td>Results from synthesis</td>
</tr>
<tr>
<td>Question</td>
<td>Questions level 4</td>
<td>Questions level 2 (1)</td>
<td>Questions level 3</td>
<td>Questions level 4</td>
<td>Questions level 5</td>
<td></td>
</tr>
<tr>
<td>Chapter</td>
<td>Chapter 2</td>
<td>Chapter 4</td>
<td>Chapter 5</td>
<td>Chapter 6</td>
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Figure 3.1: Research framework

For all selected cases, information on the project’s goal and scope, the organisational setup, the risk allocation, and the risk management practices, are obtained through documents from both public and private organisations, such as structure schemes, administrative agreements, project plans, governance reports, risk registers, project management plans (PMPs), and progress reports.

The first two cases are used to explore risk allocation in practice, the factors that influence the risk allocation, and the consequences of the risk allocation with regard to
the cooperation and the effectiveness and the efficiency of risk management. For each of both cases, data is obtained through semi-structured interviews with a) a representative from the public line organisation, b) the projectdirector of the (public) project organisation, c) the projectmanager of the private organisation, and d) the technical manager of the private organisation. Two interview protocols are drafted; one for the interviews with the representatives from the public line organisations, and one for the interviews with the projectdirectors of the (public) project organisations, the project managers of the private organisations and the technical managers of the private organisations. These interview protocols are included in appendix A. The third case is used to verify the findings from the first two cases. Data is obtained through closed interviews with representatives from the public line organisations, the projectdirectors of the (public) project organisations, and the project managers of the private organisations. One interview protocol is drafted, which is included in appendix B.

Strengths of interviews are that they are targeted and insightful; weaknesses of interviews are the question bias, the response bias, inaccuracies due to poor recall and reflexivity by the respondent. The question bias is minimised through feedback by supervisors on the interview protocol. The response bias is minimised through triangulation of interviews when possible. Inaccuracies due to poor recall are minimised by recording the interviews and a check of the interview report by the respondent. For the semi-structured interviews, reflexivity by the respondent is minimised by the formulation of the questions (open instead of steering) and focussed listening (instead of sharing thoughts) during interviews.

Construct validity is enhanced through data triangulation (in particular triangulation of the results from the interviews), and through the establishment of a chain of evidence, allowing readers to follow the derivation of any evidence (however, for privacy reasons, the transcripts of the interviews are not included in the appendix). Reliability is enhanced through the establishment of case study protocols, case study databases and a chain of evidence.

3.3 Defining concepts

The concepts project performance, cooperation, risk and organisation are already discussed in the theoretical framework (chapter 2). The effectiveness and the efficiency of risk management have not been defined yet. Verschuren and Doorewaard (2010) described that, in the absence of a generally accepted definition for a concept being studied, a stipulative definition can be used. A stipulative definition is a definition that
fits within the context of the research. The adequacy of stipulative definitions can be judged through its usefulness. Verschuren and Doorewaard (2010) distinguished the following three conditions which have to be met for a stipulative definition to be useful:

1. **Delineating the concept to manageable proportions.**
2. **Clarity on the questions of which observable entities are covered by the definition.**
3. **A linking up to the research objective and the set of research questions.**

In this section, the effectiveness and the efficiency of risk management are defined in accordance with the criteria of usefulness.

The English Oxford Dictionary defined ‘effectiveness’ (2014) as ‘the degree to which something is successful in producing a desired result’. The goal (desired result) of risk management is to minimise the negative consequences of uncertainty. The effectiveness of risk management can thus be expressed as the division of the sum of the residual risks $p_{rr} \cdot i_{rr}$ (the magnitude of the risks after application of preventative measures) and the sum of the initial risks $p_{ir} \cdot i_{ir}$ for a number of $n$ risks as follows:

$$\text{Effectiveness} = 1 - \frac{\sum_{j=1}^{n} (p_{rr_j} \cdot i_{rr_j})}{\sum_{j=1}^{n} (p_{ir_j} \cdot i_{ir_j})} \quad (3.1)$$

The English Oxford Dictionary defined ‘efficient’ (2014) as ‘achieving maximum productivity with minimum wasted effort or expense’. For this research, the efficiency is concerned with the costs of risk management. The costs of the management of a risk are comprised of the costs of the preventative measures $c_{pm}$ and the costs of the risk premium $c_{rp}$. Consequently, the efficiency of risk management can be expressed as the division of the sum of the costs of risk management $c_{pm} + c_{rp}$ and the sum of the differences between the initial risks $p_{ir} \cdot i_{ir}$ and the residual risks $p_{rr} \cdot i_{rr}$ for a number of $n$ risks as follows:

$$\text{Efficiency} = 1 - \frac{\sum_{j=1}^{n} \left(c_{pm_j} + c_{rp_j}\right)}{\sum_{j=1}^{n} \left(p_{ir_j} \cdot i_{ir_j} - p_{rr_j} \cdot i_{rr_j}\right)} \quad (3.2)$$

The effectiveness and the efficiency of risk management are illustrated in figure 3.2.
3.4 Case selection and introduction

In order to be able to investigate a) the risk allocation between the public and private organisations, b) the factors that influence the risk allocation between public and private organisations, c) the influence of the risk allocation between the public and private organisations on the cooperation between the public and private organisations, and d) the influence of the risk allocation between the public and private organisations on the effectiveness and efficiency of risk management, cases should satisfy the following criteria:

1. The project is a large infrastructure project.
2. The project is initiated by one or more public organisations.
3. The project is executed by one or more private organisations.
4. The execution of the engineering and/or construction works is near completion.

The first criterion is established because large projects have the greatest risk profiles and are therefore most interesting for this research. Based on expert opinions, projects are considered to be large if the contract for the engineering works is larger than €1 million. Three cases from the portfolio of Witteveen+Bos are selected, namely project ZuidasDok, project Afsluitdijk and project Haak om Leeuwarden. By selecting projects from the portfolio of Witteveen+Bos, accessibility to data and respondents is enhanced.

3.4.1 ZuidasDok

Project ZuidasDok, located in the Netherlands, Amsterdam, comprised the widening and partial tunnelling of the A10-Zuid, the expansion of station Amsterdam-Zuid into a public transport hub and an investment in public space, while reducing the burdening
on the environment. The purposes of project ZuidasDok were a) to further realise the Zuidas as an international top location which forms an integral part of the region and the city of Amsterdam, b) to provide an optimal functioning high quality traffic and transport network, c) to realise a high quality transport hub of international stature, and d) to integrate the infrastructure – in an sustainable manner – in order to reduce the barrier effect and in order to improve the quality of the built environment. Facts and figures of project ZuidasDok are shown in table 3.1.

<table>
<thead>
<tr>
<th>ZuidasDok</th>
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<tr>
<td><strong>Principals</strong></td>
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<tr>
<td><strong>Engineering</strong></td>
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<tr>
<td><strong>Financing</strong></td>
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<tr>
<td><strong>Costs</strong></td>
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</tbody>
</table>
| **Planning**     | 2001 Starting Decision  
2012 Preference Decision  
2015 Project Decision  
2014-2019 Tunnelling A10-Zuid  
2017-2022 Transformation of station Amsterdam-Zuid |

Table 3.1: Facts and figures ZuidasDok

3.4.2 Afsluitdijk

The Afsluitdijk, constructed in 1932, is a symbol of the Dutch struggle against water and an icon of Dutch hydraulic engineering. It protects large parts of the Netherlands against flooding. The construction of the Afsluitdijk not only increased safety in large parts of the Netherlands, it also induced social, cultural and economic transformations. The Afsluitdijk forms the barrier between salt and sweet water and connects the province of Noord-Holland with the province of Frýslan.

As a consequence of the sea level rise and higher peak flows, sufficient management of the water level in the IJsselmeer became more often and increasingly hard. Therefore, the
project Extra Drainage Capacity Afsluitdijk (in Dutch: Extra Spuicapaciteit Afsluitdijk) was initiated. In addition, during the national assessment of primary flood defences in 2006, it came to light that the Afsluitdijk no longer met legal requirements for water safety, resulting in the initiation of the project Future Afsluitdijk (in Dutch: Toekomst Afsluitdijk). In 2012, both projects were combined.

Project Afsluitdijk (the combined projects), comprised the strengthening of the dike body in order to make it resistant against overtopping, the strengthening of the existing sluices and drainage sluices Den Oever and Kornwerderzand, and the phased implementation of pumps in the existing drainage sluices Den Oever in order to increase drainage capacity. The purpose of project Afsluitdijk was to ensure the water safety and the water management for the IJsselmeer up to 2050. Facts and figures of project Afsluitdijk are shown in table 3.2.

<table>
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<td><strong>Financing</strong></td>
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<td><strong>Costs</strong></td>
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</tbody>
</table>
| **Planning**         | 2004 Start exploration ‘Extra Spuicapaciteit Afsluitdijk’  
                        | 2007 Start exploration ‘Toekomst Afsluitdijk’  
                        | 2011 Preference Decision ‘Toekomst Afsluitdijk’ (MIRT2)  
                        | 2012 Preference Decision ‘Extra Spuicapaciteit Afsluitdijk’ (MIRT2)  
                        | 2012 Start plan development phase of combined projects  
                        | 2017 Start realisation  
                        | 2021 Completion |

**Table 3.2:** Facts and figures Afsluitdijk

### 3.4.3 Haak om Leeuwarden

Project Haak om Leeuwarden, located in the Netherlands, province of Frysian, (south) west side of Leeuwarden, was comprised of the construction of a twelve kilometre road with four driving lanes with a maximum speed of a hundred kilometres per hour. The purposes of project Haak om Leeuwarden were a) to improve the accessibility of Leeuwarden, b) to stimulate the social, cultural and economic development of Leeuwarden,
and c) to improve the safety (flyover and reduced cut-through traffic). Facts and figures of project Haak om Leeuwarden are shown in table 3.3.

<table>
<thead>
<tr>
<th>Haak om Leeuwarden</th>
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<td><strong>Principals</strong></td>
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</tbody>
</table>
| **Planning** | February 2010 Route Decision  
March 2011 Start preparation works  
December 2011 Start construction  
December 2014 Opening Haak om Leeuwarden |

Table 3.3: Facts and figures Haak om Leeuwarden
In this chapter, the results from the exploratory interviews with respondents from both project ZuidasDok and project Afsluitdijk are described. For both cases, the organisation of the project, the management of risks, the procurement of the works, the allocation of risks, the outcome of the allocation of risks, the consequences, and observations with regard to strategic behaviour are elaborated.

4.1 Project ZuidasDok

4.1.1 Organisation

The contracting authorities at administrative level were the ministry of Infrastructure and Environment (abbreviated ministry of I&E), the municipality of Amsterdam, the city region of Amsterdam and the province of Noord-Holland. These public organisations established their cooperation in the Administrative Agreement (in Dutch: Bestuursovereenkomst, abbreviated AA). Consultation between the contracting authorities at administrative level took place at least once a year in the administrative consultation (in Dutch: Bestuursoverleg, abbreviated AC). The AC consisted of the minister of I&E, the secretary of state of the ministry of I&E, the mayor and aldermen of the municipality of Amsterdam, the chairman of the city region of Amsterdam and a commissioner of the province of Noord-Holland. The contracting authorities at administrative level assigned the execution of the project to Rijkswaterstaat (abbreviated RWS), ProRail and the
municipality of Amsterdam (from now on indicated with contracting authorities). The contracting authorities established a project organisation which consisted of employees from all three organisations.

The steering line was described in the Administrative Agreement. The Administrative Consultation assigned the project to the Contracting Authorities Consultation (in Dutch: Opdrachtgeversoverleg, abbreviated CAC). The CAC acted as the mandated principal towards the project organisation. The CAC consisted of the Director-General Rijkswaterstaat (DG RWS) (on behalf of the ministry of I&E), the director Zuidas (on
behalf of the municipality of Amsterdam), a representative from the city region of Amsterdam, the director of ProRail, a representative from the province of Noord-Holland and the project director of the project organisation. Consultation took place once every eight weeks.

In addition to this steering line, a consultation structure was established. The project organisation discussed its progress in the Project Management Consultation (in Dutch: Projectbeheersingoverleg Zuidas, abbreviated PMC). The PMC served as sounding board to the project organisation. The PMC consisted of representatives from the contracting authorities. These representatives disclosed the information discussed to their line organisations. These information flows were called internal preparation lines, which aided the alignment of the line organisations with the project. The ministry of I&E discussed the information from the PMC once every eight weeks in a separate Directors Consultation (in Dutch: Directeurenoverleg, abbreviated DC), which consisted of representatives from RWS and ProRail. The municipality of Amsterdam discussed the information from the PMC with their official team Zuidas and their directors team Zuidas. On administrative level, alignment was conducted through the ministry of I&E and the mayor and aldermen of the municipality of Amsterdam. The steering model is shown in figure 4.1 and the decision making model is shown in figure 4.2.

The commissioning of the project is shown in figure 4.3. The project organisation was responsible for drawing up the tender. The contents of the tender were discussed in the CAC, after which is was presented to the ministry of I&E. The Director-General Accessibility (in Dutch: Directeur-General Bereikbaarheid, abbreviated DGA) was responsible for the official approval of the tender and for the assignment to RWS and ProRail. Because this procedure took much time, the plan development phase started long before official approval of the project.

4.1.2 Risk management

The contracting authorities conducted risk management in accordance with the RISMAN method. After identification, risks were labelled endogenous or exogenous to the project. The project organisation was responsible for the management of endogenous risks, the CAC was responsible for the management of exogenous risks. Decision making with respect to risks was done in the CAC. Risks that were outside the mandate of the CAC, were scaled up to the AC. For exogenous risks, the project organisation was asked to provide insight in the consequences of the risks. The CAC often transferred the management of risks that were labelled exogenous back to the project organisation.
4.1.3 Procurement

Procurement of the engineering works was done by means of a competitive dialogue. The project organisation split up the assignment in three parts. The first part was concerned with the process management; the second with the quality (scope) of the project; and the third with opportunities for the creation of additional value. During the competitive dialogue, the scope was discussed mostly. During these discussions, it became clear that the budget was insufficient. Therefore, the project organisation raised the minimum and maximum constraints for the budget. The project organisation split up the second partial assignment in 6 work tracks; integral design, plan procedures, contracting and realisation, environmental management, communication, and function free making. Requested engineering works comprised the work tracks integral design, plan procedures and a part of contracting and realisation. In addition, the project organisation requested...
Figure 4.3: Commissioning ZuidasDok

from the participating engineering consortia to manage the quality (scope), planning, finances, risks and information for all 6 work tracks. The engineering consortia indicated that they did not want to bear responsibility for activities outside their span of control. Therefore, the project organisation agreed to take back a number of tasks, leaving the engineering consortia with the quality and the risk management of the work tracks assigned to them. Further input from the engineering consortia did not lead to changes in the assignment. The project was awarded to a consortium called ‘Ingenieursbureau ZuidasDok’, abbreviated IBZ. IBZ was composed of Arcadis, Witteveen+Bos and AT Osborne. Arcadis and Witteveen+Bos, both engineering offices, and AT Osborne, a consultant in the field of civil engineering, joined forces in order to acquire the required knowledge and expertise, and to share the risks faced by a project of this magnitude and complexity.

During procurement, the project organisation indicated that a high level of flexibility
was required in order to be able to deal with scope changes. Scope changes were expected because of the magnitude and the organisational complexity (three organisations acted as client) of the project. Cases were practiced to align views on works that were part of the contract and works that were not part of the contract. Risks were not listed nor explicitly allocated. IBZ estimated the required flexibility and included it in the tender. Because the price was an important criterion for awarding the contract, IBZ set their price low.

The Headdirector-General (HID) of Large Projects and Maintenance (in Dutch: Grote Projecten en Onderhoud, abbreviated GPO) and the HID of Programmes, Projects and Maintenance (in Dutch: Programma’s, Projecten en Onderhouden, abbreviated PPO) determined the framework for the procurement of the engineering works. Specific interpretation of contract terms and conditions was determined by the project organisation.

The contract was based mainly on a fixed price (about €7 mln.), and included a threefold bonus structure. The first bonus was a so called ‘first time right’ bonus (€5000), which could be awarded if for a certain work track works were accepted by the project organisation the first time they were delivered. The second bonus was a time bonus (€40,000 till €120,000), which could be awarded if IBZ delivered at agreed times. The third bonus was a satisfaction bonus (€60,000 till €180,000), which could be awarded if the project organisation was satisfied with the process of IBZ. The awarding of the first two bonuses was based on objective criteria. The awarding of the third bonus was based on subjective criteria. In total, these bonuses amounted up to 15% of the tender price, which made them very important to IBZ.

With the bonus structure, the project organisation tried to steer on the quality and timely delivery of the engineering works. The projectdirector of the project organisations stated that the quality of the project was established during the plan development phase. In addition to the bonus structure, the project organisation set up a risk fund, from which unforeseen but necessary works were to be paid. If the risk fund was not empty by the end of the project, IBZ would receive 50% of the remaining amount.

The respondents from IBZ were dissatisfied with the bonus structure for three reasons. Firstly, the bonus structure was used as a communicating vessel with request for additional work. If IBZ submitted a request for additional work, whether appropriate or not according to the project organisation’s contract interpretation, then the satisfaction bonus was reduced. The satisfaction bonus was thus money out of IBZ’s own pocket. Secondly, the project organisation took a lot of time to clarify whether the bonuses were awarded or not. Therefore, the bonuses formed a financial risk for IBZ. Thirdly, IBZ’s employees were not incentivised by bonuses, because they were assigned a fixed budget
by their management for which the works should be carried out. Overall, the bonus structure was therefore regarded by the respondents from IBZ to be counterproductive to its intentions.

A final contractual issue described here regards the remuneration of works based on a variable fee. The payment of the first partial assignment, which concerned the process management, was based on a variable fee. In turn, this variable fee was based on salaries of IBZ’s employees, multiplied with predetermined factors. IBZ experienced two downsides from this setup: confidential information (salaries) had to be made public, and the multiplication of salaries with predetermined factors did not match IBZ’s engineering offices’ business models, which resulted in an inadequate remuneration.

For the procurement of the construction works, the policy by the ministry of I&E prescribed Design, Build, Finance & Maintain (DBFM) contracts, because this contract form was expected to cost the government less. RWS’s procurement strategy aimed to transfer as many responsibilities as possible to private organisations. RWS conducted a Public-Private Comparator (PPC) in order to substantiate the decision to opt for a certain contract form. For project ZuidasDok, a Design & Construct (D&C) contract was chosen. Procurement of construction works had not yet started. It was planned as a competitive dialogue taking up to 1.5 years.

### 4.1.4 Risk allocation

At the start of the plan development phase, the project organisation and IBZ faced a number of risks. From the interviews, two top risks for project organisation, two top risks for project organisation in relation to their contract with IBZ, and five top risks for IBZ were identified. Top risks for project organisation are described first, followed by a description of the top risks for IBZ.

The first top risk for project organisation was disagreements regarding the scope of the project between the contracting authorities (Rijkswaterstaat, the municipality of Amsterdam and ProRail) and between the contracting authorities and project organisation. Due to the magnitude and complexity of the project, the contracting authorities and project organisation were unable to define the scope in great detail prior to and during procurement of the engineering works. Therefore, flexibility in the scope was adopted. During the plan development phase, conflicting interests regarding the scope could lead to disagreements, resulting in delays, additional work and additional costs.

The second top risk for project organisation was losing support from the environment. Project ZuidasDok’s many stakeholders had considerable influence on the project. If the
burden on the environment was heavier than expected, or if the planned scope was not realised, support from the environment could drop or even turn into resistance, which could bring the entire project in jeopardy.

Top risks for project organisation in relation to their contract with IBZ were not achieving desired quality and not meeting schedule, which could have significant adverse consequences for project organisation. IBZ had limited liability. Quality was ensured through checks by both contracting authorities and project organisation. Due to the chosen contract type (fixed price), not meeting budget was not a top risk.

The first top risk for IBZ was a low degree of convergence of design alternatives, caused by the complexity of the decision making process, in which the interests of the contracting authorities, project organisation and other stakeholders had to be aligned. Without consensus, no design alternatives could be dropped. A low degree of convergence of design alternatives could result in additional work, delays and additional costs.

The second top risk for IBZ was the establishment of a higher level of detail of design alternatives than expected. This risk had two possible causes. Firstly, contract interpretations by project organisation and IBZ could differ. In general, the project organisation strived to maximise IBZ's effort, while IBZ strived for efficiency. Partly, the project organisation's position emanated from the decision making process between the contracting authorities and the project organisation; additional information could be requested by the contracting authorities in order to be able make decisions, or the process could be subject to politics. IBZ's technical manager stated: 'If organisations do not get what they want, and they can't say it, they can respond very procedural, causing delays, additional work and additional costs. At what point has the feasibility been demonstrated? Some residual risks will always remain. In contrast, if interest are aligned, problems will be solved jointly.' Secondly, 'technical enthusiasm' by the engineers from the project organisation and IBZ could contribute to the establishment of a higher level of detail than necessary. Here, technical enthusiasm refers to the tendency of engineers to eliminate uncertainty through detailed design. This second top risk could lead to additional work, delays and additional costs.

The third top risk for IBZ was that their work was of insufficient quality, damaging the reputation of the consortium's engineering companies.

The fourth top risk for IBZ was the insufficient alignment between the work tracks within the project, caused by the absence of alignment or alignment at a late stage. The risk could result in high failure costs and a reduced level of quality. To mitigate this risk, project organisation and IBZ set up a shared office in the World Trade Center at the Zuidas. Due to the high costs of this location, the group working at this location
was kept compact.

The fifth and final top risk for IBZ was not disclosing information centrally. New information could enter the project at different levels. If this information was not disclosed centrally, alignment problems could occur, resulting in failure costs.

4.1.5 Outcome

Throughout the project, required flexibility appeared higher than expected. Respondents from IBZ attributed this to two reasons.

Firstly, the degree of convergence of design alternatives was lower than expected. Although the decision making process for the convergence of design alternatives was well organised in outline, choices made were sometimes hard to explain. In addition, conflicting interests of the contracting authorities, made the decision making process complex and subject to politics, resulting in unclear directions and postponed decisions. In the contract, one design alternative and one sub design alternative were agreed upon. In practice, there were two design alternatives and a number of sub design alternatives. The costs of this additional work were implicitly allocated to, and therefore born by IBZ. Within IBZ, Arcadis and Witteveen+Bos shared the costs by ratio of deployment. IBZ tried to recover these costs from project organisation. At the moment of inquiry, an agreement had not been reached yet.

Secondly, the required/established level of detail of design alternatives was higher than expected. It appeared hard to determine the level of detail because of differing contract interpretations by project organisation and IBZ, and because of difficulties regarding the control of technical enthusiasm of the large number of employees working on the project. The costs of this additional work were also born by IBZ.

Both top risks for IBZ thus fired which resulted in a required level of flexibility by IBZ that was higher than expected. These risks were not well defined during procurement, and they were implicitly allocated to IBZ. Although all respondents indicated that risks should be borne by the organisation best able to control them, this principle was — intentionally or unintentionally — not applied to both risks described above. Most important cause for the risks, the decision making process by the contracting authorities and project organisation, was outside the control of IBZ. Yet the consequences of the risks were for the most part born by IBZ. IBZ tried to mitigate the risks by submitting requests for additional work (VTW), and by reducing the amount of effort per task, pressurising quality.

IBZ’s process manager suggested how engineering companies could manage the risk of
additional work better. In general, engineering offices do not handle communication about additional work well. During engineering works, engineering companies are committed to their assignment, but fail to communicate additional work timely. By the end of their activities, they present contracting authorities the account, who in turn are unpleasantly surprised, blaming the engineering companies for not doing a good job. The engineering companies often respond by pointing out matters the contracting authorities did wrong during the process. In the end, it appears as if the engineering companies did not do a good job, because the quality suffered and the schedule was not met. Engineering companies could prevent this by setting conditions at the start of the project, enabling them to control the process better and to receive better support from their contracting authorities, ultimately resulting in a better financial settlement.

Assessment of the risk allocation

Respondents were asked to assess the degree of satisfaction with the risk allocation on a scale from 1 till 4, whereby 1 represents very satisfied, 2 represents satisfied, 3 represents unsatisfied, and 4 represents very unsatisfied. The results are shown in table 4.1.

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Degree of satisfaction with the risk allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultant RWS</td>
<td>1 (very satisfied)</td>
</tr>
<tr>
<td>Projectdirector RWS</td>
<td>2 (satisfied)</td>
</tr>
<tr>
<td>Process Manager IBZ</td>
<td>2 (satisfied)</td>
</tr>
<tr>
<td>Technical Manager IBZ</td>
<td>2 (satisfied)</td>
</tr>
</tbody>
</table>

Table 4.1: Assessment of the satisfaction with the risk allocation for project ZuidasDok

IBZ’s process manager commented: ‘This has everything to do with the manner in which the risk allocation is dealt with [...] if the project organisation would follow the contract by the letter, it could fleece IBZ [...] but they don’t do that [...] this could have been worse [...] however, at this moment, IBZ has to pull hard.’

4.1.6 Consequences

Assessment of the cooperation

Respondents were asked to assess the cooperation on a scale from 1 till 4, whereby 1 represents very good, 2 represents good, 3 represents bad, and 4 represents very bad. The results are shown in table 4.2.
With regard to the cooperation, the technical manager of IBZ indicated that treatments of requests for additional work by IBZ took a lot of time. Due to mutual trust, IBZ sometimes started with the activities described the request for additional work before official approval.

Furthermore, respondents were asked whether they considered the risk allocation to be of influence on the cooperation and, if so, in what manner. The project director of the project organisation considered the risk allocation the foundation for the cooperation. The agreed risk allocation contained both incentives for IBZ to give maximum performance, as hard agreements with respect to the division of costs. The process manager of IBZ considered the influence of the risk allocation on the cooperation to be marginal. However, if the risk allocation limited the space for conducting the work, this could have a negative impact on the cooperation. The risk allocation pressurised the cooperation on some aspects, but also increased the efficiency of IBZ.

### Assessment of the effectiveness and the efficiency of risk management

Respondents were asked to assess the effectiveness and the efficiency of risk management. These concepts are defined in section 3.3. For this research, due to a lack of data, it is not feasible to express the effectiveness and the efficiency of risk management this accurate. Therefore, they are expressed on a scale from 1 till 4, whereby 1 represents very effective/efficient, 2 represents effective/efficient, 3 represents ineffective/inefficient, and 4 represents very ineffective/inefficient. The results are shown in table 4.3.

The consultant from RWS indicated that the risk allocation did not influence the effectiveness and the efficiency of risk management, but the manner in which RWS handled its risk management did. The technical manager from IBZ indicated that it took a lot of time to get information from the organisation, and to take decisions thereon. The process manager from IBZ stated that IBZ’s risk management could be done better, by making arrangements, setting conditions and settling finances at an earlier stage. He did not think the risk allocation influenced the effectiveness and the efficiency of the

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Cooperation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultant RWS</td>
<td>1 (very good)</td>
</tr>
<tr>
<td>Project director RWS</td>
<td>2 (good)</td>
</tr>
<tr>
<td>Process Manager IBZ</td>
<td>2 (good)</td>
</tr>
<tr>
<td>Technical Manager IBZ</td>
<td>2 (good)</td>
</tr>
</tbody>
</table>

Table 4.2: Assessment of the cooperation for project ZuidasDok
Table 4.3: Assessment of the effectiveness and the efficiency of risk management for project ZuidasDok

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Effectiveness of risk mgmt.</th>
<th>Efficiency of risk mgmt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultant RWS</td>
<td>3 (ineffective)</td>
<td>3 (inefficient)</td>
</tr>
<tr>
<td>Projectdirector RWS</td>
<td>2 (effective)</td>
<td>3 (inefficient)</td>
</tr>
<tr>
<td>Process Manager IBZ</td>
<td>3 (ineffective)</td>
<td>3 (inefficient)</td>
</tr>
<tr>
<td>Technical Manager IBZ</td>
<td>2 (effective)</td>
<td>2 (efficient)</td>
</tr>
</tbody>
</table>

risk management. These factors were more likely influenced by the company culture. The projectdirector of the project organisation indicated that the company culture of engineering offices in general led to an inefficient (risk management) process. He stated that the risk allocation positively influenced the effectiveness and the efficiency of the risk management; without these agreements, IBZ’s risks management would probably be less effective and less efficient.

4.1.7 Strategic behaviour

To conclude this section, observations regarding strategic behaviour are described here. The consultant from RWS indicated that the relation between the ministry of I&E and RWS was very transparent. Due to sometimes conflicting interests, the relation between RWS, ProRail and the municipality of Amsterdam was less transparent.

During procurement, the project organisation and IBZ exchanged information. Contracting authorities had already been working on the project for more than ten years. This posed two problems to IBZ. Firstly, IBZ had a large information lag. The project organisation shared all technical information, indicating that a proper baseline had already been designed. According to IBZ, this appeared not to be the case; both the quality of baseline and the transparency regarding the decision making process were lower than expected. This was a setback for IBZ which made their work more difficult.

In order to prevent an information lag of the employees of IBZ during the plan development phase, the project organisation included an article in the contract stating that replacing employees during the project was only allowed for a limited number of reasons. In the article, financial consequences were attached.

According to the projectdirector of the project organisation, the project organisation
shared all relevant information during procurement and during the plan development phase with IBZ. The project organisation expected IBZ to have done the same. Respondents from IBZ indicated that engineering offices never share all information during procurement. However, IBZ had been honest about the engineering works it could do for a certain price. IBZ even shared their budget with project organisation. Because the work was done for a fixed price, project organisation had no insight in actual expenditures of IBZ. IBZ expected project organisation to have shared relevant information in all conscience.

4.2 Project Afsluitdijk

4.2.1 Organisation

For the organisation of the project, a distinction was made between the partial assignment regarding water safety and water management, and the partial assignment regarding the realisation of regional ambitions. The steering line for the partial assignment water safety and water management is shown in figure 4.4.

The ministry of Infrastructure and Environment (ministry of I&E), was the contracting authority at administrative level. It acted as the client and initiator of the project. On behalf of the ministry of I&E, the Director-General Planning and Water (in Dutch: Directeur-Generaal Ruimte en Water, abbreviated DG RW) assigned the project to Rijkswaterstaat (RWS). The project was accepted by the Director-General Rijkswaterstaat (in Dutch: Directeur-Generaal Rijkswaterstaat, abbreviated DG RWS). Within RWS, the DG RWS delegated the project to the Headengineer-Director Midden-Nederland (in Dutch: Hoofdingenieur-Directeur Midden-Nederland, abbreviated HID). The HID acted as the mandated commissioner, bearing responsibility for the daily supervision of the project organisation. The project organisation was led by the projectdirector. Other key roles within the project organisation were the manager project control, the contract manager, the environmental manager and the technical manager.

As described in the theoretical framework (section 2.5), RWS was divided in a number of organisational units, of which some bore responsibility for a certain region, and others for certain services. In general, within project organisations, the environmental manager was from an organisational unit responsible for the region (from now on ‘region’) in which the project was conducted, and the manager project control, the contract manager and the technical manager were from the organisational unit called Large Projects and Maintenance (in Dutch: Grote Projecten en Onderhoud, abbreviated GPO). Depending on the project phase, the projectdirector could be from the region or GPO. In general,
during the plan development phase, the initiative lied with the region, and during the realisation phase, the centre of gravity shifted to GPO. For project Afsluitdijk, one project director from GPO was appointed from the start of the project.

Projects were managed under the steering line. Only if there were deviations from the scope, the planning or the budget, the DG RWS and the ministry of I&E could intervene directly. For some projects, the ministry of I&E or RWS’s advisory board could
decide to give it the status of large project. For large projects, a separate management regime on Director-General level was appointed. The project Afsluitdijk was labelled a large project. Therefore, a Steering Group Infrastructure and Environment Afsluitdijk (in Dutch: Stuurgroep Infrastructuur & Milieu Afsluitdijk, abbreviated SG I&E) was appointed. The SG I&E consisted of the DG RWS (chair), the DG RW, the HID, the project director, the Headdirector Finance, Management and Control (abbreviated HFMC) and the Headdirector Administrative and Legal Affairs (abbreviated HBJZ). The project organisation reported to the HID and to the SG I&E. Formal decision making was done by the SG I&E. The SG I&E was an addition to the steering line and it was accountable to the Secretary of State.

The partial assignment regarding the realisation of ambitions was conducted by a separate steering group. Alignment and integration of both partial assignments was done through consultation on official level and by an administrative steering group. The consultation structure is shown in figure 4.5. The dotted entities were not part of the steering line for the partial assignment water safety and water management.

The project assignment was described by the ministry of I&E in a project brief. The ministry of I&E and RWS discussed the contents of the project brief before RWS was officially assigned the project. The project brief contained the product requirements and constraints, describing the scope, the planning and the budget. After the DG RWS had officially accepted the project brief, advisors from RWS reviewed it and carried it through to the project organisation. A detailed description of the project’s scope,

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**Figure 4.5: Consultation structure Afsluitdijk**

The project assignment was described by the ministry of I&E in a project brief. The ministry of I&E and RWS discussed the contents of the project brief before RWS was officially assigned the project. The project brief contained the product requirements and constraints, describing the scope, the planning and the budget. After the DG RWS had officially accepted the project brief, advisors from RWS reviewed it and carried it through to the project organisation. A detailed description of the project’s scope,
planning, budget, risks, environmental factors etcetera, labelled the scope form, was
drawn up by the project organisation. The scope form was signed by the DG RWS. In
general, the project brief hardly ever changes during the execution of a project. The
scope form however can be subject to changes. Scope changes can be achieved through
a Request for Change (in Dutch: Verzoek tot Wijziging, abbreviated VtW), which have
to be approved by the ministry of I&E. Scope changes occur mostly during realisation,
when the budget is fixed.

Process requirements RWS imposed on its project organisation were described in the
‘werkwijze aanleg’. The contract type was prescribed by the ministry of I&E. It was
government policy to apply Design, Build, Finance and Maintain (DBFM) contracts for
projects if possible. In 2011, the government drew up a list with projects that could be
executed as DBFM projects. Project Afsluitdijk was on this list. RWS could deviate from
this policy only for compelling reasons. In order to substantiate the decision to opt for
a DBFM contract, RWS conducted a Public-Private Comparator (PPC), comparing the
consequences of the use of a DBFM contract and a Design & Construct (D&C) contract.
RWS based the decision to opt for a DBFM contract on a number of considerations.
Firstly, a certain flexibility with respect to maintenance management and finances was
required in order to enable RWS to adapt to future changes. Therefore, the number of
projects for which maintenance management would be fixed as a result of the application
of DBFM contracts, was limited. Secondly, the market had only a limited capacity to
realise DBFM projects. DBFM contracts were only applied to large projects. In addition,
DBFM projects were very risky for contractors. Only a limited number of contractors
could realise large risky projects.

For most projects, the contract type was determined during the plan development
phase. For project Afsluitdijk, this decision was made directly after the MIRT2 decision
by the SG I&E, advised by the project organisation. The decision was officially approved
by the ministry of I&E. When asked how the project’s interest was linked to RWS’s
policy, the respondent from RWS indicated that the project’s interest was expressed
through the project’s scope, planning and budget. In general, procurement of a DBFM
project takes longer that procurement of a D&C project. The decision to opt for a
DBFM contract can therefore be a limiting factor if time is limited.

4.2.2 Risk management

By the end of the exploration phase, the project organisation identified the project’s
risk profile for the plan development phase and the realisation phase. The risks were
documented in an initial risk register. RWS managed risks in accordance with their
general line. The project organisation distinguished endogenous risks, which were risks for which the project organisation bore the responsibility to manage them, and exogenous risks, which were outside the project organisation’s control and which were therefore risks for the ministry of I&E. Exogenous risks were addressed by the SG I&E. Leading criterion for the allocation of risks was ‘who is best able to control them’. The risk allocation followed from this criterion logically. Consultation between the project organisation and the SG I&E was done through a risk reporting once every three months, in which the project organisation’s project director reported the top five endogenous and exogenous risks.

RWS included a risk reserve in the budget. If the probability of occurrence of a risk was equal to or greater than 25%, the risk was fully incorporated; if the probability of occurrence was smaller than 25%, the risk was incorporated as the probability of occurrence multiplied with the financial consequence(s). In addition, there was a reservation for unknown risks. If the total risk reserve was insufficient, the ministry of I&E bore additional costs.

One of the identified risks concerned changing standards for the water level on the IJsselmeer. The project organisation labelled this risk exogenous. Because this risk not only influenced the project Afsluitdijk, but many more projects, a general line to manage this risks was discussed. This general line was based on the interests of all projects affected. Therefore, the preparation of this general line took considerable time. The discussion concerning this issue was held between RWS and the ministry of I&E; the projects only provided input. Sometimes the SG I&E also brought new risks in the project. For example, the inclusion of ambitions. Subsequently, the project organisation made the consequences clear.

4.2.3 Procurement

The initial risk allocation between the project organisation and W+B was done during procurement of the engineering services. The project organisation divided the works in work packages, in which the activities and associated product and process requirements were described. Based on the coherence between the work packages and associated risks, the project organisation decided to execute work packages themselves or to include them in the requested engineering services. Requested engineering services were described in RWS’s demand specification, which consisted of the work package descriptions, contract terms and conditions and a summary of additional information. RWS requested from participating engineering offices to include the top 10 risks for both RWS and themselves in their tender. W+B identified these risks during an internal brainstorm
session, in which the project director, the project manager, the technical manager and other specialists participated. Top 10 risks for RWS and top 10 risks for W+B were selected and described. The risk descriptions and mitigation measures were included in W+B’s Project Management Plan (PMP). During procurement of the engineering services, RWS organised 7 rounds in which engineering offices could ask questions concerning the project. A total of 95 questions was posed. These questions and associated answers were described in the summary of additional information, which was accessible to all participating engineering offices and which became part of the agreement.

W+B’s tender consisted of a preliminary version of the PMP, the cost estimate and the risk register. After W+B was awarded the contract, W+B worked out the PMP further. When RWS awarded the contract to W+B, it accepted the proposed risk allocation without discussion.

The contract (€5.1 million) between RWS and W+B consisted of three components: a fixed price (€3.1 million), a variable fee (€0.7 million) and a reservation for contingencies (€1.3 million), from which additional research was to be paid. Because many employees from RWS and W+B had to cooperate, the contract was aimed at cooperation. However, W+B’s project manager stated: ‘The contract philosophy is clear, but in essence it posed problems. W+B is responsible, but RWS interferes with everything [...] making it impossible to avoid contract discussions.’ To illustrate, RWS could have described the scope of the project in great detail and procured this, or RWS could have applied Best Value Procurement (BVP), leaving W+B responsible and in charge of the engineering works. W+B’s project manager indicated that the chosen contract form, an intermediate form, did not fit well.

4.2.4 Risk allocation

Risk register project organisation: top risks

The project organisation and W+B kept a separate risk file. During procurement, W+B proposed to combine both risk registers. The project organisation wanted to comply with this proposal, but the SG I&E did not allow this. In the following paragraphs, top risks from both risk registers are elaborated.

The project director of the project organisation explained three top risks whereby the line organisation (and therefore the Ministry of I&E), the project organisation and W+B were affected.

The first risk was technical uncertainty. Not all technical details of the 80 year old coastal works were known. By conducting researches it was tried to gain additional
information. W+B bore the responsibility for the quality of the technical research and timely delivery. The project organisation bore the risk that during construction, a situation was found that differed from what was expected. If this happened and the contractor filed a claim, only part of this amount could be recovered from W+B. The project director of the project organisation was responsible for the control of the risk. The budget contained a reservation for the residual risk. If the risk was to occur to a large extend, this could lead to a scope change, which was a risk for the ministry of I&E.

The second risk was the rejection of the National Integration Plan by the Council of State. The Environmental Management Act prescribed that the project could not have negative effects on flora and fauna. If it did, the project would not obtain a permit. If this occurred, the project could face additional costs and delays, which was a risk for the project organisation, or in the worst case, the project could face a scope change, which was a risk for the ministry of I&E. The Environmental Management Act permit application was drafted by W+B. After acceptance, the project organisation bore the risk. In order to mitigate the risk, the application was split up in parts, enabling partial approval or rejection.

The third risk was that the process of including ambitions frustrated the decision making process with regional governments. A cooperation agreement enabled RWS, provinces, regional authorities and municipalities to include ambitions. However, this could lead to political discussions, with delays as a consequence. This was outside the project organisation’s and RWS’s control, and was therefore born by the ministry of I&E. This risk could also have consequences for W+B.

Besides these three risks, the risk register of the project organisation contained an additional number of exogenous and endogenous risks. Additional exogenous risks were unavailability of required specialist knowledge regarding the DBFM-contract, late clarity regarding the maintenance budget and no compliance regarding standards to be applied. Additional endogenous risks were laborious delivery of the dossier by W+B, insufficient clarity regarding the water level of the IJsselmeer, not fundable DBFM-contract and late processing of customer requirements and integration in the dossier.

**Risk register W+B: top risks for the project organisation**

The risk allocation between the project organisation and W+B was described in W+B’s PMP. In the following subparagraphs, the top 5 risks for the project organisation are summarised.

The first risk for W+B was that products were not accepted by the project organisation, testers or gate reviewers. This was caused by products by W+B that were
insufficient for decision making. Possible consequences were delays, damages to RWS’s image and loss of support.

The second risk for W+B was that the cooperation between the project organisation and W+B did not go well, caused by employees who do not get along with each other and by differing expectations regarding the cooperation between the project organisation and W+B. Possible consequences were delays, not optimal project result and loss of support.

The third risk for W+B was that the design process was not integral and did not meet all interfaces and requirements. The risk could be caused by employees working on different levels of detail, a lack of alignment with effect studies, permits and cost estimates, and a lack of alignment with adjoining policies or adjoining projects. Possible consequences were additional alignment, rework, delays and loss of support.

The fourth risk for W+B was that the quality of the DBFM-contract (Design and Build scope) was insufficient. This could be caused by insufficient alignment of interfaces between the project organisation and W+B or a lack of experience with ‘wet’ DFMB-contracts by both organisations. Possible consequences were that the DBFM-contract did not pass the gate review, requiring repairs and additional alignment, failed procurement and an insufficient project result, requiring additional work by the contractor.

The fifth and final risk for W+B summarised here, was that required additional research was more extensive than estimated, caused by a required level of detail that is higher than expected, the discovery of crucial information requiring more research and insufficient underpinning of the MIRT2 decision. Possible consequences were delays, additional costs, loss of support and reputation damage.

Risk register W+B: top risks for W+B

In the following subparagraphs, the top 5 risks for the project organisation identified by W+B are summarised.

The first risk was that the preference decision appeared not feasible. Possible causes were that the pumps could not be installed in the exiting drainage tubes, the state of the facilities was worse than expected, the existing construction of the facilities imposed more constraints than expected, the preference decision appeared ineffective and the realisation of the water management measures was in conflict with for example availability constraints for the highway. Consequences were a delayed MIRT3 decision, increased plan development and realisation costs and loss of support from stakeholders.

The second risk was that the resistance against overtopping was not demonstrable. Possible causes were that exiting testing methods were not suitable for large quantities of overtopping, lack of trust by the project organisation in the quality of the designs and
insufficient designing methods to prove the resistance against overtopping of the transitional structures. Consequences were changes in designs, not being able to determine a final design, increased plan development and realisation costs and a delayed MIRT3 decision, which in turn could lead to loss of support by stakeholders.

The third risk was that the preference decision became subject to discussion, due to politics, alignment of the project with other projects, changing norms, policies and constraints (such as the norm for the water level of the IJsselmeer), and the emergence of a new alternative. Like with the previously described risks, consequences were a delayed MIRT3 decision, increased plan development and realisation costs and loss of support from stakeholders.

The fourth risk was that the budget appeared insufficient. Possible causes were that strengthening of the engineering works required more effort than expected, a budget cut due to national cutbacks, and tenders by contractors that were more expensive than expected. Most important consequence was that the MIRT3 decision could not be made due to the absence of financial coverage. Eventually, the risk could lead to a delayed MIRT3 decision, increased plan development and realisation costs and loss of support from stakeholders.

The fifth and final risk was that the procurement of the DBFM contract (F-(finance) and M-(maintenance) scope) failed, as a consequence of the absence of a suitable tender by private organisations because these private organisations saw too many or too severe risks with respect to the F- and M-scope. Consequences were that procurement had to be redone, resulting in increased costs and delays, or that the project organisation did not receive the desired output.

A more elaborate description of the top 10 risks for the project organisation and for W+B can be found in W+B’s project management plan.

4.2.5 Outcome

The plan development phase was split up in four phases. Most important risks were identified during phase 0 (procurement) and phase 1. In phase 2 and 3, risk were mainly monitored and the risk register was actualised.

Both the project organisation and W+B kept a risk register. W+B reported risks in the PMP, which was actualised at the start of each phase, and in the progress reports. The progress reports were drafted and discussed once every four weeks, and contained a description of the top 5/10 risks, mutations in the risk register and a proposal by W+B for the allocation of new risks. The allocation of risks was not based on explicit criteria. Instead, it was looked at who caused the risks and under which organisation’s
responsibility it came. The project organisation could accept the proposed risk allocation of new risks, or try to reverse it. If the project organisation and W+B could not agree on the risk allocation, most often the risk was not allocated at all. Both the project organisation as W+B could be assigned (a part of) the mitigation measures. Risks were seldom borne by both organisations.

Changing customer requirements is an example of a risk that was transferred. W+B was responsible for retrieving customer demands, and W+B therefore also bore the risk. The organisation responsible for operations and management of the Afsluitdijk constantly changed their demands, which was outside of W+B’s control. Therefore, the risk was transferred to the project organisation, after which additional work for W+B as a consequence of changing customer requirements was paid from the variable fee.

In the context of phase 3, a number of investigations was conducted, which were paid from the reservation for contingencies. These investigations were delayed. The allocation of this risk was not determined in advance. The cause of this delay was subject of discussion and will determine the allocation. W+B’s project manager stated: ‘It is preferred to make everything explicit, but in practice risks that influence the critical path arise, resulting in discussion.’

The project organisation controlled risks in accordance with the SCB line (in Dutch: Systeemgerichte Contract Beheersing). The philosophy of SCB was that if a system/process is good, the contents must be good as well. Therefore, throughout the plan development phase, RWS conducted risk based audits with W+B. Concerns such as whether W+B had enough capacity, whether W+B worked integral and whether W+B applied systems engineering properly were discussed during the risk based audits. In general, W+B got well through the risk based audits. However, the W+B’s project manager stated that SCB did not function well in practice, because too much time passed between the moment of concern and the risk based audit, and because the risk based audits were held by employees from RWS that were not part of the project organisation. As a result, RWS’s concerns remained and W+B still felt distrust.

Besides risk management, the project organisation and W+B conducted issue management. Issues endangered the process and they should be taken care of jointly to ensure progress.

Assessment of the risk allocation

Respondents were asked to assess the degree of satisfaction with the risk allocation on a scale from 1 till 4, whereby 1 represents very satisfied, 2 represents satisfied, 3 represents unsatisfied, and 4 represents very unsatisfied. The results are shown in table 4.4.
4.2.6 Consequences

Assessment of the cooperation

Respondents were asked to assess the cooperation on a scale from 1 till 4, whereby 1 represents very good, 2 represents good, 3 represents bad, and 4 represents very bad. The results are shown in Table 4.5.

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Cooperation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultant SG I&amp;M RWS</td>
<td>2 (good)</td>
</tr>
<tr>
<td>Projectdirector RWS</td>
<td>2 (good)</td>
</tr>
<tr>
<td>Process Manager W+B</td>
<td>2 (good)</td>
</tr>
<tr>
<td>Technical Manager W+B</td>
<td>1 (very good)</td>
</tr>
</tbody>
</table>

Table 4.5: Assessment of the cooperation for project Afsluitdijk

In order to support the cooperation between the project organisation and W+B, a facilitator was appointed. During a two-day workshop at the start of the project, the project organisation and W+B discussed their cooperation. W+B’s project manager indicated that culture differences and conflicting interests sometimes made it difficult to cooperate. By the end of every project phase (the four phases within the plan development phase), the cooperation was evaluated headed by the facilitator. These interventions and evaluations supported the cooperation.

Although the risk allocation influenced the cooperation, it was tried to keep these matters separated. Contract discussions were held at board level, within the project management team and within the contract team; other employees working on the project were not involved.

To monitor the cooperation, a performance measurement tool by RWS was used. This tool required both organisations to review their own and their counterpart’s performance. When the project approached the completion date, these ratings diverged.
The project director of the project organisation indicated that this had probably to do with the bonus structure, and with the mechanism that the project organisation required maximum effort from W+B, while W+B wanted to complete their work efficiently.

**Assessment of the effectiveness and the efficiency of risk management**

Respondents were asked to assess the effectiveness and the efficiency of risk management on a scale from 1 till 4, whereby 1 represents very effective/efficient, 2 represents effective/efficient, 3 represents ineffective/inefficient, and 4 represents very ineffective/inefficient. The results are shown in table 4.6.

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Effectiveness of risk mgmt.</th>
<th>Efficiency of risk mgmt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultant SG I&amp;M RWS</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Project director RWS</td>
<td>2 (effective)</td>
<td>2 (efficient)</td>
</tr>
<tr>
<td>Process Manager W+B</td>
<td>2 (effective)</td>
<td>2 (efficient)</td>
</tr>
<tr>
<td>Technical Manager W+B</td>
<td>2 (effective)</td>
<td>2 (efficient)</td>
</tr>
</tbody>
</table>

Table 4.6: Assessment of the effectiveness and the efficiency of risk management for project Afsluitdijk

The consultant from RWS did not expect that the risk allocation influenced the effectiveness and the efficiency of the risk management. The project manager from W+B stated that W+B approached risk management less structured than the project organisation; W+B used risk management to mitigate risks while the project organisation also used it for steering and as a means to justify their actions to RWS. W+B’s project manager also stated that the risk allocation benefitted the effectiveness and efficiency of the risk management, because it made clear which organisation had which responsibilities. W+B’s technical manager stated that by establishing the risk allocation and by setting mitigation measures, risks were controlled better, thus benefitting the effectiveness and efficiency of the risk management. W+B’s technical manager also indicated that the prescribed risk management format provided by the project organisation was too extensive. As a consequence, W+B’s technical manager expected both the effectiveness as the efficiency of risk management to be lower than if a less extensive format was used. This was discussed and the project organisation agreed with this request. W+B’s technical manager was under the impressions that the project organisation proposed the initial extensive risk management format because this was part of RWS’s standard practices, and because the format was partly used as accountability means.
To conclude this section, observations regarding strategic behaviour are described here. The consultant from RWS indicated that the cooperation between the Ministry of I&E, RWS and the project organisation was completely transparent.

W+B’s project manager stated that W+B shared most but not all relevant information timely. W+B’s technical manager stated that strategic considerations are leading when drawing up a tender: ‘You do no lie, but you can be selective in the information you share.’ W+B’s tender was priced sharply; it was expected that W+B was going to lose money on this project. W+B shared these concerns with the project organisation and showed them their financial records.

As mentioned before, both the project organisation and W+B kept a risk register. W+B proposed to share and combine the risks registers. The project organisation wanted to comply with this request, but the SG I&E did not allow this because of possible strategic behaviour by W+B.

During procurement, the determination of activities that were paid from the reservation for contingencies was discussed. W+B deliberately did not ask too many questions about this. As a result, during the plan development phase, for some activities it appeared unclear whether they were to be paid from the fixed price of from the reservation for contingencies. W+B filed a claim amounting up to €200,000 for additional work to be paid from the reservation for contingencies. This claim led to a fierce argument that was held up to board level. In order to secure progress, which was considered most important by both organisations, it was tried to isolate this argument. It appeared that the issue had to be settled in court, but this did not happen. A preliminary settlement, in which both organisations contributed 50% of the claim, was agreed upon. Eventually it was decided that the project organisation contributed 60% and W+B contributed 40%. W+B’s project manager was not satisfied with this outcome, but settled in order to create goodwill for future (and larger) claims. W+B’s project manager stated: ‘The risk allocation is basically contract interpretation [. . . ] this discussion is held constantly.’

Initially, the contract did not contain a bonus structure. During procurement, the probabilistic planning indicated that the completion date was hard to meet. Therefore, a bonus for early completion was added; if W+B completed its work before the completion date, it would receive a bonus of €10,000 per week (delays were more costly for W+B). W+B’s project manager expected to be finished 9 weeks early. W+B’s project manager considered all works after completion to be paid from the variable fee. However, an agreement about this issue had not been reached yet.

W+B’s project manager expected that the project organisation shared most inform-
ation. However, W+B’s project manager stated: ‘RWS distrusts W+B per definition.’ W+B’s technical manager did not expect that the risk allocation was influenced by information that was withheld or shared late. In contrast, W+B’s project manager expected that the risk allocation was influenced by information that was withheld or shared late, but lacked proof. The project director of the project organisation stated that the project organisation did not withhold information or shared it late, and expected the same of W+B. However, he could image that W+B sometimes wondered whether they had all information.
In this chapter, the analysis of the observations for project ZuidasDok and project Afsluitdijk, and the verification on the basis of project Haak om Leeuwarden, are described. This chapter is divided in three sections. The subject of section 5.1 are the risk allocation criteria, process and outcome. The consequences of risk allocation are described in section 5.2. Finally, in section 5.3, the factors that influenced risk allocation are elaborated.

5.1 Risk allocation

5.1.1 Risk allocation criteria

For both project ZuidasDok and project Afsluitdijk, respondents indicated that risks should be allocated based on the criterion ‘a risk should be allocated to the organisation which is best able to manage the risk.’ The application of this criterion appeared ambiguous; with the ability to manage the risk, some respondents referred to the ability to influence the probability of occurrence, other respondents referred to the ability to manage the consequences. Based on this analysis, the following propositions are derived:

**Proposition 1** Both project organisations and private organisations believe that a risk should be allocated to the organisation which is best able to manage the risk.

**Proposition 2** The interpretation of the criterion ‘a risk should be allocated to the organisation which is best able to manage the risk’ is ambiguous; some refer to the
ability to influence the probability of occurrence, others to the ability to manage the consequences.

Proposition 3 Both public and private organisations understand the concepts of risk management insufficiently in order to allocate risks properly.

The findings from project Haak om Leeuwarden support propositions 1 and 2. It is found that two elements of the criterion ‘a risk should be allocated to the organisation which is best able to manage the risk’ were interpreted differently. Firstly, five out of seven respondents interpreted ‘the allocation of a risk’ as the determination of the organisation which bears the consequences. Two out of seven respondents interpreted ‘the allocation of a risk’ as the determination of the organisation which is responsible for the control of the risk. Secondly, four out of seven respondents interpreted ‘the ability to manage a risk’ as both the ability to influence the probability of occurrence and the ability to manage the consequences, whereby the former was considered most important. Two out of seven respondents interpreted ‘the ability to manage a risk’ only as the ability to manage the consequences. One out of seven respondents interpreted ‘the ability to manage a risk’ only as the ability to influence the probability of occurrence.

Proposition 3 is not supported by the findings from project Haak om Leeuwarden. Respondents indicated that they were familiar with risk identification, risk analysis, determining control measures, executing control measures and the iterative nature of the process. In addition, respondents considered jointly identifying and analysing risks to yield the most complete and highest quality risk registers, which offers best possibilities for control. Furthermore, respondents considered jointly determining control measures to be most effective. However, respondents mentioned just one criterion based on which risks should be allocated, and the interpretation of this criterion appeared ambiguous. This implies that practitioners form both public and private organisations understood the concepts of risk allocation insufficiently in order to allocate risks properly.

5.1.2 Risk allocation process

For both project ZuidasDok and project Afsluitdijk, the contracts with the engineering companies were based on the framework agreement used by Rijkswaterstaat. Specific were determined by the project organisations. Contracts were unilaterally imposed by the project organisations upon the engineering companies.

For project ZuidasDok, risks were not allocated explicitly. During the competitive dialogue, alignment of the interpretation of the project (required engineering works) between the project organisation and the engineering company was discussed mostly. For
project Afsluitdijk, risks were allocated explicitly. The engineering company proposed a risk allocation that was accepted by the project organisation without discussion.

For project Afsluitdijk, throughout the project, the engineering company monitored the risks and actualised the risk register. Mutations were discussed with the project organisation once every four weeks. If a new risk was identified, the engineering company proposed an allocation. If the project organisation did not agree with the proposed allocation, often the risk was not formally allocated at all. The project manager of the engineering company stated: ‘It is preferred to allocate all risks explicitly, but in practice [unforeseen events] happen […] these influence the critical path, which results in discussions.’ Based on this analysis, the following propositions are derived:

**Proposition 4** Project organisations impose their preferred risk allocations upon private organisations, by making their preferred risk allocations part of the contracts which are formulated by the project organisations and which are imposed upon private organisations.

**Proposition 5** During the execution of both engineering and construction works, risk allocations are not always made explicit.

**Proposition 6** During the execution of both engineering and construction works, project organisations and private organisations do not always agree upon the allocation of new risks. As a result, it remains unclear which organisation is the owner of the risk and which organisation is responsible for the control of the risk.

The findings from project Haak om Leeuwarden support proposition 4. In addition, respondents were asked about the attitude of the public organisations towards the private organisations with respect to the contract and the allocation of risks during execution. It is found that, during the execution of the works, the attitude of the project organisations towards the engineering companies was less coercive than towards the contractors.

Proposition 5 is partly supported. During the execution of the engineering works, the allocation of risks was not always made explicit. During the execution of the construction works, the allocation of risks was made explicit.

Finally, proposition 6 is not supported. Public and private organisations agreed upon the allocation of new risks in most instances. Disagreements related to whether activities were part of the contract or not. These disagreements did not affect measures to mitigate the risks.
5.1.3 Risk allocation outcome

For both project ZuidasDok and project Afsluitdijk, respondents indicated that they were satisfied till very satisfied with the risk allocation. However, for both projects, the extent of the engineering works was larger than expected. For both projects, the costs for the additional work were – for a major part – born by the engineering companies. The engineering companies tried to recover these costs from the public organisations, which resulted in contract discussions. In addition, the quality of the engineering works was pressurised. In the following paragraphs, the causes of the larger extents of the engineering works are further explored.

For project ZuidasDok, the project director of the project organisation indicated that the extent of the engineering works was in accordance with the contract. Additional work was attributed to inefficiency by the engineering consortium. The technical manager of the engineering consortium indicated that the extent of the engineering works was larger than expected by the engineering consortium. This was attributed to the complexity of the decision making process by the client organisations (Rijkswaterstaat, ProRail and the municipality of Amsterdam) and to difficulties in determining and controlling the extent to which designs should be developed. The cause mentioned by the project director of the project organisation (inefficiency by the engineering consortium) corresponds to the second cause mentioned by the technical manager of the engineering consortium (difficulties in determining and controlling the extent to which designs should be developed). Both the project organisation and the engineering consortium could influence them to a certain extent. The first cause mentioned by the technical manager of the engineering consortium (the decision making process by the client organisations), was outside of the engineering consortium’s control. The risk was thus not allocated in accordance with the criterion ‘a risk should be allocated to the organisation which is best able to manage the risk.’

For project Afsluitdijk, the project director of the project organisation indicated that the extent of the engineering works was larger than expected by the engineering company because of scope extensions and the many consultations between the project organisation and the engineering company which were required in order to align works. The project manager of the engineering company confirmed these two causes, and added further insights or results from researches whereby additional works were required. Scope extensions (cause 1) were initiated by the project organisation and also paid for by the project organisation. The project director of the project organisation considered the many consultations between the project organisation and the engineering company which were required in order to align works (cause 2), foreseeable by the engineering company
and within the contract. The project manager of the engineering company stated that the engineering company could not have foreseen them and considered them outside the contract. After fierce debate, the project organisation and the engineering company agreed to divide the costs; 60% was paid by the project organisation, 40% was paid by the engineering company. Additional works as a result from further insights or results from researches (cause 3) were paid by the project organisation. Based on this analysis, the following propositions are derived:

**Proposition 7** Project organisations transfer risks, for which private organisations are not best able to manage them, to private organisations.

**Proposition 8** During the execution of both engineering and construction works, the risk allocation is not always clear.

The findings from project Haak om Leeuwarden are in accordance with propositions 7 and 8. The project organisations transferred (some) risks to contractors, for which the contractors were not best able to control them. In addition, for both the engineering and the construction works, the risk allocation was not always clear during execution.

### 5.2 Consequences of risk allocation

#### 5.2.1 Risk allocation and cooperation

For project ZuidasDok, the consultant from Rijkswaterstaat indicated that, in general, the risk allocation, especially the manner in which the contract is drafted, influences the cooperation. The project director of the project organisation considered the risk allocation the foundation of the cooperation; the risk allocation, as described in the contract, included both incentives to cooperate (bonus structure) and agreements with respect to the division of costs. The process manager of the engineering consortium indicated that the risk allocation somewhat pressurised the cooperation on management level; on operational level, the risk allocation had no influence on the cooperation.

For project Afsluitdijk, the project director of the project organisation stated that the cooperation between the project organisation and the engineering company was good. However, the plan development phase approached its end and contract discussions regarding additional work between the project organisation and the engineering company emerged. The engineering company considered many of the consultations the project organisation requested in order to align works, not to be part of the contract; the project organisation considered them to be part of the contract. On the topic of cooperation,
the project director of the project organisation therefore stated: ‘Right now the cooperation is good, but if you would ask me the same question in two months, it might be bad.’ The project manager of the engineering company indicated that the risk allocation influenced the cooperation, but that both the project organisation and the engineering company tried to separate these matters. He stated: ‘Risk allocation and cooperation are managed from a business perspective and the project’s interest is put first.’ However, he added: ‘Now tension rises [as a result of contract discussions], evaluations [of each other’s performance with respect to the cooperation] diverge.’ The technical manager of the engineering company stated: ‘A transparent risk allocation clearly contributes to who bears responsibility [...] organisations can point this out to each other [...] therefore I think that it benefits the project.’

From the above it follows that, for both projects, the risk allocation somewhat pressurised the cooperation, and that the risk allocation can affect the cooperation in various ways. The risk allocation can have a positive impact on the cooperation through incentives to cooperate and a clear division of responsibilities. The risk allocation can have a negative impact on the cooperation if organisations bear risks they do not want to bear and in case of absence of clarity about the risk allocation. Furthermore it is observed that in order to sustain a high level of cooperation during the project, contract discussions were postponed until the end of the project. Based on this analysis, the following proposition is derived:

**Proposition 9** The cooperation is influenced by the acceptance and clarity of the risk allocation.

Respondents from project Haak om Leeuwarden were asked about the degree to which they were satisfied with the risk allocation and whether they considered the risk allocation to be of influence on the cooperation. They were also asked about the degree to which the risk allocation was clear, and whether they considered the clarity of the risk allocation to be of influence on the cooperation. The findings are in accordance with proposition 9. It is found that:

1. Three out of six respondents indicated that organisations involved were satisfied with the risk allocations and that the risk allocations did not not influence the cooperations.
2. Three out of six respondents indicated that organisations involved were not satisfied with the risk allocations and that the risk allocations did put pressure on the cooperations.
3. Two out of six respondents indicated that the clarity of the risk allocation influenced the cooperation. One respondent indicated that the risk allocation was clear and that this had a positive influence on the cooperation. One respondent indicated that the risk allocation was not always clear and that this had a negative influence on the cooperation.

5.2.2 Risk allocation and risk management

From the definitions of the effectiveness and the efficiency of risk management (section 3.3), if follows that, in order to minimise the cost of risks, the sum of the effectiveness and the efficiency of risk management should be maximised. From the results from the exploration, it can not be determined whether risks were allocated in a manner for which the sum of the effectiveness and the efficiency was maximised. However, because it is found that public organisations transferred risks, for which private organisations were not best able to manage them, to private organisations, the following proposition is derived:

**Proposition 10** Risks are not always allocated to and managed by the organisations which are best able to do this, which has a negative impact on the effectiveness and/or efficiency of risk management.

The findings from project Haak om Leeuwarden support proposition 10. Four out of six respondents indicated that they considered the risk allocation to be of influence on the effectiveness and the efficiency of risk management. Two out of six respondents indicated that (some) risks were not allocated to the organisation best able to control them, and that this had a negative impact on the effectiveness and the efficiency of risk management.

5.2.3 Risk allocation and project performance

Both project ZuidasDok and project Afsluitdijk were subject to contract discussions. The private organisations requested to be paid for additional works they considered to be outside the contracts. The public organisations considered these works to be within the contracts. In both cases, the quality of the engineering works was under pressure as a consequence of the risk allocation. Therefore, the following proposition is derived:

**Proposition 11** Improper allocated risks can ultimately result in claims and lesser quality.
Proposition 11 is supported by the findings from project Haak om Leeuwarden. For the construction works, three out of four respondents indicated that improper allocated risks resulted in claims and/or lesser quality. For the engineering works, this was not the case.

5.3 Factors that influenced risk allocation

5.3.1 Organisation

The contracting authorities for project ZuidasDok were Rijkswaterstaat, ProRail, and the municipality of Amsterdam. These parties were organised according to the model of Rijkswaterstaat (explained below). The contract for project Afsluitdijk was Rijkswaterstaat as well. The interviews revealed that, in general, Rijkswaterstaat organises projects in accordance with their general steering line. The DG RWS assigns the project to a HID, who carries the project (possibly through an assistant director) through to a project organisation. For large projects, in addition to the general steering line, a separate steering group is established, which is responsible for the decision making within its mandate. If decisions are without the steering group’s mandate (scope changes), they are carried through to the government.

Both project ZuidasDok and project Afsluitdijk were large projects for which a steering group was established. For project ZuidasDok, the Ministry of I&E, the province of Noord-Holland, the city region of Amsterdam, the municipality of Amsterdam, Rijkswaterstaat (line and project) and ProRail were represented in the steering group. For project Afsluitdijk, only the Ministry of I&E and Rijkswaterstaat (line and project) were represented in the steering group. However, in order to enable the alignment of the two partial assignments (see chapter 4), two provinces and three water boards were involved in the decision making process as well through separate steering groups. Based on this analysis, the following propositions are derived:

Proposition 12 For large projects, decision making with regard to contracts and risks is done in steering groups.

Proposition 13 Members of the steering groups, except for the projectdirector of the project organisation, represent the interests of their line organisations.

Proposition 14 Decision making in the steering groups is based mainly on the interests of the line organisations.
The results from the verification support proposition 12 and 13 partly, and they do not support proposition 14. For project Haak om Leeuwarden, politics, the steering groups and the project organisations influenced the decision making with respect to contracts and risks. Important decisions, such as decisions regarding the choice for the contract type for the construction works and the manner in which top risks were dealt with, were discussed in the steering groups. Project organisations were responsible for the management of project endogenous risks, providing insight in the impacts of the various options with respect to contracts and project exogenous risks, and for processing the chosen options in the contracts. Members of the steering group represented both the interests of their line organisations and the interests of the project, and that the interests of line organisations involved were aligned in the steering groups. The decision making in the steering group was based on both the interest of the line organisations and the interests of the project to the same extent.

5.3.2 Contracts

From literature, it follows that contract type are linked to the allocation of risks. For this research, a distinction is made between the engineering and the construction works. In the following paragraph, findings concerning the decision making with regard to the contracts for both the engineering and the construction works are described.

For both project ZuidasDok and project Afsluitdijk, the contracts for the engineering works were based on Rijkswaterstaat’s standard framework agreement, for which the project organisations determined the specifics. The contract types for the construction works were determined in the steering groups. The project organisations were responsible for the substantiations of the chosen contract types through the application of the Public-Private Comparator. Respondents from the line organisations were asked how the decision to opt for a certain contract type was linked to the project’s interest. For project Afsluitdijk, the respondent from the line organisation indicated that the contract type for construction works was based on the government’s policy, maintenance management considerations, financial considerations and market considerations. The project’s interest was represented by the description of the project’s scope, planning and budget. Based on this analysis, the following proposition is derived:

**Proposition 15** Contracts for both the engineering and the construction works are based mainly on the interests of the line organisations.

This proposition is partly supported. For project Haak om Leeuwarden, the project organisations determined the contracts for the engineering works, based on incentives for
engineering companies for maximum performance. Politics and the steering group determined the contract types for the construction works, based on political considerations and interests of line organisations.

5.3.3 Risk management

For both projects, the public organisations conducted risk management in accordance with the RISMAN method. The project organisations drew up risk registers and labelled the risks exogenous or endogenous. Both types of risks were discussed in the steering groups. The steering groups were responsible for the management of exogenous risks; the project organisations were responsible for the management of endogenous risks. Respondents from the engineering companies indicated that the public organisation’s risk management practices were not only used to manage risks, but also for internal justification. Respondents form the engineering companies perceived these practices as process-oriented (rather than action-oriented) and cumbersome. The line organisations did not allow the project organisations to share the internal risk registers with the engineering companies. The technical manager of the engineering company for project Afsluitdijk indicated that this was due to strategic considerations. The engineering companies kept a separate risk register.

Furthermore, it is observed that the public organisation’s risk management practices made it difficult for project organisations to transfer the control of risks to the steering groups, because the decision making process by the steering groups was lengthy, because decisions were often postponed, and because steering groups often returned risks, which the project organisations submitted to the steering groups, to the project organisations. Based on this analysis, the following propositions are derived:

**Proposition 16** Public organisations do not allow their project organisations to share the public organisation’s risk register with private organisations.

**Proposition 17** It is difficult for the project organisations to transfer the control of risks to the steering groups.

The findings from project Haak om Leeuwarden do not support proposition 16. The project organisations were allowed to share its risk register with private organisations. However, both projectmanagers of the project organisations indicated that the project organisations and the private organisations drew up separate risk registers, and that the project organisations did not share the complete risk registers with the private organisations. Risks which could affect the works directly, were shared; risks which
could not affect the works directly, but which could affect the works indirectly, were not shared. As a result, private organisations did not have complete information.

Proposition 17 is party supported. Project organisations could transfer the control of risks to the steering groups. However, decision making by the steering groups about risks took much time and risks were often returned to the project organisations.

5.3.4 Bargaining power

Although respondents were not specifically asked about the competitive positions of their organisations, the interviews revealed that public organisations have a strong bargaining power compared to private organisations. For this research, the following definition of ‘bargaining power’ (2014) is adopted: ‘In negotiation, bargaining power is the capacity of one party to dominate the other due to its influence, power, size, or status, or through a combination of different persuasion tactics.’

For project ZuidasDok, the process manager of the engineering consortium indicated that the risk allocation was unfavourable for the engineering consortium. He stated: ‘[...] if the project organisation would follow the contract by the letter, it could fleece [the engineering consortium].’ The project director of one of the engineering companies of the engineering consortium, when asked why the engineering consortium agreed with an unfavourable risk allocation, responded that it was a matter of ‘take it or leave it’. The consultant from the public organisation stated that private organisations should not conduct projects if these are not profitable for them. But because they do, the public organisations do not feel the urge to change their practices. Based on this analysis, the following proposition is derived:

Proposition 18 During procurement, the strong bargaining power of the public organisations, compared to those of the private organisations, increases the ability of the public organisations to transfer risks to the private organisations.

The findings for project Haak om Leeuwarden are in accordance with proposition 18. It is found that:

1. During procurement of either the engineering or the construction works, all respondents considered the bargaining power of the public organisations to be strong compared to the bargaining power of the private organisations. During execution of either the engineering or the construction works, half of the respondents indicated that the public organisations still had a strong bargaining power.

2. During procurement of both the engineering works and the construction works, all respondents from the private organisations, and one out of three respondents from
the public organisations, indicated that the strong bargaining power of the public organisations influenced the risk allocation. Public and private organisations thus had different perceptions on the influence of the bargaining power of the public organisation on the allocation of risks during procurement.

3. The perceptions of the respondents on the bargaining powers of the public and private organisations, and its influence on the risk allocations, during procurement of both the engineering works and the construction works, largely corresponded. In contrast, for the execution of both the engineering and the construction works, these perceptions largely diverged. The relations between public and private organisations, and the influence hereof on the allocation of risks, thus a) followed a similar pattern during procurement, and b) diverged during execution.

5.3.5 Strategic behaviour

From the theoretical framework (section 2.4), it follows that strategic behaviour is one of the factors which may affect the allocation of risks. For this research, the following definition of strategic behaviour is adopted: ‘Strategic behaviour is the general term for actions taken by firms which are intended to influence the market environment in which they compete. Strategic behaviour includes actions to influence rivals to act cooperatively so as to raise joint profits, as well as noncooperative actions to raise the firm’s profits at the expense of rivals’ (Centre for Co-operation with European Economies in Transition, 1993). From this definition, it follows that, in the context of the allocation of risks, strategic behaviour by public organisations aims to minimise the cost of risks, and strategic behaviour by private organisations aims to maximise the compensation for taking on risks. Public organisations can act strategically by toning down the magnitude of risks they want to transfer in order to minimise costs. In turn, private organisations can act strategically by exaggerating the magnitude of risks, increasing compensation. Respondents were asked whether the public and/or the private organisations acted strategically.

For project ZuidasDok, the projectdirector of the project organisation indicated that the project organisation shared all relevant information timely during procurement, and expected the engineering consortium to have done the same. The process manager of the engineering consortium indicated that, in order to secure their competitive position, the engineering consortium did not share all relevant information timely during procurement. However, the engineering consortium indicated that it had been honest about the works it could conduct for a certain budget. In addition, the process manager of the engineering consortium expected that the project organisation shared information
‘in all conscience’. The technical manager of the engineering consortium stated that the quality of the baseline for the design – the input for their engineering works, a product by the client organisations – was lower than the project organisation indicated during procurement. This resulted in additional works for the engineering consortium. The technical manager of the engineering consortium did not expect that the project organisation was aware of the low quality of this baseline. However, because the discrepancy between the communicated and the actual quality of the baseline differed significantly, it is plausible that the public organisation acted strategically.

For project Afsluitdijk, the project director of the project organisation indicated that the project organisation did not withhold information knowingly, and expected the same from the engineering company. However, the project organisation was not allowed to share its risk register with the engineering company. The project manager of the engineering company indicated that the engineering company did not share all relevant information timely, and expected the same from the project organisation. In addition, he expected that information asymmetry influenced the risk allocation, but he could not substantiate this. The technical manager of the engineering company indicated that strategic considerations are leading when drawing up a tender: ‘You do not lie, but you can be selective in what you show.’ He expected that the project organisation shared most, but not all, relevant information timely. Based on this analysis, the following proposition is derived:

**Proposition 19** *The risk allocation is influenced by strategic behaviour by both public and private organisations.*

The findings from project Haak om Leeuwarden are in accordance with proposition 19. It is found that both public and private organisations do not always share complete relevant information timely, and that this influenced the risk allocation. For project Haak om Leeuwarden-Zuid, the public organisation did not share its risk register with the private organisations on the basis of strategic considerations. In addition, a respondent from the public organisation for project Haak om Leeuwarden-Zuid indicated that, sometimes, public organisations provide private organisations with too much information, in order to make it difficult for private organisations to fully understand the risks they face. Furthermore, five out of six respondents indicated that their organisation’s conduct with respect to the allocation of risks was influenced by the expectation that counterpart organisations acted strategically.
Conclusions and recommendations

Based on the results from case study research and literature, conclusions with regard to the consequences of the allocation of risks (section 6.1) and the causes for the current course of events (section 6.2) are drawn. Consecutively, based on these insights and literature, recommendations to allocate risks in a manner that supports the cooperation, the effectiveness and the efficiency of risk management, and ultimately project performance, are made (section 6.3).

6.1 Consequences

Conclusion 1 The allocation of risks was not always fully accepted and clear. This affected the behavioural element of cooperation on project management level, which in turn affected project performance through claims and lesser quality.

For this research, the following definition of cooperation by Anvuur (2008) (page 11) was adopted: ‘[...] the concept of cooperation refers to behaviour that benefits all parties. In construction, this often involves/implies problem-solving, creating new value together or striving for win-win scenarios. Cooperation is also a process and emphasises the pattern and quality of interactions, activities and social relations.’

For both project ZuidasDok and project Afsluitdijk, the allocation of risks put pressure on the behavioural element of cooperation on project management level; the process
of cooperation was not affected. Furthermore, the projects were subject to contract discussions and claims, and the respondents from the private organisations indicated that the quality of the engineering works was under pressure as well.

For project Haak om Leeuwarden, three respondents indicated that the allocation of risks was generally accepted, and that this did not influence the cooperation. In contrast, three other respondents indicated that the allocation of risks was not generally accepted, and that this did influence the cooperation. In addition, one respondent stated that the allocation of risks was clear, and that this had a positive influence on the cooperation, while another respondent stated that the allocation of risks was unclear, which affected the cooperation. Finally, for the construction works, three respondents indicated that improper allocated risks resulted in claims and/or lesser quality.

The influence of the acceptance and the clarity of the allocation of risks on the cooperation, and subsequently on project performance, is illustrated in figure 6.1.

![Figure 6.1: Influence of the cooperation on project performance](image)

**Conclusion 2** Risks were not always allocated to, and managed by, the organisation which was best able to control the risk chance of occurring and manage the risk in case of occurring. As a result, the effectiveness and the efficiency of risk management, and therefore project performance, were not optimal.

![Figure 6.2: Influence of the allocation of risks on the effectiveness and the efficiency of risk management](image)

In project ZuidasDok, the risk that the extent of the required works was larger than expected was implicitly allocated to the private organisation, while the public organisation...
was best able to control it. Respondents from project Haak om Leeuwarden indicated that the public organisation transferred (some) risks, for which contractors were not best able to control them, to contractors. Logically, it follows that improper allocated risks affected the effectiveness and/or the efficiency of risk management, and therefore project performance, as illustrated in figure 6.2 and figure 6.3.

![Figure 6.3: Influence of the effectiveness and the efficiency of risk management on project performance](image)

### 6.2 Causes

The following causes are found for the current course of events:

- The handing of contracts and risks by the public organisations.
- Insufficient understanding of the principles of risk allocation.
- Separately identifying risks, analysing risks, and determining control measures.
- The strong bargaining power of the public organisations.
- Strategic behaviour by both public and private organisations.

In this section, these causes are elaborated.

**Conclusion 3** Public organisations underestimated the influence of the contract, and associated allocation of risks, and the handling of risks, on the cooperation with private organisations.

Respondents from public organisations considered a good cooperation to be important for a project to be successful. However, the manner in which they handled contracts and risks was counterproductive to a good cooperation. To substantiate this, firstly, the manner in which the public organisations were organised is explained, followed by observations with regard to the determination of the contracts and the handling of risks.

In all cases, the public organisations, which acted as contracting authority, organised the large infrastructure project through the establishment of a project organisation and a steering group. The project organisation was responsible for the execution of the project; the steering group was responsible for the steering of the project organisation.
The commissioning party towards the steering group was politics. The steering group was composed of representatives from the public organisations acting as contracting authority and the project director of the project organisation. Although the mandate of the project organisation differed for different public organisations (e.g. Rijkswaterstaat or province), in general, the most important decisions with regard to the execution of the project were made by the steering group, based on the interests of both project and line organisation(s). The organisation of public organisations for large infrastructure projects is illustrated in figure 6.4.

![Organisation of public organisations for large infrastructure projects](image)

Figure 6.4: Organisation of public organisations for large infrastructure projects

From the theoretical framework (section 2.4), it follows that the contract type has a major influence on the allocation of risks. In all cases, the contract for the engineering works was determined by the project organisation. Two project directors of the project organisations indicated that the quality of the project was established during the front-end development. Therefore, the contracts were based on incentives for the engineering companies to achieve maximum performance. However, as described before, in all cases, the project organisation made its preferred allocation of risks part of the contract, which it imposed upon the engineering company. With the input by the engineering company, little was done. For project project ZuidasDok and project Haak om Leeuwarden, during the procurement of the engineering works, risks were allocated implicitly.

The contract type for the construction works was, in all cases, established in the steering group. The decision to opt for a certain contract type was based on political considerations and line interests – financial and maintenance management considerations – of the contracting authorities. The project organisation was responsible for the substantiation for the chosen contract type by conducting a Public-Private Comparator. Furthermore, for project Haak om Leeuwarden, although explicitly discussed by the project organisation and the contractors, the preferred allocation of risks was determined by the project organisation (within the frameworks of the contract) and imposed upon the contractors. With the input by the contractor(s), little was done as well. The determin-
Determination of the contract for both the engineering and the construction works is illustrated in figure 6.5.

In all cases, the project organisation was responsible for the identification and the analysis (assessment) of the risks. The project organisation labelled the risks exogenous or endogenous, and proposed control measures. The steering group was responsible for the control of exogenous risks; the project organisation for the control of endogenous risks. Top exogenous and endogenous risks, and proposed control measures, were discussed in the steering group. For project Haak om Leeuwarden, respondents indicated that decisions by the steering group were based on both the interests of the line organisation and the interests of the project. For project ZuidasDok and project Haak om Leeuwarden, respondents indicated that the steering group often returned risks, which were labelled exogenous, to the project organisation. The transfer of the control of a risk from the project organisation to the steering group was thus often ineffective. Just as with the determination of the contract, the input by private organisations was addressed to a limited extent. However, this applied to a greater extent for the construction works than for the engineering works. During execution, the public organisations and engineering companies jointly shaped their cooperation, while, in project Haak om Leeuwarden, it is observed that public organisations unilaterally shaped their cooperation with contractors. For project ZuidasDok, it is observed that this mechanism stimulated risk transfer (flexibility risk), as illustrated in figure 6.6.

The above illustrates that public organisations imposed decisions with regard to the contract for the construction works and the control of risks, upon their project organisations, and that project organisations, in turn, imposed risk allocations upon private
organisations. As a result of this top down-control by public organisations, project organisations were limited in the establishment of risk allocations private organisations considered most suitable for the project.

**Conclusion 4** *Respondents from both public and private organisations understood the concepts of risk allocation insufficiently in order to allocate risks properly.*

In literature, different sets of risk allocation criteria are described. The most elaborate set comprises seven criteria. Respondents named only one risk allocation criterion, namely: ‘A risk should be allocated to the organisation which is best able to manage the risk’. The interpretation of this criterion amongst respondents differed in two ways. Firstly, with the allocation of a risk, some referred to the allocation of the consequences, while others referred to the allocation of the execution of control measures. Secondly, with the ability to manage the risk, some referred to the ability to manage the probability of occurrence, while others referred to the ability to manage the consequences.

**Conclusion 5** *Although it was considered best to identify risks, analyse risks, and determine control measures jointly, public and private organisations conducted these activities mostly separately.*

For project Haak om Leeuwarden, respondents from both public and private organisations indicated that they were familiar with risk identification, risk analysis (assessment), and the iterative nature of the process. Jointly identifying and analysing risks was considered to yield the most complete and highest quality risk registers, which offers best
possibilities for control. However, in all three cases, public and private organisations conducted risk identification and analysis separately, and risks were listed in separate risk registers. Furthermore, these risk registers were not completely shared. For project ZuidasDok and project Afsluitdijk, it is observed that, as a result, the perceptions of public and private organisations of the project’s risk profile differed.

Determining and executing control measures, and the iterative nature of the process, were also considered well-known issues by respondents from project Haak om Leeuwarden. It was indicated that the most effective way to determine control measures, is in a cooperative setting. However, in all three cases, control measures were determined jointly to a limited extent. For project ZuidasDok, this resulted in risk transfer from the public to the private organisation.

A possible explanation for the difference between the desired and the actual situation, is the expectation of strategic behaviour by the counterpart organisation. For project Haak om Leeuwarden, respondents from both public and private organisations indicated that their organisation’s conduct was influenced by the expectation that the counterpart organisation acted strategically. However, other matters may be of influence as well. This can be subject of further research.

Conclusion 6 During procurement, the strong bargaining power of the public organisations contributed to risk transfer.

\[
\begin{align*}
\text{Risk price by public organisation} & = c_{pm} \\
\text{Risk price by private organisation, risk transfer not beneficial} & = c_{pp} \\
\text{Risk price by private organisation, risk transfer beneficial} & = p_{ir} \cdot i_{ir} \\
\text{Influence of bargaining power on risk price by private organisation, risk transfer beneficial} & = c_{price}
\end{align*}
\]

Figure 6.7: Influence of bargaining power on the risk allocation

In project ZuidasDok and project Afsluitdijk, it is observed that the private organisations set their price sharp. In addition, for project ZuidasDok, the private organisation agreed to an unfavourable risk allocation. The conduct by the private organisations was attributed to the strong bargaining power of the public organisations compared to those of the private organisations. The findings from project Haak om Leeuwarden show that, during procurement, the strong bargaining power of the public organisations indeed increased the ability of public organisations to transfer risks to private organisations. The
manner in which bargaining power influences the risk allocation is illustrated in figure 6.7. This mechanism put pressure on the revenues of private organisations, and therefore on the acceptance of the risk allocations. Furthermore, it is observed that a) respondents from public organisations were less aware of the influence of bargaining power on the risk allocation than respondents from private organisations, and b) the differences in bargaining power between public and private organisations followed a consistent pattern during procurement but not during execution.

**Conclusion 7** Strategic behaviour by both public and private organisations influenced the allocation of risks.

In all cases, it is found that both public and private organisations acted strategically. From literature, it follows that, by acting strategically, public organisations try to minimise the costs of risks. Therefore, in the context of risk allocation, it is argued that it is in the interest of public organisations to tone down the magnitude of risks during the negotiation for risk allocation (communicated magnitude of the risk \( r_{\text{com.}} \) is smaller than the estimated magnitude of the risk \( r_{\text{est.}} \)). In the cases, three examples of manners in which public organisations acted strategically are found:

1. Not sharing complete relevant information. In project Afsluitdijk and project Haak om Leeuwarden, it is observed that public organisations did not share their risk registers with private organisations. As a consequence, the private organisations did not have complete information on the project’s risk profile.
2. Sharing complete relevant information late. In project ZuidasDok, it is observed that the project organisation’s dossier, whose quality influenced the extent of the works by the private organisation, was not shared until after the private organisation priced and estimated its works.
3. Sharing too much information. A respondent of the public organisation for project Haak om Leeuwarden indicated that, by sharing too much information, it was very difficult for private organisations to fully understand the risks they faced (agreed to take on).

In addition, from literature it follows that private organisations, in turn, act strategically to maximise the compensation for taking on risks. Therefore, in the context of risk allocation, it is argued that it is in the interest of private organisations to exaggerate the magnitude of risks during the negotiation for risk allocation (communicated magnitude of the risk \( r_{\text{com.}} \) is larger than the estimated magnitude of the risk \( r_{\text{est.}} \)). In the cases, two manners in which private organisations acted strategically are found:
1. Not sharing complete relevant information. For project Haak om Leeuwarden, several respondents from private organisations indicated that their organisations did not always share complete relevant information.

2. Sharing complete relevant information late. For all cases, one or more respondents from private organisations indicated that their organisations did not always share complete relevant information timely. In project Afsluitdijk, it is observed that, during procurement, the private organisation did not bring matters that were unclear in the contract to the public organisation’s attention.

For project Afsluitdijk and project Haak om Leeuwarden, respondents from both public and private organisations indicated that strategic behaviour by their organisations influenced the risk allocation. The mechanism by which strategic behaviour influences the risk allocation is illustrated in figure 6.8. Furthermore, strategic behaviour by private organisations can be regarded as one of the causes of an unclear risk allocation, and as a consequence of an unclear and not generally accepted risk allocation.

6.3 Recommendations

In order to support the cooperation, the effectiveness and the efficiency of risk management, and ultimately project performance, risk allocations should be accepted and clear, and risks should be allocated to the organisations which can manage them (both probability of occurrence and impact) most effectively and efficiently. To achieve this, the following is recommended:

1. **Timing** – Public and private organisations could best start with risk identific-
ation, risk analysis, risk allocation, and the determination of control measures, during procurement. This will enhance the clarity with respect to responsibilities and costs, preventing disagreements during execution and limiting the possibilities for strategic behaviour during execution, both of which can put pressure on the cooperation or induce unexpected costs. Risks that are identified during execution, could best be allocated directly after identification.

2. **Risk identification and analysis** – Public and private organisations could best share and discuss complete relevant information regarding risks with each other, during both procurement and execution. In this manner, public and private organisations get the best possible grip on the risks and their magnitudes, thus enhancing the clarity about the risks to be allocated.

3. **Determination of risk response strategies** – Public and private organisations could best share and discuss complete relevant information regarding control measures with each other, during both procurement and execution. In this manner, the most effective and efficient control measures can be determined, enhancing the effectiveness and efficiency of risk management.

4. **Risk allocation** – Public (project) and private organisations could best allocate risks in consultation. In this manner, adverse risk transfer (the transfer of a risk, which the private organisation is not willing to bear, to the private organisation) can be prevented, enhancing the acceptance of the allocation of risks. A risk can best be allocated to the organisation which best meets the following criteria (Lam et al., 2007):

   (a) Whether the party is able to foresee the risk.
   (b) Whether the party is able to assess the possible magnitude of consequences of the risk.
   (c) Whether the party is able to control the risk chance of occurring.
   (d) Whether the party is able to manage the risk in case of occurring.
   (e) Whether the party is able to sustain the consequences if the risk occurs.
   (f) Whether the party will benefit from bearing the risk.
   (g) Whether the premium charged by the risk receiving party is considered reasonable and acceptable for the owner.

In literature, different set of risk allocation criteria are listed. The set by Lam et al. (2007) is considered most specific and complete, and it is therefore adopted here. By allocating a risk to the organisation which best meets this set of risk
allocation criteria, the acceptance of the allocation of risks, and the effectiveness and the efficiency of risk management, will be highest.

5. **Leadership** – In order to enable the allocation of risks in consultation (recommendation 4), project organisations should be able to influence decisions about contracts and risks, based on their and the private organisation’s thoughts about what is best for the project. Therefore, public organisations could best enable their adaptive capacity by applying administrative leadership (top-down), adaptive leadership (bottom-up), and enabling leadership (management of entanglement between administrative and adaptive leadership)\(^1\) alternately, instead of solely the former.

\(^1\)For an elaborate description, see page 19
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Appendices
A

Case study protocol ZuidasDok & Afsluitdijk
A.1 Case study questions

Questions on level 2 (questions asked of the individual case).

1. What does the organisation of the public organisation look like?
2. How does the public organisation deal with risk management?
3. In what manner are the works procured?
4. What are the top risks?
5. How are the top risks allocated?
6. To what extent were organisations involved satisfied with the risks allocation?
7. How is the cooperation?
8. Is the cooperation influenced by the risk allocation? How?
9. How effective and efficient are risks managed?
10. Is the effectiveness and the efficiency of risk management influenced by the risk allocation? How?
11. Act public and private organisations strategically?
12. Did strategic behaviour influence the risk allocation? How?
A.2 Interview protocol project organisation / private organisation

For practical reasons, the interview protocol is written in Dutch.

Introductie en randvoorwaarden

Introductie

• Mijn naam is Erik Jan Moll. Ik studeer Construction Management and Engineering aan de faculteit Civiele Techniek van de TU Delft en ik studeer af bij Marcel Hertogh.
• In het kader van mijn afstuderen onderzoek ik de verdeling van risico’s tussen staande organisatie en projectorganisatie en tussen publiek en privaat bij infrastructuurprojecten.
• Het doel van dit onderzoek is om aanbevelingen de doen om risico’s beter te verdelen door inzicht te scheppen de manier waarop de risicoverdeling tot stand komt en het effect hiervan op de uitvoering van de opdracht.
• Voor dit onderzoek heb ik een aantal projecten geselecteerd, waaronder dit project.
• Het doel van dit interview is inzicht verkrijgen in de risicoverdeling, hoe deze verdeling tot stand is gekomen en de gevolgen van de risicoverdeling met betrekking tot de samenwerking.

Randvoorwaarden

• Het interview neemt ongeveer een uur in beslag.
• Het interview bestaat zowel uit open als gesloten vragen.
• Uw gegevens worden vertrouwelijk behandeld en komen anoniem terug in de rapportage.
• Om te voorkomen dat waardevolle antwoorden verloren gaan, maak ik van dit interview graag een geluidsoptname. Alleen ik heb toegang tot deze geluidsoptname. Na transcriptie wordt de geluidsoptname vernietigd.
• Indien gewenst zal ik u het verslag van het interview en de eindrapportage ter goedkeuring toesturen.
Interviewvragen

Dit interview bestaat uit drie onderdelen. Achtereenvolgens stel ik u een aantal vragen met betrekking tot uw achtergrond, de risicoverdeling en de gevolgen van de risicoverdeling.

Context (5 min)

Allereerst stel ik u een aantal algemene vragen met betrekking tot uw achtergrond en uw organisatie.

1. Wat is uw rol binnen dit project?
2. Hoe lang bent u al bij dit project betrokken?
3. Wat is uw rol binnen uw organisatie?
4. Wat is het belang van uw organisatie in dit project?

Risicoverdeling (45 min)

Dan gaan we nu verder met het tweede deel van het interview. In dit tweede deel stel ik u een aantal vragen met betrekking tot de risicoverdeling en de manier waarop deze tot stand is gekomen.

5. Hoe ziet de risicoverdeling eruit? (15 min)
   Doel: Vaststellen risicoverdeling belangrijkste 5/10 risico’s (inzicht risico’s).
   (a) Wat zijn de belangrijkste risico’s?
   (b) Door welke organisatie worden deze gedragen?
   (c) Door welke organisatie worden deze beheerst?

6. Hoe is de risicoverdeling tot stand gekomen? (25 min)
   (a) Welke besluitvormingsmomenten zijn van invloed geweest op de belangrijkste risico’s die in het project zitten? Welke organisaties waren hierbij betrokken? Wat waren de belangrijkste overwegingen?
      Doel: Inzicht verkrijgen in besluiten (en bijbehorende overwegingen) die project, en daarmee risicoprofiel, bepalen.
   (b) Wanneer zijn de belangrijkste risico’s gesignaleerd? Door wie? Wat is er vervolgens met deze risico’s gebeurd (kwalificatie, kwantificatie, prioritering, beheersing)?
      Doel: Inzicht verkrijgen in het proces van risicomanagement (identificatie, kwalificatie, kwantificatie, prioritering, beheersing).
(c) Op welke manier zijn de risico’s verdeeld? Wie bepaalde de allocatie? Welke criteria zijn gehanteerd? Wanneer zijn de risico’s verdeeld? Wat waren de belangrijkste overwegingen? Bij welke risico’s stond de verdeling ter discussie? Zijn er risico’s verhangen?

*Doel: Inzicht verkrijgen in manier waarop risico’s verdeeld zijn (proces, criteria, rollen verschillende organisaties, kritieke punten in de verdeling).*

(d) Op een schaal van 1 tot 4 (waarbij 1 staat voor zeer tevreden en 4 voor zeer ontevreden), in welke mate is uw organisatie tevreden met de risicoverdeling? Waarom? Welke risico’s kunnen beter door een andere organisatie gedragen en/of beheerst worden?

*Doel: Inzicht verkrijgen in de mate waarin betrokken organisaties tevreden zijn met de risicoverdeling en welke problemen zij signaleren.*

7. **Hebben betrokken organisaties gedurende het proces van risicoverdeling alle relevante informatie op passende momenten met andere organisaties gedeeld?** (5 min)

*Doel: Inzicht verkrijgen in strategisch gedrag (hou rekening met geïnterviewden die hier geen eerlijke uitspraak over doen) en de perceptie van strategisch gedrag van de andere organisaties.*

(a) Heeft uw organisatie gedurende het proces van risicoverdeling alle relevante informatie op passende momenten met andere organisaties gedeeld? Welke informatie heeft uw organisatie niet of in een later stadium gedeeld? Waarom? Wat was hiervan de invloed op de risicoverdeling?

(b) Zelfde vragen (a) voor andere organisaties.

(c) Hoe denkt u dat andere organisaties denken over de mate waarin uw organisatie informatie met de andere organisaties deelt?

**Gevolgen (10 min)**

Dat waren mijn vragen over de risicoverdeling. Voor dit laatste deel stel ik u een aantal vragen met betrekking tot de gevolgen van de risicoverdeling.

8. **Beïnvloedt de risicoverdeling de samenwerking en de effectiviteit en de efficiëntie van het risicomanagement? Op welke manier?**

*Doel: Inzicht verkrijgen in de invloed van de risicoverdeling op de relatie tussen betrokken organisaties, de samenwerking en het risicomanagement.*
(a) Hoe verloopt de samenwerking? Heeft de risicoverdeling de samenwerking met andere organisaties beïnvloed? Op welke manier?
(b) Op een schaal van 1 tot 4 (waarbij 1 staat voor zeer goed en 4 voor zeer slecht), welke beoordeling geeft u de samenwerking?
(c) Hoe verloopt de beheersing van risico’s? Heeft de risicoverdeling de effectiviteit en/of de efficiëntie van het risicomanagement beïnvloed? Op welke manier?
(d) Op een schaal van 1 tot 4 (waarbij 1 staat voor zeer effectief en 4 voor zeer ineffectief), welke beoordeling geeft u de effectiviteit van het risicomanagement?
(e) Op een schaal van 1 tot 4 (waarbij 1 staat voor zeer efficiënt en 4 voor zeer inefficiënt), welke beoordeling geeft u de efficiëntie van het risicomanagement?

Afsluiting

Tot slot, zijn er nog vragen die u wel had verwacht maar die ik niet heb gesteld? Bedankt voor het interview. Zoals vooraf al vermeld, worden de resultaten van dit interview anoniem verwerkt. Mocht u genteresseerd zijn in het resultaat, dan zal ik u het eindrapport toesturen.
A.3 Interview protocol line organisation

For practical reasons, the interview protocol is written in Dutch.

Introductie en randvoorwaarden

Introductie

- Mijn naam is Erik Jan Moll. Ik studeer Construction Management and Engineering aan de faculteit Civiele Techniek van de TU Delft en ik studeer af bij Marcel Hertogh.
- In het kader van mijn afstuderen onderzoek ik de verdeling van risico’s tussen staande organisatie en projectorganisatie en tussen publiek en privaat bij infrastructuurprojecten.
- Het doel van dit onderzoek is om tot aanbevelingen te komen die bijdragen aan het maximaliseren van de waarde van infrastructurele projecten.
- Voor dit onderzoek heb ik een aantal projecten geselecteerd, waaronder dit project.
- Het doel van dit interview is om inzicht te krijgen in de omgang met risico’s door de staande organisatie, de projectorganisatie en private partijen.

Randvoorwaarden

- Het interview neemt ongeveer een uur in beslag.
- Het interview bestaat zowel uit open als gesloten vragen.
- Uw gegevens worden vertrouwelijk behandeld en komen anoniem terug in de rapportage.
- Om te voorkomen dat waardevolle antwoorden verloren gaan, maak ik van dit interview graag een geluidsopname. Alleen ik heb toegang tot deze geluidsopname. Na transcriptie wordt de geluidsopname vernietigd.
- Indien gewenst zal ik u het verslag van het interview en de eindrapportage ter goedkeuring toesturen.
Interviewvragen

Dit interview bestaat uit drie onderdelen. Achtereenvolgens stel ik u een aantal vragen met betrekking tot uw achtergrond, de risicoverdeling en gevolgen van de risicoverdeling.

Context (5 min)

Allereerst stel ik u een aantal algemene vragen met betrekking tot uw achtergrond en uw organisatie.

1. Wat is uw rol binnen dit project?
2. Hoe lang bent u al bij dit project betrokken?
3. Wat is uw rol binnen uw organisatie?
4. Wat is het belang van uw organisatie in dit project?

Organisatie en risico’s (45 min)

Dan gaan we nu verder met het tweede deel van het interview. In dit tweede deel stel ik u een aantal vragen met betrekking tot de aansturing van de projectorganisatie door de staande organisatie en de omgang met risico’s.

5. Hoe is de relatie tussen staande organisatie en project organisatie gestructureerd?
   Doel: Stuurgroep, overlegstructuur, escalatielijn, besluitvormingslijn.

6. Hoe ziet de opdracht die de stuurgroep aan de projectorganisatie geeft eruit?
   Doel: Scope, mandaat, risico’s, gegeven input, gewenste output m.b.t. product en proces
   (a) Welke producteisen stelt de stuurgroep aan de projectorganisatie?
   (b) Welke proceseisen (bijv. voorgeschreven aanbestedingsprocedures) stelt de stuurgroep aan de projectorganisatie?
   (c) Hoe wordt dit beleid gerelateerd aan het projectbelang?

7. Wat zijn de belangrijkste risico’s?
   Doel: Belangrijkste risico’s, preventieve/correctieve maatregelen? Vraag naar documenten waarin de risicoverdeling staat.
   (a) Wanneer zijn deze gesignaleerd? Door wie?
   (b) Door welke organisatie worden deze gedragen?
(c) Door welke organisatie worden deze beheerst?

8. Hoe is de risicoverdeling tot stand gekomen? (25 min)
Doel: Inzicht verkrijgen in de manier waarop risico’s verdeeld zijn (proces, criteria, rollen verschillende organisaties, kritieke punten in de verdeling) en de mate waarin betrokken organisaties tevreden zijn met de risicoverdeling en welke problemen zij signaleren.

(a) Wat waren de belangrijkste overwegingen bij het verdelen van risico’s? Wie waren hierbij betrokken?
(b) Bij welke risico’s stond de verdeling ter discussie? Wat was het gevolg van deze discussie?
(c) Op een schaal van 1 tot 4 (waarbij 1 staat voor zeer tevreden en 4 voor zeer ontevreden), in welke mate is uw organisatie tevreden met de risicoverdeling? Waarom? Welke risico’s kunnen beter door een andere organisatie gedragen en/of beheerst worden?

9. Hoe gaat de stuurgroep om met restrisico’s?

10. Legt de projectorganisatie nieuwe risico’s bij de stuurgroep neer? Hoe gaat de stuurgroep hiermee om?

11. Brengt de stuurgroep nieuwe risico’s in het project? Hoe gaat de projectorganisatie hiermee om?

12. Wordt er voor de omgang met risico’s een algemene lijn gehanteerd of is dit project specifiek?
Doel: Inzicht in mogelijkheid tot generalisatie resultaten interview.

13. Hebben betrokken organisaties gedurende het proces van risicoverdeling alle relevante informatie op passende momenten met andere organisaties gedeeld? (5 min)
Doel: Inzicht verkrijgen in strategisch gedrag (hou rekening met geïnterviewden die hier geen eerlijke uitspraak over doen) en de perceptie van strategisch gedrag van de andere organisaties.

(a) Heeft uw organisatie gedurende het proces van risicoverdeling alle relevante informatie op passende momenten met andere organisaties gedeeld? Welke informatie heeft uw organisatie niet of in een later stadium gedeeld? Waarom?
Wat was hiervan de invloed op de risicoverdeling?
(b) Zelfde vragen (a) voor andere organisaties.
(c) Hoe denkt u dat andere organisaties denken over de mate waarin uw organisatie informatie met de andere organisaties deelt?

Gevolgen (10 min)

Dat waren mijn vragen over de risicoverdeling. Voor dit laatste deel stel ik u een aantal vragen met betrekking tot de gevolgen van de risicoverdeling.

14. **Beïnvloedt de risicoverdeling de samenwerking en de effectiviteit en de efficiëntie van het risicomanagement? Op welke manier?**
   *Doel: Inzicht verkrijgen in de invloed van de risicoverdeling op de relatie tussen betrokken organisaties, de samenwerking en het risicomanagement.*

(a) Hoe verloopt de samenwerking? Heeft de risicoverdeling de samenwerking met andere organisaties beïnvloed? Op welke manier?
(b) Op een schaal van 1 tot 4 (waarbij 1 staat voor zeer goed en 4 voor zeer slecht), welke beoordeling geeft u de samenwerking?
(c) Hoe verloopt de beheersing van risico’s? Heeft de risicoverdeling de effectiviteit en/of de efficiëntie van het risicomanagement beïnvloed? Op welke manier?
(d) Op een schaal van 1 tot 4 (waarbij 1 staat voor zeer effectief en 4 voor zeer ineffectief), welke beoordeling geeft u de effectiviteit van het risicomanagement?
(e) Op een schaal van 1 tot 4 (waarbij 1 staat voor zeer efficiënt en 4 voor zeer inefficiënt), welke beoordeling geeft u de efficiëntie van het risicomanagement?

Afsluiting

Tot slot, zijn er nog vragen die u wel had verwacht maar die ik niet heb gesteld? Bedankt voor het interview. Zoals vooraf al vermeld, worden de resultaten van dit interview anoniem verwerkten. Mocht u genteresseerd zijn in het resultaat, dan zal ik u het eindrapport toesturen.
Case study protocol Haak om Leeuwarden
B.1 Interview protocol & results

The interview protocol consists of the propositions to be tested, the questions asked of the individual respondent (level 1) based on which the propositions are tested, the format for the answers to the questions and rules that describe how the results are to be interpreted. For practical reasons, the interview questions are written in Dutch.

Context

1. Wat is uw rol binnen dit project?
2. Hoe lang bent u al bij dit project betrokken?
3. Wat is uw rol binnen uw organisatie?
Bewering 3

Betrokken partijen begrijpen risicomanagement onvoldoende om tot goede risicoverdelingen te komen.

Vraagstelling (LO, PO, IB, AN)

1. **In welke van onderstaande stellingen kunt u zich het beste vinden?**

   (a) Risicomanagement bestaat uit identificatie en analyse en het bepalen van beheersmaatregelen.
   (b) Risicomanagement bestaat uit identificatie, analyse, het bepalen van beheersmaatregelen en allocatie.
   (c) Risicomanagement bestaat uit identificatie, analyse, het bepalen van beheersmaatregelen, allocatie en het uitvoeren van beheersmaatregelen.

2. **In welke van onderstaande stellingen kunt u zich het beste vinden?**

   (a) Risico identificatie, analyse, het bepalen van beheersmaatregelen en allocatie kan het best door de opdracht gevinge partij worden uitgevoerd.
   (b) Risico identificatie, analyse, het bepalen van beheersmaatregelen en allocatie kan het best door de opdracht nemenende partij worden uitgevoerd.
   (c) Risico identificatie, analyse, het bepalen van beheersmaatregelen en allocatie kan het best gezamenlijk door de betrokken partijen worden uitgevoerd.

3. **In welke van onderstaande stellingen kunt u zich het beste vinden?**

   (a) Risico identificatie, analyse, het bepalen van beheersmaatregelen en allocatie is alleen van belang tijdens de aanbesteding van de ingenieursdiensten / bouwwerkzaamheden.
   (b) Risico identificatie, analyse, het bepalen van beheersmaatregelen en allocatie is alleen van belang tijdens de uitvoering van de ingenieursdiensten / bouwwerkzaamheden.
   (c) Risico identificatie, analyse, het bepalen van beheersmaatregelen, allocatie en beheersing is een iteratief proces dat van belang is gedurende het gehele project.
Resultaten

<table>
<thead>
<tr>
<th>Geïnterv.</th>
<th>Project</th>
<th>Organisatie</th>
<th>Antw. 1</th>
<th>Antw. 2</th>
<th>Antw. 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Zuid</td>
<td>AN</td>
<td>16. C</td>
<td>17. C (B)</td>
<td>18. C</td>
</tr>
</tbody>
</table>

*Table B.1: Results of the verification of proposition 3*

Analyse

De bewering wordt ondersteund door antwoord A of B bij vraagstelling 1, antwoord A of B bij vraagstelling 2 en antwoord A of B bij vraagstelling 3.
Bewering 1

Betrokken partijen geloven dat een risico het best gedragen kan worden door de partij die het risico het best kan beheersen.

Vraagstelling (LO, PO, IB, AN)

1. Op basis van welk criterium of welke criteria kunnen risico’s het best worden verdeeld? (Meerdere antwoorden mogelijk)
   (a) Een risico kan het best gedragen worden door de partij die het risico het best kan inschatten.
   (b) Een risico kan het best gedragen worden door de partij die het risico het best kan beheersen.
   (c) Een risico kan het best gedragen worden door de partij die de gevolgen van het risico, als het risico optreedt, het best kan beheersen.
   (d) Anders, namelijk . . .

Resultaten

<table>
<thead>
<tr>
<th>Geïnterviewde</th>
<th>Project</th>
<th>Organisatie</th>
<th>Antwoord</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Noord</td>
<td>PO</td>
<td>1. B (A, C)</td>
</tr>
<tr>
<td>2</td>
<td>Noord</td>
<td>IB</td>
<td>2. B</td>
</tr>
<tr>
<td>3</td>
<td>Zuid</td>
<td>PO</td>
<td>3. B</td>
</tr>
<tr>
<td>4</td>
<td>Noord</td>
<td>AN</td>
<td>4. B</td>
</tr>
<tr>
<td>5</td>
<td>Noord</td>
<td>LO</td>
<td>5. D</td>
</tr>
<tr>
<td>6</td>
<td>Zuid</td>
<td>AN</td>
<td>6. B</td>
</tr>
<tr>
<td>7</td>
<td>Zuid</td>
<td>LO</td>
<td>7. B</td>
</tr>
</tbody>
</table>

*Table B.2: Results of the verification of proposition 1*

Analyse

De bewering wordt ondersteund als alle geïnterviewden B antwoorden.
Bewering 2

De interpretatie van het criterium ‘een risico kan het best worden gedragen door de partij die het risico het best kan beheersen’ verschilt tussen betrokken; sommigen interpreteren het criterium als het kunnen beïnvloeden van de kans dat een risico optreedt, anderen als het kunnen beheersen van de gevolgen.

Vraagstelling (LO, PO, IB, AN)


(a) Een risico kan het best worden gedragen door de partij die de kans dat het risico optreedt, het best kan beïnvloeden.
(b) Een risico kan het best worden gedragen door de partij die de gevolgen van het risico, als het optreedt, het best kan beheersen.
(c) Een risico kan het best worden gedragen door de partij die de gevolgen van het risico, als het optreedt, het best kan absorberen.
(d) Anders, namelijk . . .

2. Handelt u ook naar dit criterium / deze criteria?

Resultaten

<table>
<thead>
<tr>
<th>Geïnterviewde</th>
<th>Project</th>
<th>Organisatie</th>
<th>Antwoord</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Noord</td>
<td>PO</td>
<td>1. A &amp; B</td>
</tr>
<tr>
<td>2</td>
<td>Noord</td>
<td>IB</td>
<td>2. A (B)</td>
</tr>
<tr>
<td>3</td>
<td>Zuid</td>
<td>PO</td>
<td>3. A (B)</td>
</tr>
<tr>
<td>4</td>
<td>Noord</td>
<td>AN</td>
<td>4. B</td>
</tr>
<tr>
<td>5</td>
<td>Noord</td>
<td>LO</td>
<td>5. B</td>
</tr>
<tr>
<td>6</td>
<td>Zuid</td>
<td>AN</td>
<td>6. A (B)</td>
</tr>
<tr>
<td>7</td>
<td>Zuid</td>
<td>LO</td>
<td>7. A</td>
</tr>
</tbody>
</table>

*Table B.3: Results of the verification of proposition 2*

Analyse

De bewering wordt ondersteund door variatie in de antwoorden.
Bewering 4

Projectorganisaties leggen marktpartijen de door hen gewenste risicoverdeling op door deze onderdeel te maken van het contract dat de projectorganisatie formuleert en aan de marktpartijen oplegt.

Vraagstelling (PO, IB, AN)

1. **Welke van onderstaande stellingen is het meest van toepassing?**
   
   (a) Gedurende de aanbesteding van de ingenieursdiensten / bouwwerkzaamheden heeft de projectorganisatie de risicoverdeling eenzijdig opgelegd.
   
   (b) Gedurende de aanbesteding van de ingenieursdiensten / bouwwerkzaamheden heeft de marktpartij de door de projectorganisatie opgestelde contractvoorwaarden kunnen aanpassen.
   
   (c) Gedurende de aanbesteding van de ingenieursdiensten / bouwwerkzaamheden is de risicoverdeling onderdeel geweest van een dialoog. De bijbehorende contractvoorwaarden zijn gezamenlijk bepaald.

2. **Welke van onderstaande stellingen is het meest van toepassing?**

   (a) Gedurende de uitvoering van de ingenieursdiensten / bouwwerkzaamheden heeft de projectorganisatie de spelregels bepaald.

   (b) Gedurende de uitvoering van de ingenieursdiensten / bouwwerkzaamheden heeft de marktpartij de spelregels bepaald.

   (c) Gedurende de uitvoering van de ingenieursdiensten / bouwwerkzaamheden hebben de projectorganisatie en de marktpartij gezamenlijk de spelregels bepaald.

Toelichting: Het doel van deze vraag is te achterhalen wat belangrijker was; de contractvoorwaarden of gezamenlijk gestelde normen en waarden. Met spelregels wordt het proces, het bepalen van de contractvoorwaarden en het bepalen van de risicoverdeling bedoeld.
Resultaten

<table>
<thead>
<tr>
<th>Aanb. ingenieursdiensten, relatie PO – IB</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectorganisatie (PO)</td>
<td>1. C</td>
<td>2. n.v.t.</td>
</tr>
<tr>
<td>Ingenieursbureau (IB)</td>
<td>3. A</td>
<td>4. n.v.t.</td>
</tr>
</tbody>
</table>

**Table B.4:** Results of the verification of proposition 4: procurement engineering works

<table>
<thead>
<tr>
<th>Aanb. bouwwerkzaamheden, relatie PO – AN</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectorganisatie (PO)</td>
<td>5. A</td>
<td>6. A (B)</td>
</tr>
<tr>
<td>Aannemer (AN)</td>
<td>7. A</td>
<td>8. A</td>
</tr>
</tbody>
</table>

**Table B.5:** Results of the verification of proposition 4: procurement construction works

<table>
<thead>
<tr>
<th>Uitv. ingenieursdiensten, relatie PO – IB</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectorganisatie (PO)</td>
<td>9. C</td>
<td>10. n.v.t.</td>
</tr>
<tr>
<td>Ingenieursbureau (IB)</td>
<td>11. C</td>
<td>12. n.v.t.</td>
</tr>
</tbody>
</table>

**Table B.6:** Results of the verification of proposition 4: execution engineering works

<table>
<thead>
<tr>
<th>Uitv. bouwwerkzaamheden, relatie PO – AN</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectorganisatie (PO)</td>
<td>13. A</td>
<td>14. C (A)</td>
</tr>
<tr>
<td>Aannemer (AN)</td>
<td>15. A</td>
<td>16. C</td>
</tr>
</tbody>
</table>

**Table B.7:** Results of the verification of proposition 4: execution construction works

Analyse

De bewering wordt ondersteund door antwoord A bij vraagstelling 1 en door antwoord A bij vraagstelling 2. Als de antwoorden van twee organisaties die een overeenkomst hebben uiteenlopen, is het antwoord van de partij die aangeeft geen inspraak te hebben leidend.
Bewering 7

Soms leggen project organisaties risico’s, die buiten de invloedssfeer van de marktpartijen liggen, toch bij marktpartijen.

Vraagstelling (PO, IB, AN)

1. Welke van onderstaande stellingen is het meest van toepassing?

   (a) De projectorganisatie heeft de marktpartijen geen risico’s opgelegd, die buiten de invloedssfeer van de marktpartijen lagen.

   (b) De projectorganisatie heeft de marktpartijen wel risico’s opgelegd, die buiten de invloedssfeer van de marktpartijen lagen.

   Welke risico’s?
   Waarom zijn deze risico’s bij marktpartijen gelegd?

Resultaten

<table>
<thead>
<tr>
<th>Relatie PO – IB</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectorganisatie (PO)</td>
<td>1. A</td>
<td>2. n.v.t.</td>
</tr>
<tr>
<td>Ingenieursbureau (IB)</td>
<td>3. A</td>
<td>4. n.v.t.</td>
</tr>
</tbody>
</table>

Table B.8: Results of the verification of proposition 7: relation project organisation – engineering company

<table>
<thead>
<tr>
<th>Relatie PO – AN</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectorganisatie (PO)</td>
<td>5. A</td>
<td>6. B</td>
</tr>
<tr>
<td>Aannemer (AN)</td>
<td>7. B</td>
<td>8. B</td>
</tr>
</tbody>
</table>

Table B.9: Results of the verification of proposition 7: relation project organisation – contractor

Analyse

De bewering wordt ondersteund door antwoord B in minimaal een van de relaties. Als de antwoorden van twee organisaties die een overeenkomst hebben uiteenlopen, is het antwoord van de marktpartij leidend.
Bewering 8

Gedurende de uitvoering van de ingenieursdiensten / bouwwerkzaamheden is de verdeling van risico's niet altijd duidelijk.

Vraagstelling (LO, PO, IB, AN)

1. Welke van onderstaande stellingen is het meest van toepassing?

   (a) Gedurende de uitvoering van de ingenieursdiensten / bouwwerkzaamheden was de verdeling van risico's duidelijk.

   (b) Gedurende de uitvoering van de ingenieursdiensten / bouwwerkzaamheden was de verdeling van risico's niet altijd duidelijk.

   Voor welke risico's was de verdeling niet duidelijk?

Resultaten

<table>
<thead>
<tr>
<th>Uitv. ingenieursdiensten, relatie LO – PO</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lijnorganisatie (LO)</td>
<td>1. n.v.t.</td>
<td>2. n.v.t.</td>
</tr>
<tr>
<td>Projectorganisatie (PO)</td>
<td>3. n.v.t.</td>
<td>4. n.v.t.</td>
</tr>
</tbody>
</table>

**Table B.10:** Results of the verification of proposition 8: execution engineering works, relation line organisation – project organisation

<table>
<thead>
<tr>
<th>Uitv. ingenieursdiensten, relatie PO – IB</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectorganisatie (PO)</td>
<td>5. A</td>
<td>6. n.v.t.</td>
</tr>
<tr>
<td>Ingenieursbureau (IB)</td>
<td>7. B</td>
<td>8. n.v.t.</td>
</tr>
</tbody>
</table>

**Table B.11:** Results of the verification of proposition 8: execution engineering works, relation project organisation – engineering company
De bewering wordt ondersteund door antwoord B. Als de antwoorden van twee organisaties die een overeenkomst hebben uiteenlopen, is het antwoord van de organisatie die aangeeft dat de risicoverdeling niet altijd duidelijk is leidend.
Bewering 5

Gedurende de uitvoering van de ingenieursdiensten / bouwwerkzaamheden wordt de verdeling van risico’s niet altijd expliciet besproken.

Vraagstelling (LO, PO, IB, AN)

1. Welke van onderstaande stellingen is het meest van toepassing?

   (a) Gedurende de uitvoering van de ingenieursdiensten / bouwwerkzaamheden zijn alle risico’s expliciet verdeeld.

   *Op welke manier (besproken / gezamenlijk)?*  
   *Opgelegd of onderhandelingsruimte?*

   (b) Gedurende de uitvoering van de ingenieursdiensten / bouwwerkzaamheden zijn risico’s niet meer van eigenaar veranderd.

   (c) Gedurende de uitvoering van de ingenieursdiensten / bouwwerkzaamheden zijn risico’s impliciet verdeeld.

   *Kunt u een voorbeeld geven?*  
   *Waarom is de verdeling van sommige risico’s niet expliciet gemaakt?*

Resultaten

<table>
<thead>
<tr>
<th>Uitv. ingenieursdiensten, relatie LO – PO</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lijnorganisatie (LO)</td>
<td>1. n.v.t.</td>
<td>2. n.v.t.</td>
</tr>
<tr>
<td>Projectorganisatie (PO)</td>
<td>3. n.v.t.</td>
<td>4. n.v.t.</td>
</tr>
</tbody>
</table>

*Table B.14: Results of the verification of proposition 5: execution engineering works, relation line organisation – project organisation*

<table>
<thead>
<tr>
<th>Uitv. ingenieursdiensten, relatie PO – IB</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectorganisatie (PO)</td>
<td>5. C</td>
<td>6. n.v.t.</td>
</tr>
<tr>
<td>Ingenieursbureau (IB)</td>
<td>7. B</td>
<td>8. n.v.t.</td>
</tr>
</tbody>
</table>

*Table B.15: Results of the verification of proposition 5: execution engineering works, relation project organisation – engineering company*
<table>
<thead>
<tr>
<th>Uitv. bouwwerkzaamheden, relatie LO – PO</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lijnorganisatie (LO)</td>
<td>9. n.v.t.</td>
<td>10. n.v.t.</td>
</tr>
<tr>
<td>Projectorganisatie (PO)</td>
<td>11. n.v.t.</td>
<td>12. n.v.t.</td>
</tr>
</tbody>
</table>

**Table B.16:** Results of the verification of proposition 5: execution construction works, relation line organisation – project organisation

<table>
<thead>
<tr>
<th>Uitv. bouwwerkzaamheden, relatie PO – AN</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aannemer (AN)</td>
<td>15. A</td>
<td>16. A</td>
</tr>
</tbody>
</table>

**Table B.17:** Results of the verification of proposition 5: execution construction works, relation project organisation – contractor

**Analyse**

De bewering wordt ondersteund door antwoorden B en C.
Bewering 6

Gedurende de uitvoering van de ingenieursdiensten / bouwwerkzaamheden worden betrokken partijen het niet altijd eens over de verdeling van nieuwe risico’s, waardoor deze blijven hangen en het niet duidelijk is welke partij de risico eigenaar is en welke partij verantwoordelijk is voor de beheersing.

Vraagstelling (LO, PO, IB, AN)

1. Welke van onderstaande stellingen is het meest van toepassing?

   (a) Gedurende de uitvoering van de ingenieursdiensten / bouwwerkzaamheden waren betrokken partijen het altijd eens over de verdeling van nieuwe risico’s.

   (b) Gedurende de uitvoering van de ingenieursdiensten / bouwwerkzaamheden waren betrokken partijen het meestal eens over de verdeling van nieuwe risico’s.

   (c) Gedurende de uitvoering van de ingenieursdiensten / bouwwerkzaamheden waren betrokken partijen het meestal niet eens over de verdeling van nieuwe risico’s.

   (d) Gedurende de uitvoering van de ingenieursdiensten / bouwwerkzaamheden waren betrokken partijen het nooit eens over de verdeling van nieuwe risico’s.

   Over de verdeling van welk risico / welke risico’s waren betrokken partijen het niet eens?

   Waarom niet?

   Wat is er vervolgens met dit risico / deze risico’s gebeurd?

Resultaten

<table>
<thead>
<tr>
<th>Uitv. ingenieursdiensten, relatie LO – PO</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lijnorganisatie (LO)</td>
<td>1. n.v.t.</td>
<td>2. n.v.t.</td>
</tr>
<tr>
<td>Projectorganisatie (PO)</td>
<td>3. n.v.t.</td>
<td>4. n.v.t.</td>
</tr>
</tbody>
</table>

Table B.18: Results of the verification of proposition 6: execution engineering works, relation line organisation – project organisation
De bewering wordt ondersteund door antwoorden C en D.
Bewering 12

Voor grote projecten wordt de besluitvorming met betrekking tot risico’s en contracten gedaan in de stuurgroepen/regiegroepen.

Vraagstelling (LO, PO)

1. Welke van onderstaande stellingen is het meest van toepassing?

   (a) De politiek is verantwoordelijk voor de besluitvorming m.b.t. risico’s en contracten.
   (b) De stuurgroep / regiegroep is verantwoordelijk voor de besluitvorming m.b.t. risico’s en contracten.
   (c) De projectorganisatie is verantwoordelijk voor de besluitvorming m.b.t. risico’s en contracten.

Resultaten

<table>
<thead>
<tr>
<th>Besluitvorming</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectorganisatie (PO)</td>
<td>3. B &amp; C</td>
<td>4. C (B)</td>
</tr>
</tbody>
</table>

Table B.22: Results of the verification of proposition 12

Analyse

De bewering wordt ondersteund door antwoord B.
Bewering 13

Op de projectdirecteuren van de projectorganisaties na, vertegenwoordigen de leden van
de stuurgroepen/regiegroepen de belangen van hun lijnorganisaties.

Vraagstelling (LO, PO)

1. Welke van onderstaande stellingen is het meest van toepassing?

   (a) Ik behartig in de regiegroep hoofdzakelijk de belangen van mijn lijnorganisatie.
   (b) Ik behartig in de regiegroep hoofdzakelijk het projectbelang.
   (c) Ik behartig in de regiegroep de belangen van mijn lijnorganisatie en het projectbelang in gelijke mate.

2. Welke van onderstaande stellingen is het meest van toepassing?

   (a) Andere leden van de regiegroep behartigen hoofdzakelijk de belangen van hun lijnorganisatie.
   (b) Andere leden van de regiegroep behartigen hoofdzakelijk het projectbelang.
   (c) Andere leden van de regiegroep behartigen de belangen van hun lijnorganisaties en het projectbelang in gelijke mate.

Resultaten

<table>
<thead>
<tr>
<th>Vraag 1</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lijnorganisatie (LO)</td>
<td>1. C</td>
<td>2. C (A)</td>
</tr>
<tr>
<td>Projectorganisatie (PO)</td>
<td>3. C</td>
<td>4. C</td>
</tr>
</tbody>
</table>

Table B.23: Results of the verification of proposition 13: question 1

<table>
<thead>
<tr>
<th>Vraag 2</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lijnorganisatie (LO)</td>
<td>1. A</td>
<td>2. C</td>
</tr>
<tr>
<td>Projectorganisatie (PO)</td>
<td>3. A</td>
<td>4. C</td>
</tr>
</tbody>
</table>

Table B.24: Results of the verification of proposition 13: question 2
Analyse

De bewering wordt ondersteund door antwoord A bij vraagstelling 1 en antwoord A bij vraagstelling 2.
Bewering 14

De besluitvorming door de stuurgroepen/regiegroepen is vooral gebaseerd op de belangen van de lijnorganisaties.

Vraagstelling (LO, PO)

1. Welke van onderstaande stellingen is het meest van toepassing?

(a) Besluitvorming in de regiegroep is hoofdzakelijk gebaseerd op belangen van de lijnorganisaties.
(b) Besluitvorming in de regiegroep is hoofdzakelijk gebaseerd op het projectbelang.
(c) Besluitvorming in de regiegroep is gebaseerd op de belangen van de lijnorganisaties en het projectbelang in gelijke mate.

Resultaten

<table>
<thead>
<tr>
<th>Besluitvorming regiegroep</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lijnorganisatie (LO)</td>
<td>1. B</td>
<td>2. C</td>
</tr>
<tr>
<td>Projectorganisatie (PO)</td>
<td>3. C</td>
<td>4. C</td>
</tr>
</tbody>
</table>

Table B.25: Results of the verification of proposition 14

Analyse

De bewering wordt ondersteund door antwoord A.
Bewering 15

De contractvorm voor zowel de ingenieursdiensten als de bouwwerkzaamheden is vooral gebaseerd op de belangen van de lijnorganisaties.

Vraagstelling (LO, PO)

1. Wie bepaald de contractvorm? Op basis van welke overwegingen?

2. Op een schaal van 1 tot 5, waarbij 1 staat voor zeer tevreden en 5 voor zeer ontevreden, en welke mate was uw organisatie tevreden met het de gekozen contractvorm? Waarom?

Resultaten

<table>
<thead>
<tr>
<th>Vraag 1: ingenieursdiensten</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lijnorganisatie (LO)</td>
<td>1. n.v.t.</td>
<td>2. n.v.t.</td>
</tr>
<tr>
<td>Projectorganisatie (PO)</td>
<td>3. De projectorganisatie bepaald de contractvorm op basis van prikkels om maximaal te presteren en het borgen van continuïteit in kennis en ervaring gedurende het gehele project</td>
<td>4. n.v.t.</td>
</tr>
</tbody>
</table>

Table B.26: Results of the verification of proposition 15: question 1, engineering works
<table>
<thead>
<tr>
<th>Vraag 1: bouwwerkzaamheden</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lijnorganisatie (LO)</td>
<td>5. De opdrachtgevende partijen bepalen de contractvorm, deels op basis van politieke overwegingen.</td>
<td>6. Respondent was ten tijde van de aanbesteding niet bij het project betrokken.</td>
</tr>
<tr>
<td>Projectorganisatie (PO)</td>
<td>7. De projectorganisatie geeft invulling aan de gekozen contractvorm op basis van creativiteit van de markt (betaalbare innovatie), het neerleggen van risico’s op de juiste plek (aanbieder krijgt vrijheid om met een risicovol ontwerp te komen, maar draagt dan ook de risico’s) en prikkels om maximaal te presteren.</td>
<td>8. De opdrachtgevende partijen bepalen de contractvorm op basis van flexibiliteit en kosten (regio en provincie wilden geen DBFM).</td>
</tr>
</tbody>
</table>

**Table B.27:** Results of the verification of proposition 15: question 1, construction works

<table>
<thead>
<tr>
<th>Vraag 2: ingenieursdiensten</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lijnorganisatie (LO)</td>
<td>1. n.v.t.</td>
<td>2. n.v.t.</td>
</tr>
<tr>
<td>Projectorganisatie (PO)</td>
<td>3. Zeer tevreden (1)</td>
<td>4. n.v.t.</td>
</tr>
<tr>
<td>Ingenieursbureau (IB)</td>
<td>5. Tevreden (2)</td>
<td>6. n.v.t.</td>
</tr>
</tbody>
</table>

**Table B.28:** Results of the verification of proposition 15: question 2, engineering works
Vraag 2: bouwwerkzaamheden

<table>
<thead>
<tr>
<th></th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lijnorganisatie (LO)</td>
<td>1. Tevreden (2)</td>
<td>2. Tevreden (2)</td>
</tr>
<tr>
<td>Projectorganisatie (PO)</td>
<td>3. Zeer tevreden (1)</td>
<td>4. Zeer tevreden (1)</td>
</tr>
<tr>
<td>Ingenieursbureau (IB)</td>
<td>5. Tevreden (2)</td>
<td>6. Tevreden (2)</td>
</tr>
</tbody>
</table>

**Table B.29:** Results of the verification of proposition 15: question 2, construction works

Aanvullingen:

1. Vraag 1, antwoord 3: ‘De kwaliteit wordt bepaald tijdens de planuitwerkingsfase van het project.’

**Analyse**

De bewering wordt ondersteund als de overwegingen bij vraagstelling 1 in het belang van de lijnorganisatie zijn. De bewering wordt verder ondersteund als de beoordeling van de mate van tevredenheid met de gekozen contractvorm tussen lijnorganisatie, project organisatie en marktpartijen sterk uiteenlopen.
Bewering 16

Publieke organisaties staan hun project organisations niet toe dat ze hun risicodossier met private organisaties delen.

Vraagstelling (LO, PO)

1. Welke van onderstaande stellingen is het meest van toepassing?
   (a) De projectorganisatie mag het interne risicodossier delen met de marktpartijen.
   (b) De projectorganisatie mag het interne risicodossier niet delen met de marktpartijen.

2. Aanvullende vragen (PO):
   (a) Heeft uw organisatie een risicodossier opgesteld?
   (b) Heeft uw counterpart een risicodossier opgesteld?
   (c) Zijn de risicodossiers met elkaar gedeeld?
   (d) Welke organisaties waren verantwoordelijk voor het actualiseren en monitoren van de risicodossiers?
   (e) Werden de geactualiseerde risicodossiers gedeeld?

Resultaten

<table>
<thead>
<tr>
<th>Beleid risicomanagement</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lijnorganisatie (LO)</td>
<td>1. A</td>
<td>2. A</td>
</tr>
<tr>
<td>Projectorganisatie (PO)</td>
<td>3. A</td>
<td>4. A</td>
</tr>
</tbody>
</table>

**Table B.30:** Results of the verification of proposition 16

Aanvullingen:

1. Antwoord 2: In een ideale wereld delen partijen hun volledige risicodossiers. In de praktijk werkt dit anders.
2. Antwoord 3: Er is geen beleid m.b.t. tot het delen van het risicodossier. De projectorganisatie en de aannemer hebben risico’s gescheiden in kaart gebracht en in verschillende risicodossiers beschreven. De risicodossiers zijn deels met elkaar gedeeld. Beide organisaties hielden hun eigen risicodossier bij. Eens per drie maanden werden top risico’s gezamenlijk besproken.
3. Antwoord 4: Zowel project organisatie als aannemer hebben een eigen risicodossier opgesteld. Deze zijn gedeeltelijk met elkaar gedeeld. Risico’s werden besproken tijdens periodieke risicosessies.

Analyse

De bewering wordt ondersteund door antwoord B.
**Bewering 17**

Het is lastig voor projectorganisaties om risico’s te verleggen naar de stuurgroepen/regiegroepen.

**Vraagstelling (LO, PO)**

1. **Welke van onderstaande stellingen is het meest van toepassing? (Meerdere antwoorden mogelijk)**

   (a) Het is lastig voor de projectorganisatie om risico’s bij de regiegroep neer te leggen, omdat de besluitvorming door de regiegroep veel tijd in beslag neemt.
   
   (b) Het is lastig voor de projectorganisatie om risico’s bij de regiegroep neer te leggen, omdat de regiegroep risico’s niet goed beheert.
   
   (c) Het is lastig voor de projectorganisatie om risico’s bij de regiegroep neer te leggen, omdat de regiegroep risico’s vaak weer terug geeft aan de projectorganisatie.
   
   (d) Het is lastig voor de projectorganisatie om risico’s bij de regiegroep neer te leggen om een andere reden, namelijk . . . .
   
   (e) Het is niet lastig voor de projectorganisatie om risico’s bij de regiegroep neer te leggen.

**Resultaten**

<table>
<thead>
<tr>
<th>Verleggen risico’s</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lijnorganisatie (LO)</td>
<td>1. C &amp; D (gebrek expert.)</td>
<td>2. E (C)</td>
</tr>
<tr>
<td>Projectorganisatie (PO)</td>
<td>3. E</td>
<td>4. C (E)</td>
</tr>
</tbody>
</table>

*Table B.31: Results of the verification of proposition 17*

**Analyse**

De bewering wordt ondersteund door antwoorden A, B, C en/of D.
**Bewering 18**

Gedurende de aanbesteding / uitvoering van ingenieursdiensten / bouwwerkzaamheden hebben de projectorganisaties een sterke onderhandelingspositie ten opzichte van de marktpartijen, waardoor de projectorganisaties eenvoudiger risico’s naar de marktpartijen kunnen verleggen.

**Vraagstelling (PO, IB, AN)**

1. Welke van onderstaande stellingen is het meest van toepassing?

   (a) Gedurende de aanbesteding / uitvoering van de ingenieursdiensten / bouwwerkzaamheden heeft de projectorganisatie een sterke onderhandelingspositie ten opzichte van de marktpartijen. Hierdoor kan de projectorganisatie risico’s (eenvoudiger) verleggen naar de marktpartijen.

   (b) Gedurende de aanbesteding / uitvoering van de ingenieursdiensten / bouwwerkzaamheden heeft de projectorganisatie een sterke onderhandelingspositie ten opzichte van de marktpartijen. Dit heeft echter geen invloed op de risicoverdeling.

   (c) Gedurende de aanbesteding / uitvoering van de ingenieursdiensten / bouwwerkzaamheden heeft de projectorganisatie een neutrale onderhandelingspositie ten opzichte van de marktpartijen. Hierdoor kunnen de marktpartijen (eenvoudiger) risico’s verleggen naar de projectorganisatie.

   (d) Gedurende de aanbesteding / uitvoering van de ingenieursdiensten / bouwwerkzaamheden heeft de projectorganisatie een neutrale onderhandelingspositie ten opzichte van de marktpartijen. Dit heeft echter geen invloed op de risicoverdeling.

**Resultaten**

<table>
<thead>
<tr>
<th>Aanbesteding ingenieursdiensten</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectorganisatie (PO)</td>
<td>1. B</td>
<td>2. n.v.t.</td>
</tr>
<tr>
<td>Ingenieursbureau (IB)</td>
<td>3. A</td>
<td>4. n.v.t.</td>
</tr>
</tbody>
</table>

*Table B.32: Results of the verification of proposition 18: procurement engineering works*
Analyse

De bewering wordt ondersteund door antwoord A. Als ten minste een van de twee organisaties die een overeenkomst hebben aangeeft dat de onderhandelingsmacht van de andere organisatie van invloed is geweest op de risicoverdeling, dan wordt aangenomen dat dit inderdaad zo is.
Bewering 19

Strategisch gedrag door zowel projectorganisaties als marktpartijen beïnvloedt de verdeling van risico's.

Vraagstelling (LO, PO, IB, AN)

1. Welke van onderstaande stellingen is het meest van toepassing? (Meerdere antwoorden mogelijk)

(a) De lijnorganisatie / projectorganisatie / marktpartij deelt bewust niet altijd volledige informatie / inzichten. Dit heeft de risicoverdeling beïnvloed. Op welke manier?

(b) De lijnorganisatie / projectorganisatie / marktpartij deelt bewust niet altijd juiste informatie / inzichten. Dit heeft de risicoverdeling beïnvloed. Op welke manier?

(c) De lijnorganisatie / projectorganisatie / marktpartij deelt informatie / inzichten bewust niet altijd tijdig. Dit heeft de risicoverdeling beïnvloed. Op welke manier?

(d) De lijnorganisatie / projectorganisatie / marktpartij deelt informatie volledig, juist en tijdig.

2. Welke van onderstaande stellingen is het meest van toepassing?

(a) De verwachting dat andere partijen strategisch handelen heeft de handelswijze van uw organisatie bij het verdelen van risico's niet beïnvloed.

(b) De verwachting dat andere partijen strategisch handelen heeft de handelswijze van uw organisatie bij het verdelen van risico's beïnvloed. Op welke manier?

Resultaten

<table>
<thead>
<tr>
<th>Vraag 1: Relatie LO – PO</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lijnorganisatie (LO)</td>
<td>1. D</td>
<td>2. D</td>
</tr>
<tr>
<td>Projectorganisatie (PO)</td>
<td>3. D</td>
<td>4. A (D)</td>
</tr>
</tbody>
</table>

Table B.36: Results of the verification of proposition 19: question 1, relation line organisation – project organisation
<table>
<thead>
<tr>
<th>Vraag 1: Relatie PO – IB</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectorganisatie (PO)</td>
<td>5. D</td>
<td>6. n.v.t.</td>
</tr>
<tr>
<td>Ingenieursbureau (IB)</td>
<td>7. A</td>
<td>8. n.v.t.</td>
</tr>
</tbody>
</table>

**Table B.37:** Results of the verification of proposition 19: question 1, relation project organisation – engineering company

<table>
<thead>
<tr>
<th>Vraag 1: Relatie PO – AN</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectorganisatie (PO)</td>
<td>9. D</td>
<td>10. A (D)</td>
</tr>
<tr>
<td>Aannemer (AN)</td>
<td>11. A &amp; C</td>
<td>12. D</td>
</tr>
</tbody>
</table>

**Table B.38:** Results of the verification of proposition 19: question 1, relation project organisation – contractor

<table>
<thead>
<tr>
<th>Vraag 2: Relatie PO – IB</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectorganisatie (PO)</td>
<td>1. B</td>
<td>2. n.v.t.</td>
</tr>
<tr>
<td>Ingenieursbureau (IB)</td>
<td>3. B</td>
<td>4. n.v.t.</td>
</tr>
</tbody>
</table>

**Table B.39:** Results of the verification of proposition 19: question 2, relation project organisation – engineering company

<table>
<thead>
<tr>
<th>Vraag 2: Relatie PO – AN</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectorganisatie (PO)</td>
<td>5. B</td>
<td>6. B</td>
</tr>
<tr>
<td>Aannemer (AN)</td>
<td>7. B</td>
<td>8. A</td>
</tr>
</tbody>
</table>

**Table B.40:** Results of the verification of proposition 19: question 2, relation project organisation – contractor

Aanvullingen:

1. Vraag 1, antwoord 10: ‘Soms delen we zo veel informatie dat het voor marktpartijen bijna onmogelijk is om volledig te begrijpen hoe het contract in elkaar zit.’

**Analyse**

De bewering wordt ondersteund door antwoorden A, B en/of C bij vraag 1 en door antwoord B bij vraag 2.
Bewering 9
De samenwerking wordt beïnvloed door de mate van tevredenheid en de mate van duidelijkheid van de risicoverdeling.

Vraagstelling (LO, PO, IB, AN)

1. Welke van onderstaande stellingen is het meest van toepassing?
   (a) Betrokken partijen waren tevreden met de risicoverdeling. Dit heeft geen invloed gehad op de samenwerking.
   (b) Betrokken partijen waren tevreden met de risicoverdeling. Dit heeft een positieve invloed gehad op de samenwerking.
       Op welke manier?
   (c) Niet alle betrokken partijen waren tevreden met de risicoverdeling. Dit heeft de samenwerking niet onder druk gezet.
   (d) Niet alle betrokken partijen waren tevreden met de risicoverdeling. Dit heeft de samenwerking onder druk gezet.
       Op welke manier?

2. Welke van onderstaande stellingen is het meest van toepassing?
   (a) De risicoverdeling was duidelijk. Dit heeft geen invloed gehad op de samenwerking.
   (b) De risicoverdeling was duidelijk. Dit heeft een positieve invloed gehad op de samenwerking.
       Op welke manier?
   (c) De risicoverdeling was niet altijd duidelijk. Dit heeft de samenwerking niet onder druk gezet.
   (d) De risicoverdeling was niet altijd duidelijk. Dit heeft de samenwerking onder druk gezet.
       Op welke manier?
Resultaten

<table>
<thead>
<tr>
<th>Vraag 1: Relatie LO – PO</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lijnorganisatie (LO)</td>
<td>1. n.v.t.</td>
<td>2. n.v.t.</td>
</tr>
<tr>
<td>Projectorganisatie (PO)</td>
<td>3. n.v.t.</td>
<td>4. n.v.t.</td>
</tr>
</tbody>
</table>

Table B.41: Results of the verification of proposition 9: question 1, relation line organisation – project organisation

<table>
<thead>
<tr>
<th>Vraag 1: Relatie PO – IB</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectorganisatie (PO)</td>
<td>5. A</td>
<td>6. n.v.t.</td>
</tr>
<tr>
<td>Ingenieursbureau (IB)</td>
<td>7. B</td>
<td>8. n.v.t.</td>
</tr>
</tbody>
</table>

Table B.42: Results of the verification of proposition 9: question 1, relation project organisation – engineering company

<table>
<thead>
<tr>
<th>Vraag 1: Relatie PO – AN</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectorganisatie (PO)</td>
<td>9. A</td>
<td>10. D</td>
</tr>
<tr>
<td>Aannemer (AN)</td>
<td>11. D (C)</td>
<td>12. A</td>
</tr>
</tbody>
</table>

Table B.43: Results of the verification of proposition 9: question 1, relation project organisation – contractor

<table>
<thead>
<tr>
<th>Vraag 2: Relatie LO – PO</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lijnorganisatie (LO)</td>
<td>1. n.v.t.</td>
<td>2. n.v.t.</td>
</tr>
<tr>
<td>Projectorganisatie (PO)</td>
<td>3. n.v.t.</td>
<td>4. n.v.t.</td>
</tr>
</tbody>
</table>

Table B.44: Results of the verification of proposition 9: question 2, relation line organisation – project organisation

<table>
<thead>
<tr>
<th>Vraag 2: Relatie PO – IB</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectorganisatie (PO)</td>
<td>5. A</td>
<td>6. n.v.t.</td>
</tr>
<tr>
<td>Ingenieursbureau (IB)</td>
<td>7. B</td>
<td>8. n.v.t.</td>
</tr>
</tbody>
</table>

Table B.45: Results of the verification of proposition 9: question 2, relation project organisation – engineering company
Vraag 2: Relatie PO – AN

<table>
<thead>
<tr>
<th></th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectorganisatie (PO)</td>
<td>9. A</td>
<td>10. D</td>
</tr>
<tr>
<td>Aannemer (AN)</td>
<td>11. C</td>
<td>12. C</td>
</tr>
</tbody>
</table>

**Table B.46:** Results of the verification of proposition 9: question 2, relation project organisation – contractor

Aanvullingen:

1. Vraag 2, antwoord 7: Door de heldere verdeling van verantwoordelijkheden en kosten kom je er samen uit.
2. Vraag 2, antwoord 10: Doordat de risicoverdeling niet altijd duidelijk was, ontstond discussie. Dit heeft de samenwerking onder druk gezet.

**Analyse**

De bewering wordt ondersteund door antwoorden B en D bij vraagstelling 1 en door antwoorden B en D bij vraagstelling 2.
Bewering 10

Risico’s worden niet altijd gedragen en beheerst door de partij die dit het beste kan, wat een negatieve invloed heeft op de effectiviteit en/of efficiëntie van het risicomanagement.

Vraagstelling (LO, PO, IB, AN)

1. Welke van onderstaande stellingen is het meest van toepassing?

   (a) Risico’s werden gedragen en beheerst door partijen die deze het beste konden beheersen. Dit heeft geen invloed gehad op de effectiviteit en/of efficiëntie van het risicomanagement.

   (b) Risico’s werden gedragen en beheerst door partijen die deze het beste konden beheersen. Dit heeft een positieve invloed gehad op de effectiviteit en/of efficiëntie van het risicomanagement.

   Kunt u daar een voorbeeld van geven?

   (c) Risico’s werden niet altijd gedragen en beheerst door partijen die deze het beste konden beheersen. Dit heeft geen invloed gehad op de effectiviteit en/of efficiëntie van het risicomanagement.

   (d) Risico’s werden niet altijd gedragen en beheerst door partijen die deze het beste konden beheersen. Dit heeft een negatieve invloed gehad op de effectiviteit en/of efficiëntie van het risicomanagement.

   Kunt u daar een voorbeeld van geven?

Resultaten

Table B.47: Results of the verification of proposition 10: relation line organisation – project organisation
Relatie PO – IB

<table>
<thead>
<tr>
<th></th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectorganisatie (PO)</td>
<td>5. B</td>
<td>6. n.v.t.</td>
</tr>
<tr>
<td>Ingenieursbureau (IB)</td>
<td>7. A</td>
<td>8. n.v.t.</td>
</tr>
</tbody>
</table>

**Table B.48**: Results of the verification of proposition 10: relation project organisation – engineering company

Relatie PO – AN

<table>
<thead>
<tr>
<th></th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectorganisatie (PO)</td>
<td>9. B</td>
<td>10. D</td>
</tr>
<tr>
<td>Aannemer (AN)</td>
<td>11. D</td>
<td>12. C</td>
</tr>
</tbody>
</table>

**Table B.49**: Results of the verification of proposition 10: relation project organisation – contractor

**Analyse**

De bewering wordt ondersteund door antwoorden B en D.
Bewering 11

Onjuist verdeelde risico’s kunnen uiteindelijk leiden tot claims en/of verminderde kwaliteit.

Vraagstelling (LO, PO, IB, AN)

1. Welke van onderstaande stellingen is het meest van toepassing?
   
   (a) De risicoverdeling was duidelijk en geaccepteerd.
   (b) De risicoverdeling was niet duidelijk en/of niet geaccepteerd. Dit heeft de kwaliteit van het werk onder druk gezet.
   (c) De risicoverdeling was niet duidelijk en/of niet geaccepteerd. Dit heeft tot claims t.g.v. meerwerk geleid.
   (d) De risicoverdeling was niet duidelijk en/of niet geaccepteerd. Dit heeft de kwaliteit van het werk onder druk gezet en tot claims t.g.v. meerwerk geleid.
   (e) De risicoverdeling was niet duidelijk en/of niet geaccepteerd. Dit heeft noch kwaliteit van het werk onder druk gezet noch tot claims t.g.v. meerwerk geleid.

Resultaten

<table>
<thead>
<tr>
<th>Relatie LO – PO</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lijnorganisatie (LO)</td>
<td>1. n.v.t.</td>
<td>2. n.v.t.</td>
</tr>
<tr>
<td>Projectorganisatie (PO)</td>
<td>3. n.v.t.</td>
<td>4. n.v.t.</td>
</tr>
</tbody>
</table>

**Table B.50:** Results of the verification of proposition 11: relation line organisation – project organisation

<table>
<thead>
<tr>
<th>Relatie PO – IB</th>
<th>Haak-Noord</th>
<th>Haak-Zuid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectorganisatie (PO)</td>
<td>5. A</td>
<td>6. n.v.t.</td>
</tr>
<tr>
<td>Ingenieursbureau (IB)</td>
<td>7. A</td>
<td>8. n.v.t.</td>
</tr>
</tbody>
</table>

**Table B.51:** Results of the verification of proposition 11: relation project organisation – engineering company
Relatie PO – AN | Haak-Noord | Haak-Zuid
---|---|---
Projectorganisatie (PO) | 9. A | 10. C (B)
Aannemer (AN) | 11. D | 12. C

Table B.52: Results of the verification of proposition 11: relation project organisation – contractor

Analyse

De bewering wordt ondersteund door antwoorden B, C en D.