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Master Thesis

**Risking More Private Involvement in Waterway
Infrastructure? -
Evaluating a Dutch DBFM Contract in Case of German's
Navigation Lock in Scharnebeck**

For Obtaining the Academic Degree:

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List of Abbreviations

IAD Framework – Institutional Analysis and Development Framework
NLStVB – Niedersächsische Landesbehörde für Straßenbau und Verkehr
PPP – Public-Private Partnership
RWS - Rijkswaterstaat
WSV – Wasserstraßen- und Schifffahrtsverwaltung des Bundes

Abstract

Provision of infrastructure such as waterways is always a contested topic in public discourse. Today more projects are conducted under public-private partnerships. Such a collaboration is considered more efficient and qualitative in project execution, but is it the better way of managing infrastructure? The upcoming research aims to understand the advantages and disadvantages of such private involvement and how they are rooted in the institutional design of infrastructure planning regimes. Commencing from a conventional planning process of a navigation lock in Scharnebeck, the research project will conceptualize a PPP provision model in the German waterway planning regime through a comparative case study. Based on expert interviews, the findings will suggest a more open discourse towards private involvement, but only if distinct points of considerations related to the external environment, risk allocation, control function of authorities as well as the stakeholder complexity are considered more thoroughly in the planning processes.

1 Introduction

Hijdra et al. (2014) point out that *‘many countries have waterway systems of some sort, but quite often such systems are either very limited in extent or limited in use’*. In contrast to those countries, others integrate both natural and artificial water courses into their transport systems elaborately. Two of the latter cases are the Netherlands and Germany. Sharing borders, rivers, but also a long tradition of waterborne transport, there is one major difference between both countries with respect to waterway management. While in Germany, waterway management is largely considered a public authority task, the Netherlands commenced experimenting with privatized contractual agreements, shifting competences from the state to market parties. The privatization approach, which already became prominent in the provision of road infrastructure in both countries, can have similar implications for waterway management. In spite of several similarities in planning, Hijdra et al. (2015) mention distinct features of waterway systems that are posing particular pressure on the management processes. What makes waterway networks different from road networks is that, apart from transport functions, waterways fulfill distinct societal functions, such as flood protection or fresh water supply, that have to be considered carefully and therewith make it a sensitive topic (Bernardini, et al., 2014).

The complexity and risk involved in waterway planning pose *‘considerable challenges to the tradition of water management characterized by a prediction-and-control approach and an emphasis on technical solutions’* (Pahl-Wostl, 2007), which was dominated by public authorities so far. In today’s administrative environment, Hague & Harrop (2007) identify cuts in public budgets. These cuts interfere with the conclusion of Hijdra et al. (2014) that a pressing issue from the past in waterway infrastructure is that due to aging of assets, *‘major reinvestment is needed in order to maintain the transportation function of these waterways’*. Keeping that contradiction in mind and taking into account the *‘pressure to expand and improve public facilities and services, governments have turned to the private sector, in order to harness private finance and achieve better value for money’* (Grimsey & Lewis, 2004, p. 41). In line with the arising administrative challenges, several other researchers, such as Klakegg et al. (2016), Hijdra et al. (2014), Hague & Harrop (2007), deal with the issue of private involvement. Under the term ‘public-private partnership’ (PPP), for example, several experiments between public authorities and the private market were established, predominantly in road construction and utility sectors. Their aim is to check outcomes in terms of success.

A recent challenge in waterway management is a navigation lock in Germany’s Scharnebeck. As part of the Elbe Lateral Canal, the existing ship lift partly overcomes the difference in elevation between beginning and end of the canal. However, the ship lift no longer fulfills today’s size requirements and is also considered prone to breakdowns (Hanseatic Transport Consultancy, 2013). The solution is the construction of a new navigation lock right next to the ship lift as displayed in Appendix 1. While the new construction site solves the technical dimension of the bottleneck, it is debatable whether the institutional design is appropriate for dealing with the waterway asset, leading to the research objective of this project.

1.1 Research Objective

While exploring the topic, two statements by Grimsey & Lewis (2004) raised attention as they mention better coordination and greater efficiency through market competition in infrastructure delivery. The underlying institutional change to more private involvement thereby relates to the concept of governance, which *‘in the project context is about the relationship of the project owner and its temporary project organization’* (Klakegg et al., 2016). In recent decades, this relationship became increasingly complex due to *‘challenges and problems of the old public administration’* (Christensen & Laegreid, 2011). Keeping the statement of Grimsey & Lewis (2004) in mind, private involvement could be seen as a solution to deal with limited availability of public budget, increased flexibility and, in the end, ensure more efficiency for the entire waterway system of countries. Opening up towards

more private involvement, however, implies a rethinking of the relationship between public authorities and the market (de Roo, 2010).

In evaluating advantages and potential risks of private involvement, a clear picture of the implications for waterway management can be drawn. While most authors, such as Grimsey & Lewis (2004), Klijn (2009), deal with positive implications of PPPs in the realm of complexity, the paper aims at shedding light on the fundamental problems of governments to involve the market as well. Leendertse et al. state that *'trust is vital whenever risk, uncertainty, or interdependence exist and it is actually the extent of trust that decides the type of contract'* (Leendertse et al., 2015, p. 17), because the market largely thinks in terms of economy of scale, efficiency and profit, and not in terms of public welfare. Because of this emphasis, *'the option to leave control – or the responsibility to others and to accept uncertainty as an inseparable part of the real world has hardly been a consideration'* (de Roo & Porter, 2004, p. 97). Commencing from conventional provision models in infrastructure, with a central state-guided, governmental process to new, more liberal forms of governance designs, the objective is to draw upon the success factors and constraints that surround the private involvement and whether its implications are feasible in the provision of waterway infrastructure as well. Figure 1 displays the selected projects of the research plus their location in either national infrastructure network. Apart from waterway projects, road projects were selected, as this sector is considered more experienced with private involvement. They will be considered in the second part of this project. With the

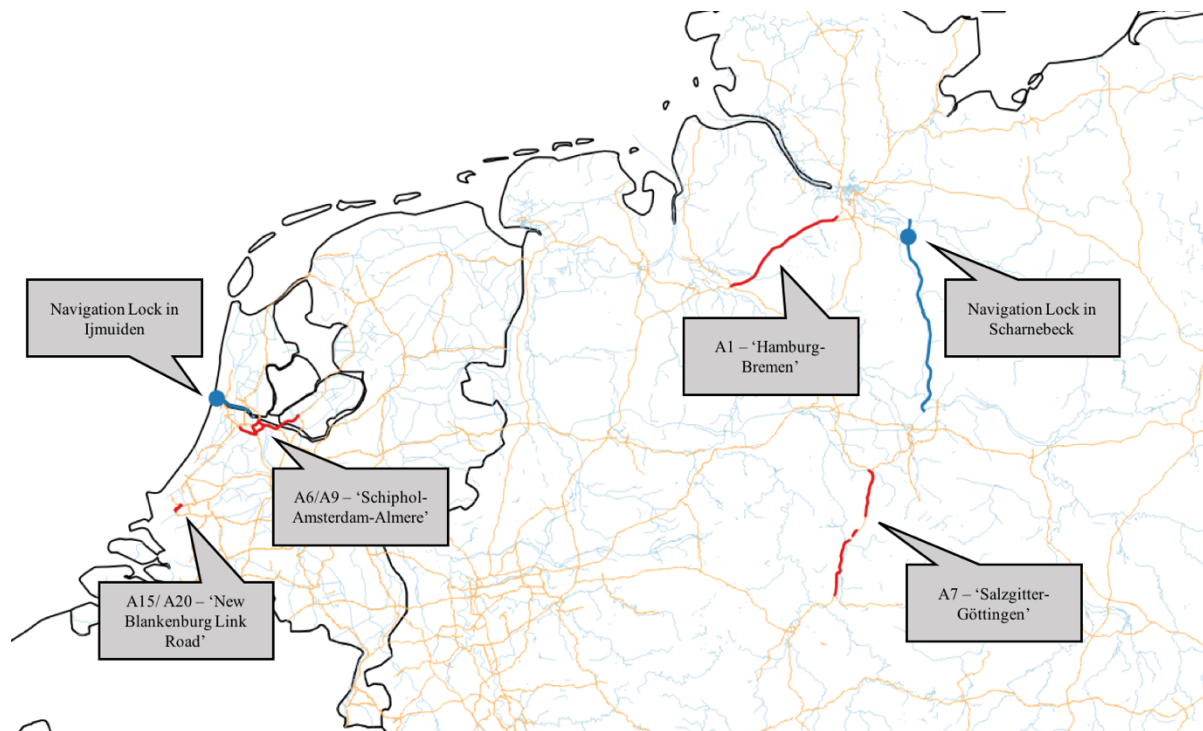


Figure 1: Selected Projects in Road and Waterway Networks in Germany & the Netherlands

construction of a new navigation lock in Scharnebeck, the shortcoming of accessibility is solved. However, the aforementioned vulnerability to breakdowns is considered from a private involvement perspective. Koppenjan & Groenewegen state that *'technological systems require an institutional structure that coordinates [...] the parties that own and operate the system'* (2005, p. 241), which leads to the ultimate question whether a change in the institutional design could better prepare for such incidents in future and how it must look like.

1.2 Research Questions

This thesis will investigate on the following research question:

- I. How can more private involvement in the provision of infrastructure be explained?**
 - i. What is private involvement in infrastructure planning?*
 - * What are the characteristics of private involvement?*
 - * What are similarities and differences of private provision models compared to conventional procurement?*
 - * What forms of private provision models were selected/exist in each country?*
 - ii. What are institutional characteristics in infrastructure planning?*
 - * What are the main differences in the four institutional designs in waterway management in the Netherlands and Germany?*
 - * What external variables (IAD framework) are influencing the degree of private involvement in waterway management?*
 - What lessons can be drawn from infrastructure areas that are more consolidated in terms of PPPs?*
- II. Risking more private involvement in waterway infrastructure in Germany?**
 - i. What are advantages and disadvantages of private involvement derived from cases?*
 - ii. What needs to be changed in the German waterway sector?*

In a nutshell, this project aims at delivering a clear answer on 1) the advantages/ disadvantages of more private involvement in waterway infrastructure compared to a more state-controlled form and 2) whether more private involvement of a Dutch DBFM contracting is of use for the German case of the navigation lock in Scharnebeck.

2 Theoretical Conceptualization

In this research project, the term ‘infrastructure’ generally refers to economic infrastructure, which is defined as the provision of *‘key intermediate services to business and industry and its principal function is to enhance productivity and innovation initiatives’* (Grimsey & Lewis, 2004, p. 21). The problem statement raised an issue in the maintenance of a German ship lift. Thereby, it seems that inefficiencies in infrastructure management are not related to hard engineering alone, but are also a result of the institutional design surrounding the infrastructure planning process. As in other domains, the planning of infrastructure should generally be considered what Alexander (2005) calls *‘translation of ideas into action’*, involving a large variety of interests and actors. As stated by Rothengatter in the process of planning, *‘wrong procurement is a major cause of public failure; the problems of high risk and long-life of mega-projects deserve particular consideration in the procurement process’* (Rothengatter, 2008, p. 215). The procurement of projects, in turn, is only one part of a complex planning process. In essence, Hijdra et al. (2015) refine this process into four major stages:

- Agenda-setting/policy-making
- Programming
- Planning
- Project preparation and implementation

Keeping those stages in mind, it is crucial to understand that the governance of infrastructure projects has two parallel sub-systems (Klakegg et al., 2016): a political and an administrative one. In the planning process, both systems are considered complementary to some degree. Originally, the agenda-setting phase was determined by political actors (Hijdra et al., 2015), however, the planning and implementation phases were predominantly conducted by the executive, bureaucratic authorities. Procurement and the resulting contracting process are to a large extent part of the latter planning stages (Hijdra et al., 2015). De Roo (2003) dedicated a large part of his article to the actor involvement behind infrastructure planning. Generally, he distinguished between three groups in infrastructure planning: the government, individuals and actors of society. The latter group, including citizens, representative groups, but also regional and local governments, is usually composed of influential stakeholders in infrastructure planning. However, it becomes immanent that *‘special interest groups can promote projects at no cost or risk to themselves’* (Flyvberg et al., 2003, p. 45) and therewith cannot be part of the contracting process and its risk allocation. Following the distinction of Hijdra et al. (2015) about different stages in infrastructure planning, the position of interest groups is better located in earlier phases of the planning process, such as policy-making, programming and planning, but not so much in the implementation phase. Therefore, this project is focusing on the latter stage of ‘planning and implementation’. It is crucial to mention that this is only a theoretical distinction. In reality, the feedback systems in the entire planning process are a lot more complex, especially the political dimension, due to its web of formal and informal arrangements and due to the fact, that *‘transport infrastructure planning and financing are controversial topics’* (Short & Kopp, 2005, p. 360). Lenferink et al. (2012) further divide the last planning phase into the states of strategic planning, design, construction and maintenance.

If *‘wrong procurement is a major cause of public failure’* as mentioned by Rothengatter (2008, p. 215), it might be time to reconsider current working procedures and forms of contracts within infrastructure. In this respect, the emergence of new governance concepts such as ‘New Public Management’ come into mind. The quintessence of those new concepts in public administration is the question whether current processes fulfill their purpose in the most efficient manner or whether other forms could improve them. In infrastructure planning, more specifically within the planning and implementation phase, the involvement of private actors is an example of such considerations. From a public administrative perspective, the basic assumption is that the *‘public procurer seeks an effective use of public funds’* (Grimsey & Lewis, 2004, p. 171). Flyvberg et al. (2003) refer to three experiences from private involvement that can significantly induce more effectiveness for infrastructure projects. The first part of the theoretical conceptualization is going to elaborate on several aspects of private

involvement, including advantages and disadvantages and its treatment of risks. From a theoretical point of view, the main tool of public authorities is contracting, which will therefore be discussed in more detail. The theoretical consideration of private involvement seems to raise new opportunities in infrastructure planning, but an entire planning system cannot be changed from one day to the other. It is rooted in an institutional system that thoroughly determines the working procedures in each infrastructure project. In order to understand the system behind the planning process, Ostrom (2011) developed the so-called ‘Institutional Analysis and Development Framework’ (IAD framework). Accordingly, the second part of this chapter issues the institutional setting behind infrastructure by describing the most important dimensions, which are considered influential to the action arena of contracting in e.g. infrastructure planning.

2.1 Private Involvement in Infrastructure Planning

For understanding the current status quo in infrastructure planning, it is crucial to highlight important issues and developments from the past. The reason behind the supremacy of governmental authorities is generally vested in the public character of infrastructure. Following Grimsey & Lewis (2004), five characteristics imply the necessity of governmental intervention in infrastructure. First of all, network services bind different economic activities together, causing large losses in case of failure. Secondly, the provision of infrastructure is considered as public good, which means that those who do not pay for the service cannot be excluded from using it. Third, network externalities may exist. Market actors thereby prefer the provision of infrastructure with positive externalities, while neglecting those with negative externalities, leading to biased facilitation of infrastructure. Fourth, infrastructure may raise issues of natural monopolies, as scale economies may arise due to one sole service provider. Finally, the large investment volume diminishes the attractiveness of market involvement. All in all, ‘these five characteristics traditionally have been seen as casting doubt on the viability of private-sector, competitive market provision’ (Grimsey & Lewis, 2004, p. 29). Taking all aspects together, the provision of infrastructure becomes a sensitive topic for public authorities. The point of departure for the provision of infrastructure in this project is the pre-dominant role of the government in infrastructure provision. What Hague & Harrop (2007) call the ‘old public administration’, is mainly related to systemic features of bureaucracy, which ‘refers to the salaried officials who conduct the detailed business of public administration, advising on and applying policy decisions’ (Hague & Harrop, 2007, p. 365). Public authorities’ main advantages are related to both ‘control and accountability mechanisms’ (Flyvberg et al., 2003) that link to the public interest via the governmental and political processes and respectively deliver legitimacy to project execution (Matos-Castaño & Mahalingam, 2014). On the other hand, there are private parties, such as construction companies, that follow private interests and provide distinct capabilities (Matos-Castaño & Mahalingam, 2014) for the realization of infrastructure projects. In terms of ‘infrastructure planning, increased involvement of business organizations is an example of stronger actor involvement’ (Lenferink et al., 2013, p. 928).

In order to benefit from market mechanisms, a distinct degree of freedom has to be granted that would

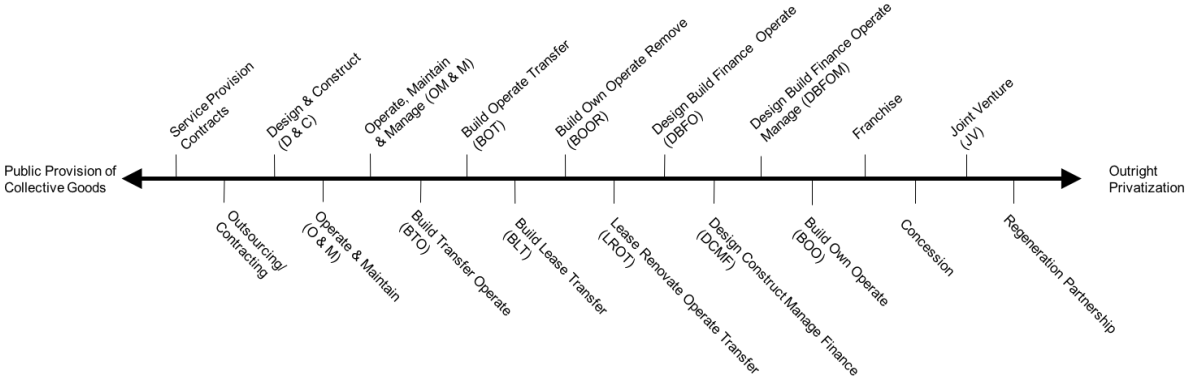


Figure 2: Different Provision Models in Public-Private Collaboration Based on Grimsey & Lewis (2004, p. 54)

not exist under an entire state-owned planning process. Leendertse et al. (2015) propose a solution through an appropriate form of contracting, a partnership between the public and market. Both of the forms should be considered as two opposing poles in a continuum with *'partnerships cover most of the points between the two'* (Grimsey & Lewis, 2004, p. 54). The scale between both poles is divided into different compositions of public and private involvement. Figure 3 exemplifies different business models in infrastructure planning. Inherent with them are different contractual arrangements to guarantee an efficient execution of the plan. The movement from the left-hand side to the right-hand side thereby implies that *'the private sector entity is encouraged to plan beyond the bounds of the construction phase and incorporate features that facilitate operations and maintenance within a cooperative framework'* (Leendertse et al., 2015, p. 3) up to a point where the private sector entirely owns a project. However, from a public administrative angle, there is one fundamental requirement with respect to the asset at hand: It needs to fulfill its function as desired by the public. As a base line for the evaluation of private involvement in infrastructure planning, Grimsey & Lewis (2004, p. 137) mention the Public-Sector Comparator (PSC), which they define as *'the benchmark cost of providing the specified service with traditional procurement'*. From a public administrative perspective, a successful private involvement is therefore one that incurs lower costs than the conventional public procedure with comparable terms of quality.

2.2 Managing Infrastructure Projects – Experiencing Private Involvement

Grimsey & Lewis (2004) develop two propositions for private involvement in infrastructure planning, which explain the emergence of public-private partnerships as provision models. First of all, they state that *'market competition is a form of coordination with intrinsic advantages over bureaucratic organizational forms'* (Grimsey & Lewis, 2004, p. 52). Secondly, *'market contracting arrangements are valuable for injecting greater efficiency into infrastructure delivery'* (Grimsey & Lewis, 2004, p. 53). Both statements are interrelated and point towards more cost-efficiency in infrastructure planning. In this respect, Flyvberg et al. (2003) mention three experiences from private involvement concerning *'Design & Build'*, *'Privatization on Balance'* and *'Private Megaproject Finance'*, which will be further explained below. Following these three concepts, the upcoming section will compare conventional and privatized provision models, in order to clarify the assumptions made by Grimsey & Lewis (2004).

2.2.1 Design & Build

Under conventional provision models, the public authorities were considered the pre-dominant actors for the project implementation. From a theoretical point of view, the conventional process is displayed in Appendix 2. Apart from the fact that some feasibility and safety studies as well as the parts of the designs are prepared by consultancies, it becomes evident that the 17 steps are predominantly performed by governmental bodies or a state-owned entity. The detailed design delivered by public authorities shifts the burden of the risks towards the public, leaving the contractor only with risks during the implementation phase. The contractor involvement is assigned to step 15 of 17, which is located after the approval of the detailed design. Contractors therewith have no possibilities to influence the design and are only responsible for the realization of the project, which was tendered to them. An effective allocation of the public funds, as proposed by Grimsey & Lewis (2004), is ensured through the close supervision of the government throughout the entire process. Following this assumption, de Roo & Porter state that *'in that sense the government is in 'full control', based on the assumption that it knows what is good for us all'* (de Roo & Porter, 2004, p. 100). Some critical voices arose, stating that *'purely public approaches to infrastructure, however, brought their own problems – projects bogged down by bureaucracy, political meddling and interference, new investment starved of funds, and often poor management and maintenance of facilities'* (Klakegg et al., 2016, p. 284). Moreover, in that period *'critics [...] judged that civil servants engaged in unproductive games to increase the budgets and staffing of their particular sections'* (Hague & Harrop, 2007, p. 366). Following Priemus et al., *'problems include low transport performances, adverse environmental effects, underestimated costs and disappointing returns'* (Priemus et al., 2008, p. 3). Public authorities were accused of not reflecting the public interest appropriately anymore due to internal power

struggles and therewith delivering outcomes that were not feasible in financial terms anymore (Klijn, 2009).

In contrast to conventional provision, the advantage of private involvement arises for construction processes due to *'incentives created by the integration of asset design, construction techniques and operational practices'* (Grimsey & Lewis, 2004, p. 171). The aforementioned disadvantages of conventional provision and implications of bureaucratic planning practices are largely replaced by more market-based mechanisms as *'there is a great deal of creative innovative potential left unearthed [...] if public regulations determine the how and what of infrastructure development'* (de Jong, 2008, p. 318). Public authorities lose their conventional predominant role in the implementation process by transferring responsibility towards market actors, which with regard to Appendix 3 explains the selection of the contractor (step 18) before the detailed design (step 22). In terms of the construction process, the intrinsic advantages relate to *'the transfer of key risks in design, construction delays, cost overruns and finance and insurance to private sector entities'* (Grimsey & Lewis, 2004, p. 171). The tool for public authorities, to determine responsibilities of involved actors, is the contractual arrangement that was mentioned in the second statement of Grimsey & Lewis (2004). Several provision models have been displayed in Figure 3, which deliver the opportunity for public authorities to determine certain responsibilities beforehand. Matos-Castaño & Mahalingam (2014) characterized the public side in terms of legitimacy, while the private side contains capabilities. On the continuum displayed in Figure 3, both are to be considered as substitutes. The more responsibilities are transferred to the private side, the lower the legitimacy of public authorities. This in turn explains resistance of moving the decision-making dimension completely to the market, thus away from the government, because *'the key problem [...] is a lack of accountability for the parties involved in project development and implementation'* (Flyvberg et al., 2003, p. 45).

2.2.2 Private Involvement on Balance - The New Role of the Government

Ongoing liberalization raises new issues in the 'control and accountability' mechanisms of public administration (Hague & Harrop, 2007), because *'its role as a protector of the public interest [becomes] subordinate to its role as promoter of projects'* (Short & Kopp, 2005, p. 366). Academia, politicians and governments were always intrigued by the private involvement in governmental tasks. Terms like 'New Public Management' emerged, which refer *'to self-organizing, inter-organizational networks and argue these networks complement markets and hierarchies as governing structures for authoritatively allocating resources and exercising control and coordination'* (Rhodes, 2006, p. 653). In line with this, several countries started to experiment with more liberal forms of their administrative designs. While academics such as Miraftab state that *'it is often economically and/ or politically weak governments that opt for decentralizing their responsibilities [...] to nongovernmental institutions'* (Miraftab, 2004, p. 94), it turned out that this must not necessarily be the case in infrastructure planning (Grimsey & Lewis, 2004). Generally remarkable for provision models with increased private involvement is the degree of liberalization, for example, through more discretion for managers compared to conventional provision. Together with simultaneously increasing outsourcing of project parts to the market, this has a remarkable impact on the governmental authorities, because risks are contracted away from the authorities, theoretically supporting the aim of public procurer that *'seeks an effective use of public funds'* (Grimsey & Lewis, 2004, p. 171). However, the advantages of liberalization come along with negative implications as well. Earlier, five distinct economic features of infrastructure were mentioned that favored the predominant role of the government. These implications for infrastructure did not change and respectively, shifting competences to the market also implies certain risks for governments. In conventional provision, governmental institutions were held democratically accountable. In privatized provision models, the role of the government as the protector of public control and accountability has to be reconsidered or, as Flyvberg puts it, it is necessary *'to rethink and recast the projects of modernity and democracy, and of modern politics, administration, and planning, in terms of not only rationality but of rationality and power'* (Flyvberg, 1998, p. 319). In infrastructure planning, this raises one of the main issues with respect to private involvement: Which tasks in infrastructure planning are eligible for private involvement and which ones have to remain public? Grimsey & Lewis (2004) thereby distinguish between core and non-core

services of infrastructure provision. The former has to remain to be governed by public authorities, as they need to keep the public interest in mind. The latter delivers room for private involvement. The underlying core service of economic infrastructure provision was mentioned earlier as the *'key intermediate services to business and industry'* (Grimsey & Lewis, 2004, p. 21), which therewith need to be governed by public authorities. However, *'even if the public provision principle is to remain sacrosanct in some of these particular cases, there is no reason why supporting infrastructure and ancillary services within those areas cannot be delivered by the private sector'* (Grimsey & Lewis, 2004, p. 96) and respectively some infrastructure tasks can be considered a non-core service. As the distinction between those different forms of services varies between projects, even on a theoretical basis it can become difficult to determine the core and non-core functions of infrastructure assets, which respectively determines whether private involvement is possible or not.

From public perspective, more liberalization in infrastructure planning calls for *'effective state intervention [that is] using its financial, institutional, or legislative muscle to level the playing field for all partners by regulating unequal power relationships between partners who have uneven socio-institutional capacities'* (Miraftab, 2004, p. 93) and therewith retaining the administrative obligation to represent the public interest through the management of the project. In this respect, especially the profit interest of the market, which *'points to the role of the state as essential to regulate the relationship between the partners and keep the playing field level'* (Miraftab, 2004, p. 89). In this respect, Grimsey & Lewis point towards the fact that the role of governments does not diminish by any means, but is rather specializing as *'the government will assume different roles and thus wear a number of different 'hats''* (Grimsey & Lewis, 2004, p. 83) in managing the project at hand. Public authorities *'should look broadly at transport in the context of its social and economic impacts, should examine options strategically and should deal proactively with transport policy issues'* (Short & Kopp, 2005, p. 366). In order to do so, the technocratic orientation of such bodies with their *'reliance on specialists and technical training, either in administrative skills or in specialized roles'* (Gallagher et al., 2006, p.156) has to change towards a role wherein *'senior civil servants must be skilled in the arts of both government and governance'* (Hague & Harrop, 2007, p. 368). Table 1 exemplifies the variety of roles of governments under a more privatized contract form. The remaining obligations *'are placed on the private sector entity because the government is not acquiring and taking immediate ownership of infrastructure assets'* (Grimsey & Lewis, 2004, p. 84), which in turn has important implications for the treatment of risks.

Table 1: Stages and Roles of Government under PPP Contracts Based on Grimsey & Lewis (2004, p. 85)

Stage	Define Service	Appraisal	Business Case	Project Development	Bidding Process	Project Finalization	Final Negotiation	Contract Management
Role of Government	Customer Network Planner	Network Planner, Protector of Environment, Representative of Public Interest	Network Planner, Funding	Project Manager	Concession Grantor	Network Planner, Representative of Public Interest	Concession Grantor, Funding	Inspector, Overseer, Contract Manager

2.2.3 Private Megaproject Finance - Allocating Risks and Rewards between Actors

In line with the aforementioned allocation of responsibilities, also *'the identification and allocation of risks are important issues in contractual agreements'* (Zhang, 2005, p. 7). From public perspective, the aim of contracts is to allocate the risks in the most efficient manner, but also to *'define claims on rewards'* (Flyvberg et al., 2003, p. 94). Referring to the public-private continuum, it assumes that *'to the extent that publicly provided capital is a substitute for private capital in private production technologies [...], firms require less private capital to produce the same level of output'* (Grimsey & Lewis, 2004, p. 30). From an economic point of view, private capital contains a competitive advantage over public capital in those areas raising the interest for private project finance (Flyvberg et al., 2003). Allmendinger differentiates infrastructure assets from other capital assets *'like land or labor that can be bought and sold because they involve a great deal of capital investment with little or no return'*

(Allmendinger, 2009, p. 34). Two distinct characteristics become evident in this statement. At first, infrastructure assets behave disproportionate in market terms as they do not follow conventional supply and demand patterns. Secondly, infrastructure assets usually involve a great deal of capital investment. Inherent with this, planning of infrastructure bears the risk of project failure and thus, an outcome that would be contrary to the effective usage of public funds or private capital (Grimsey & Lewis, 2004). In order to identify potential sources of project failure, Flyvberg et al. (2003) worked out four broad categories of risks that occur in megaprojects. Table 2 is a representation of them and includes indications of their general origins. Generally, one has to distinguish between risks that can be accounted for within the planning process itself and external risks that stem from outside the planning. What generally becomes evident in Table 2 is that the internal risks related to construction

Table 2: Risks and Their Origins in Infrastructure Based on Flyvberg et al. (2003)

Category of Risk	Reason(s)
Project-specific Risks	- Engineering and Design Failures - Faulty Construction Techniques, Cost Escalation & Delays in Construction
Market Risks	- Related to fundamental events that affect economic activities
Sector-policy risks (including force Majeure)	- Resulting from Planning Changes, Legal Changes and Unsupportive Government Policies - Because of Adverse Environmental Impacts and Hazards - Involving War and other Calamities and Natural Circumstances
Capital-Market Risks	- As a Result of Failure of the Project from a Combination of any Above

and operation of the infrastructure assets only make up a distinct proportion of the entirety of risks in infrastructure planning. External, unpredictable circumstances, such as impacts from climate change, which lead to *'irreversible change and 'surprises' with immense consequences for economies, vital ecosystems, and human welfare'* (Duit & Galaz, 2008, p. 312), increase complexity around infrastructure projects even more. Also, Klakegg et al. mention that *'public projects have become increasingly complex and difficult to manage'* (Klakegg, Williams, & Shiferaw, 2016, p. 283). When considering the definition of old bureaucracy by Hague & Harrop, in which officials should *'conduct the detailed business of public administration, advising on and applying policy decisions'* (Hague & Harrop, 2007, p. 365), it is raising doubts on whether the conventional, predominant role of public authorities is appropriately equipped to deal with the entirety of risks surrounding infrastructure projects.

In summarizing this section, the advantages of private involvement have been identified. Especially in terms of risk allocation, but also regarding the costs of an efficient infrastructure implementation, the private sector can contribute significantly and is therewith eligible for taking over tasks such as non-core services, which public authorities are not specialized in. However, infrastructure is not comparable to other economic markets, because of its important role for the whole national economy. Nevertheless, MirafTAB mentions that *'the current neoliberal perspective expects the private sector to pursue, more effectively and efficiently, the development of infrastructure and the provision of public services, while the state monitors activities'* (MirafTAB, 2004, p. 93). Emerging natural monopolies, large investment volumes, but also other negative external influences, however, raise constraints for the involvement of the private sector in infrastructure planning. A way to deal with it is a focus on the contractual arrangements of infrastructure planning. Several different models on the public-private continuum can ensure flexibility for the respective infrastructure project in order to ensure the control and accountability function of public authorities.

2.3 The Institutional Background of Action Arenas in Infrastructure Planning

As stated in the introduction, a specific operational problem is the involvement of private actors or contractors in the planning process of waterway infrastructure. According to Ostrom, the IAD

framework ‘can be utilized to describe, analyze, predict and explain behavior within institutional arrangements’ (Ostrom, 2011, p. 11). The IAD framework focuses more on the immediate indicators that influence an action situation such as the contracting arena. In this respect, Alexander states that ‘all planning [...] takes place within a specific institutional context, or often in sets of different varying ‘nested’ institutional contexts’ (Alexander, 2005, p. 210). Respectively, decision-making and

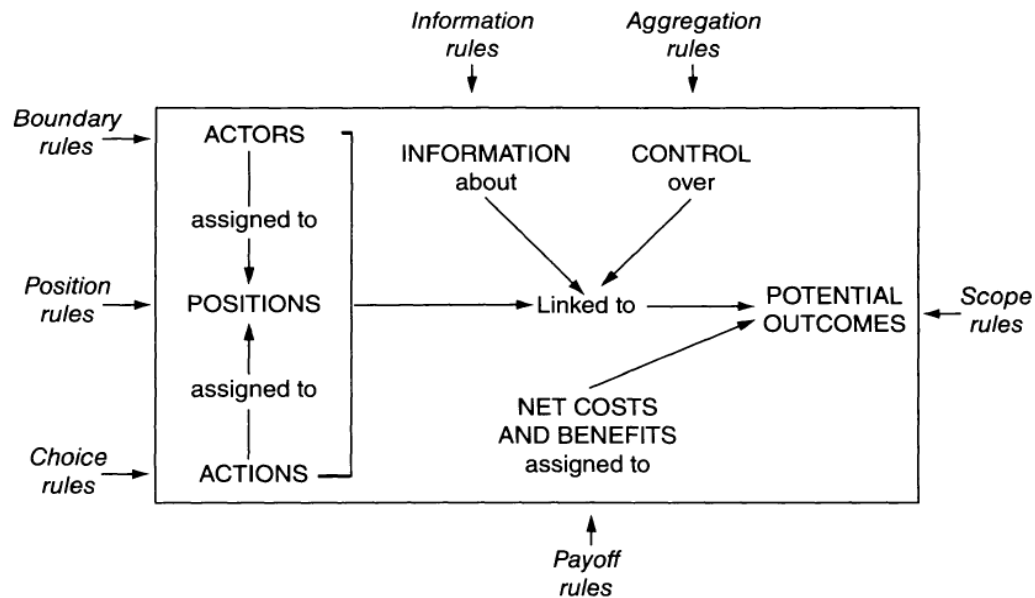


Figure 3: Rules as Exogenous Variables Affecting the Elements of an Action Situation (Ostrom, 2010, p. 651)

planning of infrastructure projects follows rules and procedures in both formal and informal ways, which evolved in a unique historical setting (Erakovic & Powell, 2006). Taking account of that, it is necessary to understand the meaning of institutions first. Alexander further defines an institutional design as ‘the devising and realization of rules, procedures, and organizational structures that will enable and constrain behavior and action so as to accord with held values, achieve desired objectives, or execute given tasks’ (Alexander, 2005, p. 213). What already seems normative, vague and interrelated, is only strengthened, when Allmendinger states that planning should be ‘understood as a ‘complex whole’, a ‘set of connected things or parts’ and a ‘group of objects related or interacting so as to form a unity’ (Allmendinger, 2009, p. 71). A state-of-the-art finding that de Roo would generally describe as ‘fuzziness in planning that needs to be understood and needs to be challenged’ (de Roo, 2010, p. 109). For this research project, it is essential to entangle the complex institutional system. The previous section elaborated on the degree of private involvement on a theoretical basis. In this respect, Koppenjan & Groenewegen mentioned that ‘the private involvement of public infrastructures and service delivery in the field of transportation [...] shows how widespread and far-reaching practices of institutional design are, but also the relative lack of knowledge on which these attempts are based’ (Koppenjan & Groenewegen, 2005, p. 241). From an academic perspective, a major finding for this field of research was contributed by Ostrom and the concept of the ‘Institutional Analysis and Development Framework’ (IAD framework). In stating that ‘an institutional framework should identify the major types of structural variables that are present to some extent in all institutional arrangements’ (Ostrom, 2011, p. 9), the author developed a common basis for analyzing institutional compositions of all kinds. When Koppenjan and Groenewegen state that ‘besides the design of technological component, complex technological systems require an institutional structure that coordinates the positions, relations and behavior of the parties that own and operate the system’ (Koppenjan & Groenewegen, 2005, p. 241), the necessity of understanding this institutional background in infrastructure planning becomes evident. Following Matos-Castaño & Mahalingam, there are ‘two factors that can be used as predictors of the direction of institutional change: a long-term orientation towards institutional change and a willingness to learn and modify institutions’ (Matos-Castaño & Mahalingam, 2014, p. 47).

Following Ostrom, the point of departure for the IAD framework is the so-called ‘action arena’. This action arena ‘*is used to refer to an analytic concept that enables an analyst to isolate the immediate structure affecting a process of interest to the analyst for the purpose of explaining regularities in human actions and results*’ (Ostrom, 2011, p. 11). Given the fact that Flyvberg et al. (2003) define the contract as the heart of a project, the upcoming part will be used to tailor the framework around the contracting arena. Crucial for understanding the IAD framework are the internal and external dimensions. The external dimension influences the internal dimension by affecting ‘*the structure of an action situation*’ (Ostrom, 2011, p. 19). Figure 2 is a graphical representation of such an arena. 7 exogenous working rules are displayed, which ‘*constitute the minimal but necessary set of rules needed to offer an explanation of actions and results*’ (Ostrom, 2011, p. 19). Respectively, they influence the set of actors, their positions, the set of allowable actions, potential outcomes, the level of control over choice, the information available and the costs and benefits of actions and its preferential outcomes. The next sections examine the relationships in more detail. ‘*All rules are the result of implicit or explicit efforts to achieve order and predictability among humans by creating classes of persons (positions)*’ (Ostrom, 2011, p. 17).

3 Methodology

The hypothesis for this project is that the institutional setting behind infrastructure planning influences the degree of private involvement. In this research, the four planning phases defined in the theoretical background are reduced to the project preparation and implementation phase, because this phase ‘involves a lot of local work to prepare a project, negotiate a variety of issues with local stakeholders, prepare the bidding process, contract a construction company and manage construction’ (Hijdra et al., 2015, p. 69) and therewith covers issues that are closely related to the contracting of the project. The Netherlands started a private involvement initiative in the organization of waterway assets, while Germany relies on a public authority-driven organization of its waterway assets. This chapter develops a suitable method for measuring the relationship more closely. Generally, the analysis follows a structure that is displayed in Figure 3. After introducing the general implications for conducting a



Figure 4: Research Design

comparative case study between the two countries based on Rose (1991a), both the ‘Degree of Private Involvement’ as dependent variable and the ‘Institutional Background’ as independent variable are described in more detail. In short, Grimsey & Lewis (2004) introduce a scale of business models in a public-private continuum that is used to determine the respective degree of private involvement of projects and Ostrom (2011) developed the IAD framework in order to describe the institutional background of an action situation on the basis of seven distinct variables. Generally, a scale based on a continuum between public dominance and collaborative is applied for the description of the variables. De Roo & Porter (2004) mention the historically dominant role of governmental authorities, while Grimsey & Lewis (2004) delivered reasons for such dominance. The underlying assumption is that the measurement of the independent variables will explain the different ‘degrees of private involvement’ in the two national waterway sectors. Because both countries are experienced in the private involvement of road infrastructure, implications from this sector are considered as supplementing source of knowledge and useful in an analysis of the waterway sector. As several authors such as Erakovic & Powell (2006) or Matos-Castaño et al. (2014) identify, the institutional background is a path-dependent process influenced by a complex web of cultural, political, but also other public factors.

3.1 Methodological Argumentation for Country and Infrastructure Sector Selection

The chosen method for the research is a comparative case study. The countries of reference for the analysis are the Netherlands and Germany. The selection is not arbitrary, but rather a reason of proximity on a variety of cultural, institutional and geographical variables, which strongly relates to Rose as ‘the first task of comparison is to observe the extent to which countries differ or are similar’ (Rose, 1991a, p. 447). From a cultural point of view, Hofstede’s 6-D Model¹ indicates same orientations for both countries among the four dimensions ‘power distance’, ‘individualism’, ‘uncertainty avoidance’ and ‘long-term orientation’. Significant differences arise on the dimensions of

¹ Based on **6 Dimensions** (Hofstede, 2001), which are as follows:

Power Distance - The extent to which the less powerful members of institutions and organizations expect and accept that power is allocated unequally

Individualism - Degree of interdependence a society maintains among its members

Masculinity - What motivates people, wanting to be the best (masculinity) or liking what you do (feminine)

Uncertainty Avoidance - The extent to which the members of a culture feel threatened by ambiguous or unknown situations and have created beliefs and institutions that try to avoid these

Long-Term Orientation - How every society has to maintain some links with its own past while dealing with the challenges of the present and future

Indulgence - The extent to which people try to control their desires and impulses

'masculinity', where Germany is considered masculine and the Netherlands feminine and 'indulgence', on which Germans are restrained in terms of living their desires and impulses, while the Netherlands generally emphasize the realization of impulses and desires. The proximity on the cultural level describes the informal institutional environment that was mentioned by Koppenjan & Groenewegen, which as such *'influences the perceptions of agents with respect to the problems they consider feasible'* (Koppenjan & Groenewegen, 2005, p. 246). Following their argumentation, the cultural dimensions further significantly influence the institutional system of complex technological systems. In this respect, the three dimensions 'power distance', 'uncertainty avoidance' and 'long-term orientation' are to be of special importance as they relate either to the allocation of power of actors involved in terms of democratic reality as mentioned by Flyvberg (1998), avoidance of uncertainty which according to de Roo (2004) is ultimately the main objective of infrastructure planning, and long-term orientation as the lifecycles of infrastructure assets, like in waterway infrastructure, sometimes exceed 100 years (Hijdra et al., 2015). Together they induce a detailed planning of assets to cope with present and future risks on a variety of dimensions. The scores underline the proximity of both the Netherlands and Germany. Apart from cultural similarities, also economic and political factors favor similarities between the countries. Through ongoing European integration in terms of the European common market and closely related projects such as TEN-T, the collaboration between both countries is enhanced inevitably (EC, 2011). In the same vein, similar GDP per capita as well as comparable public spending shares on infrastructure (OECD, 2016) further underline proximity. As can be seen in Figure 1 the geographical perspective implies proximity as the countries are sharing borders and some important navigable European rivers such as Rhine and Meuse. Respectively, both countries show similar patterns when it comes to the role of their waterway infrastructure as mode of transport (Hijdra et al., 2014). However, the high percentage share of waterborne transport in the Netherlands of around 40% compared to German's 12% has to be emphasized at this point (EC, 2016). Apart from the similarities, Rose (1991a) points out the importance of identifying main differences as well in order to conduct a comparative case study. In terms of waterway management, one of the most fundamental differences in asset planning is the form of contracting in the planning process, which is simultaneously related to the degree of private involvement.

As one of the most fundamental work on experimental and quasi-experimental designs, Shadish et al. (2002) find several reasons to explain enthusiasm for qualitative methods. Apart from reducing uncertainties around cases, *'such methods can also engage a broad view of causation that permits getting at the many forces in the world and human minds that together influence behavior in much more complex ways than any experiment will uncover'* (Shadish et al., 2002, p. 500). As stated earlier, the planning of infrastructure is a complex process. Only a small number of experts can deliver reliable arguments on the topic, which makes a quantitative analysis in form of surveys unfeasible. More than this, it is the prospect of in-depth information (Hennink et al., 2011) that calls attention. The dependent variable indicates that only a minority of projects is conducted under the PPP scheme, which simultaneously means that even in public authorities, just a distinct number of civil servants is involved in such forms of contracting. Rather than selecting a quantitative method that in the end lacks reliability in terms of the limited number of experienced participants, it is considered more appropriate to use a qualitative format for data collection.

Nevertheless, a major shortcoming for case studies is related to the concept of generalization and the question: *'how those who received treatment would have changed without treatment'* (Shadish et al., 2002, p. 501). What is called threat to validity in quantitative research and usually prevented through a treatment and control group becomes difficult in a case study. In order to understand whether it would be beneficial to involve private market parties in the planning process in German waterway infrastructure, two main threats to validity are identified in this research. First and foremost, the planning of waterway infrastructure in Germany lacks an immediate control group, because the system develops in a complex, independent process. Even though the Dutch waterway sector was identified as being similar to the German case, the institutional development is rooted in different national systems. In order to overcome this gap, the road sectors of both countries are included in the research project. Road infrastructure is taken into account as the experiences in this field of infrastructure are more mature than in the private involvement in waterway infrastructure. Table 3 summarizes the number of

‘public-private partnerships’ (PPP) by sector and country. It becomes evident that both countries implemented more PPP models in road infrastructure. The table further confirms the aforementioned

Table 3: Numerical Summary of PPPs in country and infrastructure sector (Based on Appendix 8)

	The Netherlands	Germany
Road Infrastructure	15	23
Waterway Infrastructure	6	0

differences in waterway infrastructure. While the Netherlands introduced the concept of PPP in its waterway management, Germany has not yet implemented any such partnerships in its waterway assets. Also, it is necessary to clearly define country-specific details of a ‘public-private partnership’. Given the large variety of collaboration forms among the public-private continuum of Grimsey & Lewis (2004), this research project is only selecting cases that are clearly defined as PPPs by the

Table 4: Common Forms of PPP in the Netherlands & Germany and their Degree of Private Involvement

Type of PPP	The Netherlands	Germany
	- <i>DBFM(O)</i> ¹ : - Design, Build, Finance, Maintenance, (Operate) are the most common types for PPP projects	- <i>A-Modell</i> ² : - Design, Build, (Partial) Finance, Maintenance - Traffic-dependent reimbursement - <i>F-Modell</i> ³ : - Design, Build, (Partial) Finance, Maintenance - Traffic-dependent reimbursement - <i>V-Modell</i> ⁴ : - Design, Build, Partial Finance, Maintenance - Reimbursement through asset reliability

¹Rijkswaterstaat (2014)

²BMVI (2016a)

³BMVI (2016b)

⁴BMVI (2016c)

respective governmental entities. Even though the continuum is much wider, the most common references for PPPs in public discourse are the contract forms, which are displayed in Table 4. ‘*DBFM and DBFMO are the most common types of contract for PPP projects used in the Netherlands*’ (Government of the Netherlands, 2012). In line with Lenferink et al. (2012), the form of contracting includes the (D)esign, (B)uild, (F)inance, (M)aintenance and in some cases the (O)peration of the assets. Similar but summarized under a different naming, German’s BMVI distinguishes between three forms of contracting under the umbrella of PPP: A-Modell, F-Modell, and V-Modell. The difference between the models is the type of reimbursement for the contractor. While the first two models guarantee financing through traffic-dependent reimbursement, the V-Modell is based on a non-traffic-dependent reimbursement and depends on the general availability of the asset instead (BMVI, 2016e).

Taking the information together, the research for this project was developed. Appendix 5 depicts the two countries with their waterway and road contracting regimes. In analyzing the institutional background, this project aims at understanding the previously mentioned differences in the degree of private involvement. Through dealing with threats to validity, this project is attempting to belong to the research projects that ‘*regularly make valid causal inferences using a qualitative process that combines reasoning, observation, and falsificationist procedures*’ (Shadish et al., 2002, p. 500). In order to draw reliable inferences about the feasibility of a PPP, representative cases from the other infrastructure sectors are going to be selected in the following section.

3.1.1 Case Selection for Evaluating Private Involvement in Dutch and German Infrastructure Sectors

When turning back to the case of Scharnebeck, the requirements of overcoming a height of 38 meters (MW, 2012) pose challenges in terms of its technical specifications on both planned navigation lock and ship lift that is already in place. For the selection of its Dutch peer, Appendix 8 displays respective PPP provision models in the Netherlands. The navigation lock in Ijmuiden is implemented with similar features as in the case of Scharnebeck, because it is constructed in immediate proximity to two other navigation locks, posing challenges to engineering. Respectively, the navigation lock in Ijmuiden is selected for the comparison. For the selection of road infrastructure projects, one has to acknowledge different technical characteristics and requirements of their assets. Hijdra et al. (2015) mention 5 distinct features of waterways, which are considered unique among the different modes of transport:

- Long lifecycles of waterway assets (sometimes exceeding 100 years)
- Problems are less visible because of the water
- Construction of assets is capital-intensive
- Network serves multiple purposes (in contrast to e.g. roads/railway)
- Vulnerability of network due to missing alternative routes

Technical specifications are, however, only one part of a contract. Insights of the road sector will still provide coherent information on the private involvement in terms of project management. Finally, the case selection results in the projects that are displayed in Table 5. Grimsey & Lewis (2004) mentioned that PPP provision models are only eligible when passing a budgetary threshold of 200 million €, which is mainly related to the costs of the higher procurement costs compared to conventional contracts. The estimated costs of 235 million Euros for the navigation lock respectively pass this threshold. This applies to the other listed projects as well.

Table 5: Final Case Selection for Comparison with Navigation Lock in Scharnebeck

	The Netherlands	Germany
Road	- A15/A20 – New Blankenburg link road	- A1 – ‘Hamburg-Bremen’ (650 mil €) ⁴
Infrastructure	(1100 mil €) ² - A6/A9 – Schiphol-Amsterdam-Almere (1000 mil €) ³	- A7 – ‘Salzgitter-Göttingen’ (600 mil €) ⁵
Waterway	- Navigation Lock in Ijmuiden	- Navigation Lock in Scharnebeck (235 mil
Infrastructure	(850 mil €) ⁶	€) ⁷

3.1.2 Selection of Interview Partners

After initially contacting the respective authorities, the selection of potential partners was conducted via a snowball method. After each interview, the participant was asked to mention potential candidates that could deliver useful information about the research topic. In this respect, the selection method inherits a selection bias, as the respective interviewee could choose to name persons with likewise attitudes or opinions. In order to overcome this situation, the author asked for the respective occupation of the persons of reference. However, no potential expert was excluded, as the vast majority of the interviewees were civil servants of the Netherlands or Germany. Appendix 7 displays

² Rijkswaterstaat (2013a)

³ Rijkswaterstaat, (2013b)

⁴ BMVI (2017)

⁵ NLSStVB (2017)

⁶ Government of the Netherlands (2012)

⁷ MW (2012)

the institutions of the participants. In order to guarantee the anonymity of the research participants, a specific coding scheme was developed.⁸

3.2 Developing the Interview Guide – Preparing for Data Collection

Keeping in mind the statements of Shadish et al. (2002) about qualitative research, semi-structured interviews have been selected as research method for gathering the data. Only a distinct group of people is involved in these processes and therefore is able to deliver reliable information. The reason for selecting in-depth interviews is that one can grasp the *'context in which the interviewee lives'* (Hennink et al., 2011, p. 110), which is indirectly determined through the institutional background of each planning sector. Hennink et al. (2011) further deliver the main guidelines for structuring interviews. Generally, an interview is thereby based on four different parts: An introduction, opening questions, key questions, and closing questions. *'The design of the questions in the interview guide reflects the concepts that are embedded within the research questions and the conceptual framework of the study'* (Hennink et al., 2011, p. 117), and is especially related to the research plan, which is displayed in Appendix 5. The blue parts are meant to describe the institutional background, while the red parts aim at describing the degree of private involvement. They further state that each *'question includes a series of topical probes that remind the interviewer to ask about certain topics'* (Hennink et al., 2011, p. 119), and therewith deliver the opportunity to take slight control of the interview. The main concepts for the research are the *'degree of private involvement'* as well as the *'institutional background in infrastructure planning'*. Respectively, the key questions are based on these two concepts and their relationship.

Following a general introduction⁹, the first opening questions *'are usually broadly related to the key questions'* (Hennink et al., 2011, p. 113), and used to further introduce into the topic. Following the opening, the interview turns to the main part. Based on both dependent and independent variable, the questionnaire is *'designed to collect the core information to answer the research questions'* (Hennink et al., 2011, p. 113). The part of the dependent variable *'degree of private involvement'* thereby focuses on the experienced advantages and disadvantages of the respective forms of contracts in infrastructure planning and reason for the selection. The second part of the key questions establishes a relationship between the independent variables and the degree of private involvement. Based on a set of questions that was mentioned by Hijdra et al. (2015), these questions aim at explaining the 7 categories that are described in Ostrom's IAD framework (Ostrom, 2011). Without such a framework, *'information about different countries may be assembled together but we [would] have no basis for relating one country to another'* (Rose, 1991a, p. 447). Respectively, the questions are transformed in a manner that eases the understanding for interviewees and therewith increases the quality of the data collection. Last but not least, the closing questions are defined as *'broader, general questions [...] or related to the general topic of the research'* (Hennink et al., 2011, p. 114). The questions in the closing part answer a distinct set of research questions for the research project. Thereby, they aim at a personal evaluation of the success of each interviewee's project, but it is also an opportunity to raise doubts and concerns. Another important question points towards a personal opinion concerning the politicization of private involvement in infrastructure projects.

⁸ The Coding for the Interview Partners reads as follows:

NL (Dutch)	W(aterway)	2
NL (Dutch)	G(eneral)	1
D (German)	R(oad)	1
Country of Origin	Infrastructure Sector	Number of respective Interviewee

⁹ Included information about the data collection and anonymization of interview participant

3.2.1 *Conceptualizing the Dependent Variable: Degree of Private Involvement*

As mentioned in Figure 3, the ‘*Degree of Private Involvement*’ is identified as dependent variable in this project. The interviewees explain the contract form of each project in detail, together with their general intention. Following the public-private continuum in Figure 3, the projects can be ranked in terms of their degree of private involvement. It is important to understand the reasons for choosing a given provision model in-depth for each of the chosen projects. The questions on advantages and disadvantages of PPPs have two functions. First of all, a relationship to the three experiences of private involvement by Flyvberg et al. (2003) is established. In asking about the advantages and disadvantages of PPPs in general, the aim is to identify concurrent issues of infrastructure provision and to evaluate whether the theoretical propositions hold true in reality. On the other hand, the aim is to understand potential resistance of the involved authorities to involve the private sector, which becomes important for the discussion that seeks to evaluate the applicability of a DBFM contract in the case of German’s navigation lock.

The overall proposition is that this degree of private involvement in infrastructure projects is influenced from outside factors. As stated by Koppenjan and Groenewegen (2005, p. 241), *‘besides the design of the technological component, complex technological systems require an institutional structure that coordinates the positions, relations and behavior of the parties that own and operate the system’*. The aim of the following section is to lay a basis for measuring the institutional background of the four different infrastructure systems.

3.2.2 *Conceptualizing the Independent Variable: Institutional Background*

As identified beforehand, the planning processes and therewith also the form of contracting are largely pre-determined by the institutional design of each infrastructure sector. Hijdra et al. mentioned that *‘systems and their related institutions have often had long histories of sectoral optimizations and are still aligned to this’* (Hijdra et al., 2014, p. 65). Two crucial topics for this project will be placed as opening questions. The first question evaluates whether there is collaboration between road and waterway sectors in both countries. Hijdra et al. (2014) mentioned differences between both road and waterway sectors and observes if the option is shared among the experts. The second question asks whether the infrastructure sector is generally open for new forms of contracts, in order to explain the differences in the number of PPPs in each infrastructure sector. Following Matos-Castaño & Mahalingam, there are *‘two factors that can be used as predictors of the direction of institutional change: a long-term orientation towards institutional change and a willingness to learn and modify institutions’* (Matos-Castaño & Mahalingam, 2014, p. 47). In order to evaluate such an institutional change, the question about the openness for new forms of contracting is raised.

The second part of the key questions is related to Ostrom’s IAD framework and therewith deals with the independent variable of the institutional background. In order to ensure the comparability of the institutional backgrounds on the project’s form of contracting, *‘concepts are necessary as common point of reference for grouping phenomena that are differentiated geographically and often linguistically’* (Rose, 1991a, p. 447). In line with the IAD framework, Hijdra et al. (2015) worked out a set of questions for the identification of the exogenous rules as mentioned earlier. This general set of questions allows an appraisal of the institutional background of the different sectors, independent of their national and specific means of transport. The set of questions has already been mentioned in the theoretical conceptualization. For conducting interviews with experts in the realm of the contracting arena, it is necessary to adapt the questions slightly as they are rooted in *‘theoretical concept for some people and therefore difficult to respond to in an interview’* (Hennink et al., 2011, p. 117). For this project, the question for each of the 7 exogenous rules have been adapted in Section ‘C’ of Appendix 6. Reasons for adapting the questions are displayed in the theoretical framework of his project. The

Table 6: Questions for Determining the Action Arena of IAD framework in Infrastructure Planning (Hijdra, Woltjer, & Arts, 2015) & Measurement Scale

Exogenous Variables	Question for Determination	Measurement Scale
<i>Position Rules</i>	- What do these actors want or need through infrastructure planning? - How many have similar wishes in infrastructure planning?	- One Actor vs. Multiple Actors
<i>Boundary Rules</i>	- How do actors leave the arena of infrastructure planning?	- Simple vs. Complex
<i>Choice Rules</i>	- What actions do they take in infrastructure planning?	- Public Dominance vs. Collaborative
<i>Aggregation Rules</i>	- How are decisions made in infrastructure planning?	- Public Dominance vs. Collaborative
<i>Information Rules</i>	- What information is or must be shared among actors in infrastructure planning?	- Public Dominance vs. Collaborative
<i>Pay-Off Rules</i>	- How are benefits and costs distributed to actors in positions in infrastructure planning?	- Public Dominance vs. Collaborative
<i>Scope Rules</i>	- What is the result of infrastructure planning about?	- Simple vs. Complex

contracting arena is the result of preceding planning stages (Hijdra et al., 2015). More specifically, the arena is composed of actors that deal with risks and rewards to some degree (Flyvberg et al., 2003), in order to measure differences between the projects a rank between public dominance (orange) and a more collaborative (green) form is applied, which is adapted on the type of question respectively (compare Tale 6). Because the public authorities are obliged by law to administer their respective infrastructure domains, the *boundary rule* is focusing on the exit scenarios of contractors alone, as the entrance of a contractor into the arena is guaranteed through a successful bidding phase as mentioned by Hijdra et al. (2015). Based on Lenferink et al. (2012), the *choice rule* is targeting on the role of the authority, because it is changing with different forms of contracts or provision models (see Table 6). The question is how to allocate the role of actors in the different realization stages of planning, design, construction, finance and maintenance, and how the allocation changes in different provision models. The *scope rules* have been changed towards the general aim of the procurement, because they ‘*delimit the potential outcomes that can be affected and, working backwards, the actions linked to specific outcomes*’ (Ostrom, 2011, p. 20). Aggregation rules and information rules identify the ‘*level of control that a participant in a position exercises*’ (Ostrom, 2011, p. 20) and ‘*the knowledge-contingent information sets of participants*’ (Ostrom, 2011, p. 20) respectively. The question concerning the pay-off rules ‘*affect the benefits and costs that will be assigned to particular combinations of actions and outcomes, and they establish the incentives and deterrents for action*’ (Ostrom, 2011, p. 20).

3.2.3 Transcription of Interviews, Coding and Categorization

After conducting the interviews, transcriptions of each interview were prepared. The respective transcripts are the main element for the analysis. Several methods for transcribing interviews exist. In this project, emphasis is ‘*on the informational content of the interview and the social or cultural meanings attached to this content*’ (Hennink et al., 2011, p. 130). The coding aims to describe both the dependent and independent variable in the infrastructure sectors. Respectively, the first set of codes that is applied for the analysis is deductive in nature and based on the theoretical framework of the thesis. Deductive in this project means that the fundamentals are already laid out in the theory and methodology and that they are used to identify those concepts in the interviews. Hijdra et al. (2015) worked out a set of questions for describing the 7 different exogenous variables of Ostrom’s IAD framework in infrastructure planning (compare Table 6). These questions are used to process the data collection for the independent variable within the transcribed interviews. The codes that were identified in this project are displayed in Appendix 6.

4 Analysis

This section provides an overview of the findings of the interviews. First, a detailed description of the selected projects including their respective form of contract is given. Based on the exogenous rules of Ostrom's IAD framework, the second subchapter will the institutional background around those projects. In the theoretical conceptualization, differences between conventional and PPP provision models were highlighted. Based on the three experiences of private involvement that were mentioned by Flyvberg et al. (2003), the third section will elaborate on the advantages and disadvantages of PPP models over conventional forms of provision. Last but not least, the findings are categorized by the most immanent issues that were identified during the interviews.

4.1 Describing the Degree of Private Involvement in Selected Infrastructure Projects

Point of departure for the case selection is the navigation lock in Scharnebeck. In line with Rose (1991a), the one major difference between the selected projects and the case in Scharnebeck is the private involvement in the project. The other projects are procured under a PPP provision model, while the navigation lock in Scharnebeck is planned to be procured only in terms of the realization. According to the public-private continuum that was developed by Grimsey & Lewis (2004), DBFM models as well as A- and V-Modelle are to be located towards the private pole, while the contracting of the realization has to be located close to the public pole. Summarized in Table 7, this part will elaborate further on the four different projects.

Table 7: Projects and Respective Contract Forms (in Brackets)

	<i>The Netherlands</i>	<i>Germany</i>
Road Infrastructure	- A15/A20 – New Blankenburg link road (DBFM) - A6/A9 – ‘Schiphol-Amsterdam-Almere’ (DBFM)	- A1 – ‘Hamburg-Bremen’ (A-Modell) - A7 – ‘Salzgitter-Göttingen’ (V-Modell)
Waterway Infrastructure	- Navigation Lock in Ijmuiden (DBFM)	- Navigation Lock in Scharnebeck (Contracting of Construction)

4.1.1 Navigation Lock in Scharnebeck

As the project is still in the early stages of planning, no specific contract form has been chosen, as acknowledged by DW1. In the same vein, however, he mentioned that the form of provision will not significantly differ from previous contracting forms, which are based on conventional procedures. Hence, the project preparation and implementation phases, but also the period after construction such as the maintenance remain mainly the task of governmental authorities (compare Appendix 2). In line with that, DW2 mentioned that the conventional working procedure is following a contracting of the construction to private parties only. In turn, this implies that public authorities conduct the detailed planning and a close construction supervision of waterway assets. The contractor's liability ends with the delivery of the asset and is taken over by the public authorities again.

4.1.2 A1 – ‘Hamburg – Bremen’ & A7 – ‘Salzgitter-Göttingen’

In German road infrastructure, two projects were selected. The A1 between Hamburg and Bremen was chosen, because the road project was implemented as an ‘A-Modell’, meaning that the reimbursement is toll-dependent. In Germany, toll payment is based on the traffic of heavy-weight vehicles. The A1 between Bremen and Hamburg was identified as a pilot project by the federal government of Germany as it was a road section with usually high traffic volumes. The PPP developed further into what is called a ‘V-Modell’ due to recognizing the need to retain risks of traffic volumes in public hands.

Projects under this contracting type follow an availability-related reimbursement. Currently, the A7 between Salzgitter and Göttingen is prepared as such a provision model.

4.1.3 Navigation Lock in IJmuiden

A prominent case in the Dutch waterway sector is the navigation lock in IJmuiden, which is currently implemented as a DBFM contract. According to NLW2, the provision model was most suitable for the requirement of the navigation lock, because accessibility to the Amsterdam harbor is guaranteed in the most efficient manner. Additionally, NLG1 mentioned that through the DBFM, the navigation lock is going to be constructed as a clever design, which is already pointing towards one of the strength of private involvement that was mentioned by Grimsey & Lewis (2004).

4.1.4 A15/A20 – ‘New Blankenburg Link’ & A6/A9 – ‘Schiphol-Amsterdam-Almere’

The planning process of the ‘A15/ A20 - Blankenburg Link’ concluded in a DBFM contract with a partial concession model. The partial concession is applied to a tunnel that is considered a shortcut. Following NLR2, such a concession only applies if there is an alternative route without the necessity to imply charges for the user. This is not the case for the ‘A6/ A9 – Schiphol-Amsterdam-Almere’,. Nevertheless, it also concluded in a DBFM contract. Both projects are considered differently with regards to project management, as the A15/A20 is implemented with a conventional consortium and the A6/A9 with a system manager, who aims at reducing the overall size of the consortium.

4.1.5 Summary

This section provided an overview of the forms of contracting that are used or are most likely used in the selected infrastructure projects. Throughout the sectors, three different provision models were mentioned. Summarized in Figure 6, the German waterway sector relies on conventional contracting schemes, only tendering the realization of the project. In contrast to that both the German and Dutch PPP provision models include a more privatized lifecycle consideration. They are transferring design

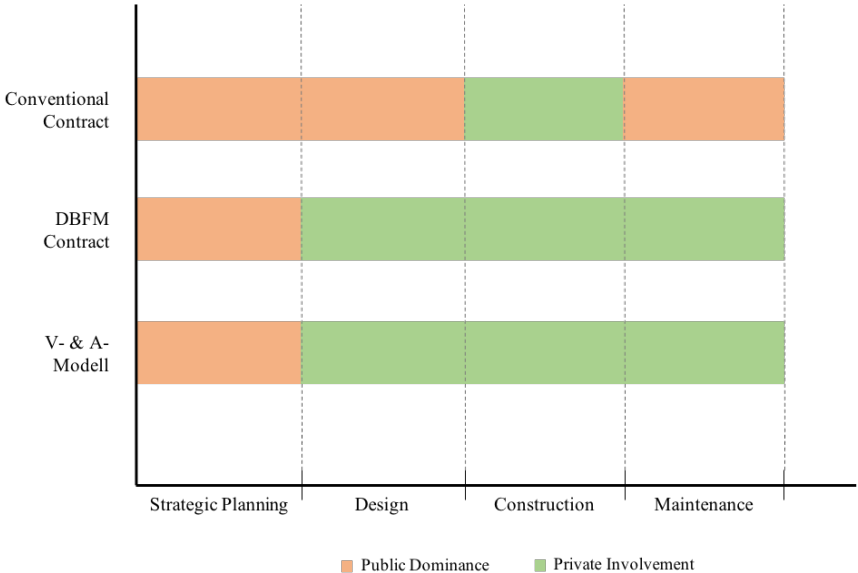


Figure 5: Lifecycle of Selected Conventional & PPP Projects Based Implementation Stages by Lenferink et al. (2012)

and maintenance responsibilities as well as parts of the project finance towards the market. In order to understand these implications for the projects in more detail, Koppenjan & Groenewegen pointed towards the ‘institutional structure that coordinates the positions, relations and behavior of the parties that own and operate the system’ (Koppenjan & Groenewegen, 2005, p. 241). By applying the IAD framework to the selected contracting arenas, the following section will entangle the institutional background to analyze the underlying structures. In line with the methodological argumentation,

NLR1 underlined that a real comparison between provision models is difficult. Concepts such as the ‘public-private comparator’ pre-assume normalized circumstances surrounding the infrastructure project, but thereby lack a clear reference to reality.

4.2 Describing the Institutional Background in Selected Contracting Arenas

The methodology identified the IAD framework as a tool to ‘identify the major types of structural variables that are present to some extent in all institutional arrangements’ (Ostrom, 2011, p. 9). Four different infrastructure sectors are described in the following section. Koppenjan & Groenewegen mentioned that ‘the private involvement of public infrastructures and service delivery in the field of transportation [...] shows how widespread and far-reaching practices of institutional design are’ (Koppenjan & Groenewegen, 2005, p. 241). The IAD frameworks thereby ‘isolate the immediate structure affecting a process of interest to the analyst for the purpose of explaining regularities in human actions and results’ (Ostrom, 2011, p. 11). Following the 7 exogenous rules in this part will give a clear picture of similarities and differences between selected conventional and PPP provision models.

4.2.1 Position Rules

Regarding the actors that are involved in the four infrastructure sectors, the contracting arenas become quite complex and diversified. Generally, a distinction between public and private side becomes evident. In all four sectors, the main authority resides on the executive agency’s side. All of the sectors have in common that they retain the role as guardian of the public interest as indicated by Hague & Harrop (2007). In infrastructure planning, this role is usually expressed through the control and accountability function of those agencies. In the German waterway sector, competences of contracting are transferred to the ‘Wasser- und Schifffahrtsverwaltung’ (WSV). In this respect, DW1 emphasized the dominant role of the agency in waterway management. In German road infrastructure, it is important to mention the federal state administration on behalf of the federal government. Being located in Lower-Saxony, the *NLStBV* is the executive agency in the preparation and implementation phase of road projects, which then acts as the public contracting party. In the Dutch case, the executive agency ‘Rijkswaterstaat’ retains competence of both road and waterway infrastructure and is the main contracting authority respectively. A variety of other public authorities is generally involved in the planning processes. Ranging from federal ministries over city and local administrations to harbour authorities, their role is located in earlier stages than the realization and implementation that deal more with strategical and political considerations, before tendering. Apart from the public side, the private sector organizes in consortia for projects of comparable size throughout the four infrastructure sectors. With construction and engineering companies taking the lead, they carefully choose necessary market actors for such projects. The general interest of all involved parties in the contracting arena is the preparation of a well-structured, well-organized and successful project. Apart from that, private actors wish to gain a distinct mark-up from the project. In terms of the position rules, the following quotes were of particular interest:

Table 8: Main Quote Related to Position Rules

Sector	Main Quotes	Rank in Spectrum
German Waterway Sector	<i>‘We have ultimate control in planning. We let the contractor construct. And we conduct the maintenance.’ (DW1)</i>	Multiple Actors
German Road Sector	<i>‘It is a contractual relationship between the federal road administration and the consortium’ (DR4)</i>	Multiple Actors
Dutch Waterway Sector	<i>‘[...] the governmental side. Then there are also private firms.’ (NLG1)</i>	Multiple Actors
Dutch Road Sector	<i>‘We changed that a bit, not only the executing, but also the design is done by the market and even the maintenance is done by the market. And we only do the planning now.’ (NLR2)</i>	Multiple Actors

4.2.2 Boundary Rules

The *boundary rules* are quite simple, because everything is written down in the contract. Generally, the exit can be initiated from both the public and the private sector. The methodology already indicated that generally public authorities cannot leave the contracting arena due to their public obligation to administer their infrastructure networks. Their control and accountability function, however, grants the possibility to cancel a contract when the contractor does not fulfil its task. Whatever exit scenario has to be chosen, it is not easy to leave a contract. Respectively, exit scenarios are not common in the project implementation, as they always involve long-lasting legal procedures, cost overruns and time delays. Therewith, they mostly lead to bankruptcy of the contractor and are not initiated voluntarily. Stipulated by the respective contract, both the selected conventional and PPP provision model share an exit scenario during the realization phase. Following NLG2, this stage would be the most severe, as it could result in a private party building half a bridge and then going bankrupt. The underlying reason is that such a scenario would imply a new tender procedure for finishing the asset. Given the duration of PPP provision models over several years, the PPP contracting arenas also determine additional exit scenarios that are located in the operation phase. Following the same procedures as in the realization phase, the ultimate scenario would be a transfer of the object back into public hands, which would be considered *'enough to compensate for it'* (DR3). In a nutshell, every exit scenario will have an impact on the project in terms of time frame and financing flows. Respectively, the main quotes referred to the complexity, resistance or *'Ultima Ratio'* to leave the contract. A situation preferably avoided by all involved parties as can be seen in the following statements:

Table 9: Main Quote Related to Boundary Rules

Sector	Main Quotes	Rank in Spectrum
German Waterway Sector	<i>'Can the contractor leave? Generally, ,Yes'. You can always leave. But he would generally not do this, neither would we.'</i> (DW1)	Complex
German Road Sector	<i>'It would be the 'Ultima Ratio', if you understand it as cancellation of the contract. This is not something you would deal with within one afternoon.'</i> (DR4)	Complex
Dutch Waterway Sector	<i>'Yes, it is always possible, but it will cost.'</i> (NLG2)	Complex
Dutch Road Sector	<i>'It is not easy to leave a contract.'</i> (NLR1)	Complex

4.2.3 Choice Rules

In the *planning process* of all four infrastructure sectors, the strong role of the government bodies as project principal becomes evident. A variety of governmental institutions as well as other actors of society are involved in the previous planning stages of policy-making, programming, and planning up to the zoning plans. For project preparation and implementation, the executive agencies legally retain a control and accountability function as well as their function as network manager. The early *planning process* is largely determined by the executive authorities, who are responsible for the preparation of the tender and procurement, regardless of the contracting form. At a later stage, the project plans and their preparation mark a turning point between conventional and privatized provision models. Following the selected cases, the conventional provision model in the German waterway sector stipulates the provision of a detailed project design by the public authority WSV as part of the plan making. DW1 partly explained the dominance of public authorities with a small market of projects, because not many navigation locks or weirs are constructed per annum compared to other infrastructure sectors, making the bundling of expertise on public side essential. For the selected PPP provision models, the responsibility for the *detailed design* is shifted towards the market. The control and accountability function is ensured through the provision of the reference specifications by the

public authorities. For the selected conventional provision model, the only task on the private side is the *building* stage. It receives detailed technical specifications from the WSV, which impedes the freedom of choice for the private contractor by clearly defining his tasks and observing the correct implementation closely. For the PPP provision models, the building process aligns with the terms of reference delivered by public authorities and their own detailed design. The correct implementation is thereby observed by public authorities; however, they only evaluate compliance with the terms of reference. In terms of *project finance*, the German waterway sector relies on a down payment by the government itself. The selected PPP provision models partly shift the finance to the private side. After an initial down payment by public authorities, the contractor has to borrow the remaining capital for the construction externally. Given the high investment volumes of such projects, the consortia contract financial institutions for this function, such as private banks. The financial mechanism behind the PPP provision models is that the financial institutions receive their return on investment mainly during the operation phase of the project. The *maintenance* of the conventional provision model of the German waterway sector is conducted by the executive agency itself. In contrast, the maintenance under PPP provision is transferred towards the contractor. Public authorities in turn follow their legal obligation for administering the PPP provision model by controlling the quality of the project during the operation period. In the end, the contractor is held accountable for it. Compared to the public dominance in conventional provision, the more integrative approach in distinct planning stages within PPP provision models is of particular interest for the choice rules. The different action within the contracting arena are best displayed in the following quotes:

Table 10: Main Quote Related to Choice Rules

Sector	Main Quotes	Rank in Spectrum
German Waterway Sector	<i>'The contractor also has planning responsibilities in conventional contracts, but obviously based on our detailed reference specifications, implying small degree of decision-making freedom' (DW2)</i>	Public Dominance
German Road Sector	<i>'We will supervise during the construction, but not as closely anymore. Also in the maintenance, this will be similar.'</i> (DR3)	Collaborative
Dutch Waterway Sector	<i>'This especially in the developing or construction phase and the operational phase. Things are really different, if you go to classic contract or DBFM contract. DBFM contracts allocate more responsibilities towards the private sector'</i> (NLW1)	Collaborative
Dutch Road Sector	<i>','The design, the building and the maintenance is for the contractor.'</i> (NLR2)	Collaborative

4.2.4 Aggregation Rules

Concerning the *aggregation rules* in German waterway management, decisions are largely taken by the WSV. Even during implementation, the executive agency has a close supervisory role. As such the WSV develops detailed project specifications, which can be amended by alternative bids in the tender. Nevertheless, the WSV has the ultimate decision on whether to implement a bid or not. For the other three sectors, a more collaborative approach becomes apparent. By law, public authorities remain the last actors in terms of their control and accountability function. However, under a PPP provision model, executive agencies only develop a technical program, shifting parts of the project towards the private actors, which also implies a shift in accountability for the project. The private actors receive a higher degree of decision-making for the implementation phase, but are held accountable through the contract. The contractual arrangements are negotiated between public and private parties, usually in form of a dialog during the tender phase with public authorities controlling the compliance of those contracts in the aftermath. Private actors are invited to negotiate about distinct parts of these contracts. After concluding the contract, DR4 pointed towards a gap between theory and practice. In theory, the contract should prepare for every future scenario, which would make every decision in the aftermath obsolete. However, in practice there will always be reasons to decide about project-related issues,

because a project of 25-30 years and of such size always induces readjustments. Both public and private parties can ask for change even after the conclusion of the project as long as it is not changing the entire scope of the project, but collaboration between both parties is necessary. The differences between the sectors were underlined through the following statements:

Table 11: Main Quote Related to Aggregation Rules

Sector	Main Quotes	Rank in Spectrum
German Waterway Sector	<i>'We generally decide, in planning absolutely' (DW1)</i>	Public Dominance
German Road Sector	<i>'About the contract content is decided in collaborative negotiations' (DR3)</i>	Collaborative
Dutch Waterway Sector	<i>'collaboration between the two parties is always necessary' (NLG2)</i>	Collaborative
Dutch Road Sector	<i>'nowadays it is more a real dialog, so they ask questions or they push us away a little bit' (NLR1)</i>	Collaborative

4.2.5 Information Rules

In spite of the actual tender process for the project, the *information rules* in the contracting arena are quite liberal throughout the four infrastructure sectors. From the public administrative perspective, DW2 mentioned that public authorities are required to deliver all necessary information in order to reduce potential risks for the contractor. In the conventional contracting procedures, this means the contractor receives information up to the detailed technical specifications that have been developed by the executive agencies, such as the WSV, beforehand. Similar propositions hold true for PPP provision models. Generally, this implies the same basis of knowledge as the public authorities have themselves in project areas that are transferred to the private party. In this respect, NLR2 referred to a 'data room', including information on aspects like the subsoil or the reference design. During the realization phase of the project, the contractor has to inform public authorities about the current status. From public side, the collaborative intention of the civil servants was underlined through the following statements:

Table 12: Main Quote Related to Information Rules

Sector	Main Quotes	Rank in Spectrum
German Waterway Sector	<i>'It is contracting law that the contractor must not have any risks that make his planning problematic' (DW2)</i>	Collaborative
German Road Sector	<i>'He gets all information. Always.'</i> (DR2)	Collaborative
Dutch Waterway Sector	<i>'more information will flow of course besides those minimum requirements' (NLW1)</i>	Collaborative
Dutch Road Sector	<i>'In the tender, we provide the party with I think about 50GB of information and I find it a lot.'</i> (NLR2)	Collaborative

4.2.6 Pay-Off Rules

Keeping the public dominance in the conventional provision model in Germany in mind, the WSV considers the form of contracting *'as something for us'* (DW1), but also the contractor benefits from a low risk profile. By delivering the detailed design, public authority largely retains accountability for the project realization. In the end, the contractor only constructs what he was told to construct. Similar attributes were mentioned for the selected PPP provision models. DR4 mentioned that the form of contracting should be structured in a way that there is a positive-sum game for all involved actors. Within the contracting arena of all four infrastructure areas, the pay-off rules follow the same,

collaborative implications. Generally, the contract should be structured in a way that all parties benefit in some way, which was supported through the following statements:

Table 13: Main Quote Related to Pay-Off Rules

Sector	Main Quotes	Rank in Spectrum
German Waterway Sector	<i>'We profit from the contract and the contractor as well' (DW1)</i>	Collaborative
German Road Sector	<i>'Surely, everyone should profit from it' (DR4)</i>	Collaborative
Dutch Waterway Sector	<i>'If you stick to that contract and everything goes well, it goes perfect for all three parties' (NLG2)</i>	Collaborative
Dutch Road Sector	<i>'I think both parties, if it is working well, both parties win and the surroundings' (NLG1)</i>	Collaborative

4.2.7 Scope Rules

In order to understand the scope rules of the contracting arena, one has to keep the control and accountability function of Flyvberg et al. (2003) in mind. Throughout the interviews and across all four infrastructure sectors, the main public interest, to set up a contract that guarantees the most economical solution incorporating price, technical and innovative considerations, was underlined. NLW1 defined the scope of infrastructure planning as a process 'where we provide maximum results for a minimum of resources'. Independent from the provision model, the interviews concluded different complexity levels for road and waterway assets, which relate to the distinct features of waterways that were in line with Hijdra et al. (2015). In both Dutch and German road infrastructure planning, the result of the project should ensure availability for the users or, as NLG1 mentioned, the road network's main purpose is to facilitate connectivity for the user from A to B. In contrast to that, Dutch and German waterway managers mentioned more complexity surrounding their infrastructure assets. Water is unmerciful, implying a different hazard class for its assets compared to the road sector. Apart from that, waterway assets fulfil a multitude of functions ranging from transport to fresh water supply and flood protection. The difference between road and waterway planning became most evident through the following statements:

Table 14: Main Quote Related to Scope Rules

Sector	Main Quotes	Rank in Spectrum
German Waterway Sector	<i>'In road construction...well, I don't want to play it down...but it has a smaller degree of complexity than water construction. Water is an unmerciful fluid' (DW2)</i>	Complex
German Road Sector	<i>,The scope is a fast and qualitative extension and provision of the highways for transport' (DR1)</i>	Simple
Dutch Waterway Sector	<i>'When you go to a lock, you have more functions to fulfil. You have to deal with shipping, you have to deal with water management, you have to deal with flood protection, you have to deal with traffic over the lock.' (NLW2)</i>	Complex
Dutch Road Sector	<i>'Road is a network. As a user, you want to be perfectly served from A to B' (NLG1)</i>	Simple

Table 15 summarizes the findings comprehensively. It becomes evident that the selected PPP sectors display similar characteristics in the IAD framework in comparison with the German waterway sector. It becomes evident that the position rules as such are not changing considerably. In all four sectors, the main actors are the executive agency as well as a contractor. In terms of the boundary rules, the

Table 15: Application of IAD Framework on Contracting Arena in Road & Waterway Infrastructure of the Netherlands and Germany

Germany		
Arenas	<i>Waterway Sector</i>	<i>Road Sector</i> ^a
Position Rules	<i>Executive Agency: Wasserstraßen- und Schifffahrtsverwaltung des Bundes (WSV)</i> - Guardian of the public interest ⁶ <i>Contractor(s):</i> - As profit-seeking organizations, contractors want to retain/extend their role in the market through a variety of strategies ⁵	<i>Executive Agency: Landesbehörde für Straßenbau und Verkehr (NLStBV)</i> - Guardian of the public interest ⁶ <i>Contractor(s):</i> - As profit-seeking organizations, contractors want to retain/extend their role in the market through a variety of strategies ⁵
Boundary Rules	<i>Executive Agency: WSV</i> - No exit scenario because of control and accountability function by law <i>Contractor(s):</i> - Several exit scenarios exist	<i>Executive Agency: NLStBV</i> - No exit scenario because of control and accountability function by law <i>Contractor(s):</i> - Several exit scenarios exist
Choice Rules	<i>Planning:</i> - WSV as executive agency <i>Design:</i> - WSV responsible for detailed design <i>Built:</i> - Contractor responsible for realization <i>Finance:</i> - Financed through public budget <i>Maintenance:</i> - WSV responsible for maintenance	<i>Planning:</i> - NLStBV as executive agency <i>Design:</i> - Contractor responsible for detailed design <i>Built:</i> - Contractor responsible for realization <i>Finance:</i> - Pre-financed through private financial institutions & partial down payment by government <i>Maintenance:</i> - Contractor responsible for maintenance for 30 years
Aggregation Rules	<i>Executive Agency: WSV</i> - Maintains strict control and accountability through detailed project specifications <i>Contractor(s):</i> Distinct decision-making power through amendments	<i>Executive Agency: NLStBV</i> - Delivers reference specifications <i>Contractor(s):</i> Freedom of decision as long as authority's specifications are fulfilled
Information Rules	<i>Executive Agency: WSV</i> - As main public authority, it is responsible for sharing necessary information ⁸ <i>Contractor(s):</i> - Delivers evidence of correct project implementation	<i>Executive Agency: NLStBV</i> - As main public authority, it is responsible for sharing necessary information ⁸ <i>Contractor(s):</i> - Delivers evidence of correct project implementation
Pay-Off Rules	<i>Executive Agency: WSV</i> - Costs and benefits depend on execution of project (e.g. financially sound, high availability) <i>Contractor(s):</i> - Costs and benefits depend on execution of project (e.g. financially sound, high rate of reimbursement)	<i>Executive Agency: NLStBV</i> - Costs and benefits depend on execution of project (e.g. financially sound, high availability) <i>Contractor(s):</i> - Costs and benefits depend on execution of project (e.g. financially sound, high rate of reimbursement)
Scope Rules	<i>Executive Agency: WSV</i> - Fulfillment of multiple purposes (transport, flood protection, water supply) <i>Contractor(s):</i> - Seeks profit through sound project execution	<i>Executive Agency: NLStBV</i> - High transport function for road users <i>Contractor(s):</i> - Seeks profit through sound project execution

Notes: ^aAs the administration of federal highways is transferred on federal-state level, the IAD is applied on the case of Lower-Saxony (Niedersachsen); Landesbehörde(n)/-ämter für Straßenbau und Verkehr [NLStBV] = State Authority for Road and Traffic; Wasserstraßen- und Schifffahrtsverwaltung [WSV] = Fairway and Shipping Administration

The Netherlands

Arena	Waterway Sector	Road Sector
Position	<i>Executive Agency: Rijkswaterstaat (RWS)</i>	<i>Executive Agency: Rijkswaterstaat (RWS)</i>
Rules	- Guardian of the public interest ⁶	- Guardian of the public interest ⁶
	<i>Contractor(s):</i>	<i>Contractor(s):</i>
	- As profit-seeking organizations, contractors want to retain/extend their role in the market through a variety of strategies ⁵	- As profit-seeking organizations, contractors want to retain/extend their role in the market through a variety of strategies ⁵
Boundary	<i>Main Public Authority: RWS</i>	<i>Main Public Authority: RWS</i>
Rules	- No exit scenario because of control and accountability function by law	- No exit scenario because of control and accountability function by law
	<i>Contractor(s):</i>	<i>Contractor(s):</i>
	- Several exit scenarios exist	- Several exit scenarios exist
Choice	<i>Planning</i>	<i>Planning</i>
Rules	- RSW as executive agency	- RSW as executive agency
	<i>Design</i>	<i>Design</i>
	- Contractor responsible for detailed design	- Contractor responsible for detailed design
	<i>Built</i>	<i>Built</i>
	- Contractor responsible for realization	- Contractor responsible for realization
	<i>Finance</i>	<i>Finance</i>
	- Pre-financed through private financial institutions and partial down payment by government	- Pre-financed through private financial institutions and partial down payment by government
	<i>Maintenance</i>	<i>Maintenance</i>
	- Contractor responsible for maintenance for 25 years	- Contractor responsible for maintenance for 25 years
Aggregation	<i>Executive Agency: RWS</i>	<i>Executive Agency: RWS</i>
Rules	- Delivers reference specifications	- Delivers reference specifications
	<i>Contractor(s):</i>	<i>Contractor(s):</i>
	- Freedom of decision as long as authority's specifications are fulfilled	- Freedom of decision as long as authority's specifications are fulfilled
Information	<i>Executive Agency: RWS</i>	<i>Executive Agency: RWS</i>
Rules	- As main public authority, it is responsible for sharing necessary information ⁸	- As main public authority, it is responsible for sharing necessary information ⁸
	<i>Contractor(s):</i>	<i>Contractor(s):</i>
	- Delivers evidence of correct project implementation	- Delivers evidence of correct project implementation
Pay-Off	<i>Executive Agency: RWS</i>	<i>Executive Agency: RWS</i>
Rules	- Cost and benefits depend on execution of project (e.g. financially sound, low demand of maintenance)	- Costs and benefits depend on execution of project (e.g. financially sound, low demand of maintenance)
	<i>Contractor(s):</i>	<i>Contractor(s):</i>
	- Costs and benefits depend on execution of project (e.g. financially sound, low demand of maintenance)	- Costs and benefits depend on execution of project (e.g. financially sound, low demand of maintenance)
Scope	<i>Main Public Authority: RWS</i>	<i>Main Public Authority: RWS</i>
Rules	- Fulfillment of multiple purposes (transport, flood protection, water supply)	- High transport function for road users
	<i>Contractor(s):</i>	<i>Contractor(s):</i>
	- Seeks profit through sound project execution	- Seeks profit through sound project execution

accountability and control functions retain the public authority in the arena. The contractor enters the arena through a successful bidding phase, while the contracts as such deliver respective exit scenarios for the contractors that can be initiated from both public and private side. In terms of information rules, the interviewees mentioned that all necessary information will be delivered to the contractor and in return, the contractor has to update the public side about the project throughout all sectors. The pay-off rules in the contracting arena are similar as well, given the fact that public authorities aim at having an asset that fulfils its function and the contractor ultimately seeks profit from the project. However, the higher project volumes of PPP projects and the involved risks need to be taken into account. To put it in NLW2's words, *'from a governmental point of view there is no difference between a DBFM contract and D&C contract, the difference the type of contract deals with is the relation between the contractor and the principle'* (NLW2). Major differences between the conventional German waterway sector and the other sectors arise in terms of the choice and aggregation rules. The IAD framework indicates that major actions such as design, finance and maintenance will shift towards the private market in the PPP sectors, which also shifts the decision-making within the arena, because the contractor will gain more freedom to develop, execute and maintain the project. Within the three sectors themselves, however, one major difference arises for the scope rules. While both German and Dutch road infrastructure sectors aim at granting a qualitative project in time and in budget that guarantees its transport function, the Dutch waterway sector has to consider other waterway functions, such as flood protection or water. This is identical to the aim of the German waterway sector and, therewith, might be a general reason for the resistance against private involvement in the waterway sectors. In order to understand the implications of private involvement in more detail, the following sections will treat advantages and disadvantages that were mentioned during the interviews.

4.3 Determining Main Concepts of Private Involvement - Describing Differences between Conventional and PPP Provision Models from Expert Perspective

In order to understand implications of private involvement, the developed interview guide further asked the experts to identify advantages and disadvantages of PPP provision models. Based on Flyvberg et al. (2003), the theory identified three determining factors for private involvement: *'Contracting'*, *'Accountability'*, and *'Finance'*, which in this section are used to structure the results of the data collection. A statement that was frequently repeated in the interviews was the inability to draw conclusions from the PPP provision models yet. NLW1 stated that *'you have to wait, because you don't know unless you have the entire contract'*, NLG1 stated that *'the whole contract is a promise'*, DR1 said that *'it has an unpredictable outcome'*, and DR4 stated that *'there is not yet a project that has been entirely assessed in economic terms'*. Respectively, the statements in this research are all based on the current status quo. The findings of Table 16 are separated into German waterway sector and the other three PPP sectors. The underlying assumption is that the arguments from the first sector are based on expectations, while the latter one are more based on observations. Regardless of their background, the experts generally mentioned similar concepts around private involvement.

The first part of this section deals with the findings of respective expert interviews regarding advantages and disadvantages of private involvement. The second part relates those findings to the theoretical assumptions of the project. Generally, the theoretical conceptualization already pointed towards the control function of public authorities, the risk allocation within the project, but also external environmental uncertainty. Apart from the theoretical findings, the interviews indicated that stakeholder complexity is another crucial factor that needs to be considered in project management of infrastructure assets. These four categories provide the basis for the third part of this section, which elaborates on the question of what needs to change for conventional projects to become PPP provision models. Following the different implementation stages that were identified by Lenferink et al. (2012), this part deals with what needs to be changed in terms of actions and decision-making to successfully structure private involvement through a focus on both internal and external factors.

4.3.1 Characteristics of Private Involvement from Expert Perspective

When turning back to theory, the patterns of the contracting arena of the German waterway regime follow the old public administration style as defined by Hague & Harrop (2007). Civil servants are conducting the majority of tasks, including the planning, detailed design as well as the later maintenance. In contrast to that, the other three covered infrastructure sectors indicated a shift of responsibilities towards the contractor. From a general perspective, interviewees mentioned internal and external characteristics of the provision models alike, and thus collected characteristics that are either directly related to the project or to its environment.

Contracting

From an external perspective, DW2 mentioned *outsourcing* as a potential benefit, because the respective infrastructure sectors are able to realize projects that would not have been possible under the lead management of public administrations only. Also, one of the biggest advantages of PPP provision models is that *'you connect the drive of the commercial organization, which is money driven, to a more societal goal'* (NLG1). Thereby, it is expected that the selected PPP models incur welfare effects through an efficient allocation of expertise. As there is a competence shift towards the private sector, public authorities need to coordinate the realization process less, therewith saving resources for their predominant tasks. From an internal, project-related perspective, Grimsey & Lewis stated that *'market competition is a form of coordination with intrinsic advantages over bureaucratic organizational forms'* (Grimsey & Lewis, 2004, p. 52). Throughout the interviews, most of the positive arguments were related to the lifecycle consideration of PPP projects and the contractor's responsibility to provide for everything in the contract. While the planning remains largely in the hands of public authorities, private parties gain essentially more freedom in the executing functions of design, built, finance and maintenance as mentioned by Leendertse et al. (2015). Through this, DW1 expects an increasing *'flexibility in contracts'* of PPP provision models, as the project can be coordinated more on demand compared to public provision models. Following his argument, less bureaucratic procedures would thereby imply an execution that is more *'flexible, faster and more on demand'*. In comparison to conventional contracts, PPP provisions have several implications for the realization of the project. As an example, *'you got all split when you have a traditional contract, you have building, you have maintenance, which is not longer than 5-6 years, and every 5-6 years you get some new contractors, which leads to a lot of problems for the availability of the infrastructure'* (NLW2). In this respect, the contractor *'is building it in the cheapest way'* (NLR2), which is related to his profit-seeking behavior. His legal accountability for the construction ends after a relatively short period of time. In economic terms, there is no incentive to invest in more durable solutions than the minimum requirements, because the contractor will not be accountable for it. Under a PPP provision model, the contractor is responsible for the realization of the project and its maintenance in the aftermath. In bundling these stages under one contract, the incentive for high quality of his design solution changes as this implies lower maintenance costs in the aftermath. Summarized under the concept *'optimization of total cost'*, the inclusion of the maintenance function can thereby be considered as guarantee for a qualitative and quick implementation that is in line with the reference specifications that are delivered by public authorities. This ambition is difficult to trigger under conventional provision models.

In terms of the internal lifecycle, German waterway managers mentioned the gap between the planning and realization of the projects as a potential drawback of PPP provision models. Under conventional procedures, this is handled through detailed design, close supervision of construction and maintenance by the executive agencies. Under PPP provision, the gap between planning and realization indeed occurs, but is usually covered by a complex procurement process, preceding the project implementation. Even though they acknowledge potential benefits during realization and operation, new forms of expertise, such as contract managers, lawyers and capital managers, are necessary in the procurement phase to ensure a success of the project. This is rated as one of the expected disadvantages mentioned by German waterway managers. However, from a lifecycle perspective, DR4 and other interviewees from the PPP sectors observed that this finding is balanced

by fewer procurement procedures in the operation phase and therewith should rather be considered beneficial. Apart from that, two other gaps in implementation are closed, one between the design and construction phases, the other between the construction and maintenance phases. After the conclusion, the contractor is legally responsible for the project. Given the duration of the contract, another aspect that is yet to be determined is the end of the contract. In the current stage of the selected PPP contracts, the incentives of the contractors are high, because they are still responsible for the project maintenance. However, NLR2 mentioned that it is a general problem of contracts that the private party has no incentive to invest in the tail of the contract, which is yet to be assessed and could evolve into a potential disadvantage of PPP provision models. What becomes evident is that the transfers of responsibility from public authority towards private party and vice versa are imposing challenges throughout the different forms of provision models.

Depending on the degree of private involvement, NLG1 mentioned that banks might take a control function for the quality of the project, if the PPP provision model covers private capital as well. As their reimbursement is based on distinct quality measures of the project, the banks observe compliance closely.

In stark contrast to the advantages of less bureaucracy that were mentioned by German waterway managers, Dutch infrastructure managers experienced the flexibility of contracts as disadvantage, because contracting impedes such flexibility from the lifecycle perspective. As main services of the infrastructure project are contracted out to one party for the next 30 years, a lock-in situation arises as the public authority has a fixed contract with this party. Specifications about obligations of the contractor are determined at the start of the contract, but might prevent from adaptation to future scenarios. NLW1 mentioned that *'whenever you have a change in mind after the contract is awarded, [...] the contractor will say that it will have an effect for the next 30 years'* (NLW1) and respectively charge for the service. This will usually lead to a situation in which an amendment forces the principal to pay both the original function *'for the total life-time'* and the change to the project in addition. This is in contrast to conventional contracts as the ownership of the project is transferred back to the principal. In case of a change, it can simply be procured through a new tender.

Accountability

The transfer of several obligations towards the market was mentioned as an advantage as it might *'help to increase accountability'* (Flyvberg et al., 2003, p. 104). Under conventional provision models, the high degree of governmental involvement ensures their accountability. After the detailed plan-making of public authorities and the transfer of the asset after the construction, the executive agency also follows a close supervision of the contractor's construction. DW2 thereby distinguished between the building supervision and physical construction supervision. The disadvantage is their close interrelation. A PPP provision model transfers the latter one to the private sector, while the building supervision must remain state obligation. This in turn raises issues concerning the accountability in case of failure. The more of the physical construction supervision is transferred to profit-seeking parties that might face losses from breaching the same, the higher the risk of omissions that affect the general security and order function that is retained by public authorities. In this respect, DW2 referred to the advantage of engaging a civil servant, who is not convicted of any profit-seeking behaviour, which results in a more rational decision-making behaviour. A mentioned example is a more rational decision on a shutdown of a construction site. However, due to today's changing business environment, public authorities increasingly face amendments after the conclusion of the contract. A common point of amendments under conventional contracts relates to the detailed designs of projects. Because contractors deliver detailed designs and are responsible for the maintenance under PPP provision, a large amount of amendments can be superseded. Respectively, accountability is increased as the party constructing the asset is also responsible for the design and its later maintenance. Given the long lifecycle of the project, the *'only disadvantage is the dubiety and uncertainty, if everything works out as you have planned, contracted and wished including the transfer'* (DR1). However, the future project environment is not predictable and the contract between both parties is concluded at the very start of the project. A disadvantage of this strategy is that a stable environment is required for

PPP provision models. Otherwise, you need *'to pay for it and therefore it is very inflexible during that period'* (NLW2). With continuously changing society and politics, such as smart mobility and sustainability, it becomes questionable whether a DBFM contract is flexible enough to account for such changes. Another controversial topic for accountability is the complex web of subcontracts on private side. NLR1 mentioned that *'contracts are complex; they contract work and risks away'* (NLR1). This becomes especially visible in case of amendments as stakeholders focus on dividing the problem based on their separate contracts rather than optimizing in cooperation with all involved parties.

In terms of accountability, the public authority's control function is not only focusing on this project. As stated in the theoretical conceptualization, public authorities also act as a *network manager* in infrastructure. During the interviews, NLG1 and NLW1 mentioned the integration of assets that need to be aligned. Pointing towards the PPP provision models, both interview partners assumed that the higher degree of freedom for private design solutions will cause a fragmentation of the system, which impedes *'the action and coordination between those parts within the network'* (NLG1). During the period of the contract, this does not become as much of a problem, because the contractor has to operate the asset and is held accountable for it. However, after the termination of the contract, the ownership of assets is transferred back to the principal, which then has to deal with a *'network which is not aligned really well'* (NLW1). This, respectively, is raising doubts on whether private involvement increases accountability.

In terms of accountability, a general point of attention is the transfer of labour from the public to the private sector. Several interviewees welcomed the transfer, because it implies decreasing labour demand in public authorities and a preceding reduction of labour force within the public sector. However, these personnel cutbacks might cause a loss in expertise within authorities, which always need to maintain a degree of understanding of the project specifications in turn.

Finance

Flyvberg et al. (2003) further mentioned the interest for private capital for financing infrastructure. The advantage of this approach is that infrastructure projects can still be realized if states face times with low public budget. In contrast to that, the state would pay back the private investor off-balance during contracting period. In the selected PPP provision models, parts of the investments must be financed by the private sector at project start. The role of the banks and other financial institutions is related to the large initial investment costs and their position as a lender, which was also mentioned by Grimsey & Lewis (2004). Banks negotiate their own terms and conditions with the contractor and therewith take over a control function next to public authorities. They participate for financial reasons or, as NLR1 mentioned, *'they don't care about infrastructure, they care about money'*. What some considered negatively, others regarded as benefit, because the banks are *'really doing due diligence on the contract, meaning they check everything'* (NLR2). In that, their investment strategy in infrastructure projects is risk-averse, meaning that they try to prevent from taking risks as much as possible. As mentioned before, innovation goes hand in hand with increased risks as it might cause failure, while raising opportunities for efficiency gains. Generally, NLW1 mentioned that the learning curve of public authorities stagnates, because they are *'dependent on the people within this single group and this single group is obviously copying their own ideas, inspiring each other, but it's a small group'* (NLW1). Through private involvement, *'you can combine your knowledge with the knowledge of the private party'* (NLR1). With a larger pool of ideas, it is easier to optimize around the project, because *'you get your learning curve steeper and you push for innovation'* (NLW1). Keeping this in mind, the role of the bank is controversial because *'one could say that the government is conservative in designing and developing stuff, but banks are even way more conservative than we are'*, therewith preventing from innovation.

Table 16: Research Findings in Relationship to IAD Framework (Ostrom, 2011) and Experiences from Private Involvement (Flyberg et al., 2003)

	Contracting <i>(Private side provides for everything)</i>		Accountability <i>(Does it help to increase accountability)</i>		Finance <i>(Interest for private capital)</i>	
	German Waterway	Three PPP Sectors	German Waterway	Three PPP Sectors	German Waterway	Three PPP Sectors
Choice Rules <i>(What actions do they take?)</i>	<p><u>Pro:</u></p> <ul style="list-style-type: none"> - Outsourcing as potential benefit <p><u>Contra:</u></p> <ul style="list-style-type: none"> - Less control by public authority - Gap between planning and realization 	<p><u>Pro:</u></p> <ul style="list-style-type: none"> - Optimization total costs of ownership - Quick and qualitative realization - Role of bank as controller <p><u>Contra:</u></p> <ul style="list-style-type: none"> - Tail of contracts 	<p><u>Pro:</u></p> <ul style="list-style-type: none"> - Less amendments - Contractors deliver detailed design and maintain <p><u>Contra:</u></p> <ul style="list-style-type: none"> - Close interrelation between building and construction supervision 	<p><u>Pro:</u></p> <ul style="list-style-type: none"> - Complex web of subcontracts 	<p><u>Pro:</u></p> <ul style="list-style-type: none"> - 'F' in contract: realization of projects with low public budget <p><u>Contra:</u></p>	<p><u>Pro:</u></p> <ul style="list-style-type: none"> - Contractors as innovator - Banks as contract manager & investor <p><u>Contra:</u></p> <ul style="list-style-type: none"> - Banks as lender and opponent of innovation
Aggregation Rules <i>(How are decisions being made?)</i>	<p><u>Pro:</u></p> <ul style="list-style-type: none"> - Flexibility in contracts (less bureaucracy) <p><u>Contra:</u></p> <ul style="list-style-type: none"> - Complex procurement 	<p><u>Pro:</u></p> <ul style="list-style-type: none"> - Connection Commercial drive to public goal - Shift of project-related parts to market <p><u>Contra:</u></p> <ul style="list-style-type: none"> - Flexibility of contracts (Lock-in) 	<p><u>Pro:</u></p> <ul style="list-style-type: none"> - Losing labor expertise in public authorities <p><u>Contra:</u></p> <ul style="list-style-type: none"> - Role of public authority as network manager - Loss of expertise in public authority - Uncertainty of project success 	<p><u>Pro:</u></p> <ul style="list-style-type: none"> - Macroeconomic labor implications <p><u>Contra:</u></p> <ul style="list-style-type: none"> - Role of public authority as network manager - Loss of expertise in public authority - Uncertainty of project success 	<p><u>Pro:</u></p> <ul style="list-style-type: none"> - Reimbursement by PA for qualitative realization and operation <p><u>Contra:</u></p>	

The second point is the *reimbursement during the operation phase* of the project, which is set in the contract. The contractor invests capital in form of loans from banks in the project. The contract includes a defined reimbursement from principal to the agent, which is usually paid on a monthly basis. The requirements for the payment are specified in the contracts respectively. Given the large investment volumes that major projects in infrastructure imply, both the Ministry of Finance but also other institutions such as the Court of Auditors are usually interested in an economical execution and evaluation of the project. As the whole idea of PPP provision models is based on the lifecycle consideration, economic assessment of the PPP project is conducted regularly by the auditing authorities over the period of time, which is not always the case for conventional infrastructure projects, according to DR2.

4.3.2 *Dealing with Internal and External Complexity – Where do I Start as Expert?*

The choice and aggregation rules have been identified as implicitly different for conventional and PPP provision models. The underlying notion is that actions and decision-making largely influence the treatment for all the categories and the degree of private involvement respectively. The PPP model implies a more integrated approach between public authorities and the contractor on both scales. With respect to private involvement, four key categories became apparent throughout the entire research process. Displayed in Table 17, external environmental influences, control of authority, risk allocation and stakeholder complexity were identified. With respect to stakeholder complexity, the special role of banks was mentioned, which is the reason for allocating an individual color scheme to the ‘shadow of the banks’. The following section will assess these categories more thoroughly.

Table 17: *Categories, their Origins and Color Scheme*

Category	Argument for Category	Color Scheme in Table 16
External Environment	- Theory: Duit & Galaz (2008)	Green
Control of authority	- Theory: Flyvberg et al (2003)	Yellow
Risk Allocation	- Theory: Grimsey & Lewis (2004)	Blue
Stakeholder Complexity	- Identification in Interviews	Red
- Shadow of Banks	- Identification in Interviews	Black

External Environment

In terms of the external dimension, DR1 mentioned that a disadvantage of PPP provision models is the uncertainty of project success. Underlying reason for this is that the terms of reference of the project are concluded in the beginning, but reckon for upcoming decades, while the project environment is not predictable in the long run. As NLW1 mentioned, ‘*society is not stopping there*’, because new initiatives or necessities, such as smart mobility or sustainability alter future desires. However, PPP provision models need a stable environment as you need ‘*to pay for [change] and therefore it is very inflexible during that period*’ (NLW2). The question is whether a PPP contract is flexible enough to account for such change. In terms of actions and decision-making, macroeconomic labour implications were considered as potentially beneficial for the PPP project execution throughout the interviews. In the theoretical conceptualization, Hague & Harrop (2007) were quoted to point towards different employment strategies of public authorities and private sector, with the latter one delivering more discretion for decision-making towards managers, which inevitably increases the overall accountability for project execution. Moreover, several interviewees mentioned a general trend of reducing labor force within public institutions on both German and Dutch side, which further underlines the benefits of more private involvement.

Control Function of Public Authority

The negative implications of PPP provision models mainly relate to the supervision of the project as well as the accountability for these processes. Again, two different dimensions need to be considered. From an external perspective, the interviews underlined the importance of public authority's core function as network manager, which is following the distinction of Grimsey & Lewis (2004) mentioned before. What followed a clear principal-agent relationship between the public authority and the contractor under conventional provision models, becomes a more integrative approach under PPP provision. Due to the freedom of design, each PPP project follows unique patterns, making an alignment of PPP infrastructure projects into the general infrastructure network difficult. While the public authorities maintain their control function through the monthly reimbursement during the contracting period, the actual problem arises at the end of the contract, when the non-aligned asset is transferred back to public authorities. According to DR4, neither every infrastructure project, nor the entire network, is therewith feasible as a PPP provision model.

The question is what needs to change to maintain the control function of authorities under PPP provision models. A focal point is the recognition of the difference between conventional and service contract of PPP provision, as both imply different mindsets in the public authorities and the private sector. Arguing from the IAD framework, the service contract or 'surface' contract implies that public authorities only develop reference specifications for the project. Such specifications imply a more conceptual mindset that clearly defines the desired outcome of the project from public perspective. In line with this, German waterway managers mentioned an arising gap between planning and realization as potential drawback of PPP provision models. Clearly defined reference specifications are the tool to close this gap as the contractor will know exactly what actions he has to perform. Decisions about the preparation and implementation of detailed designs, maintenance and finance are then largely transferred to the private sector, which in its entirety demands new capacities on private side. Following DR3, those capacities can be made available by the contractor. From a labour perspective, the loss of expertise in public authorities in project execution was criticized throughout the interviews, while the interviewees also stated the need for reorientation towards new provision models due to the aforementioned general cuts in labour force of public authorities.

In terms of the complexity of the procurement process, several contradicting arguments were mentioned during the interviews. Given higher capital volumes and longer contract periods, several interviewees criticized the complex procurement, while others mentioned the advantages of one procurement procedure at the project start.

Risk Allocation

As stated in theoretical conceptualization, several risks enlance infrastructure projects. Risk allocation thereby relates to Miraftab, stating that *'the current neoliberal perspective expects the private sector to pursue, more effectively and efficiently, the development of infrastructure and the provision of public services, while the state monitors'* (Miraftab, 2004, p. 93). Most of the statements in this category deal with the benefits of contracting and the prospects of increased accountability. PPP provision models shift project-related tasks and decisions towards the contractor. Also, the detailed plan-making of the project is shifted mostly to the contractor's side, leaving the authorities with the need to deliver a reference plan or shadow design only, while the contractor has to develop the detailed design. Due to this, two concurrent factors arise. Firstly, the contractor wants to realize the project quickly, because this way, his reimbursement will start earlier. Thereby, the shift of several planning stages and related lifecycle consideration will encourage the contractor to innovate and optimize around his total costs of ownership. His ambition for a high-quality construction plan is higher in the beginning, because he will face lower maintenance costs in the future and therewith, in terms of total costs, will receive higher mark-ups from his project. Secondly, the contractor is held accountable for the project. For public authorities, this implies less amendments and *'in case that a design solution is not working, you just point to the contractor [...], so you are responsible, so you fix it and you pay for it'* (NLW1). However, one needs to mention that *'private parties can take risks up to a certain extent'* (NLR2). As

an example, DR2 mentioned the German concession model ‘A-Modell’, which was established during 2008’s financial crisis. Based on a traffic-dependent reimbursement, the project was soon facing financial issues, due to decreasing traffic volumes for the project. Generally, such external risks are difficult to handle for the private side, which encouraged the development of the V-Modell that reallocates the external risk back to the public side.

The risk allocation thereby refers to the form of reimbursement for the contractor, which is paid on a monthly basis by public authorities. The difference between both forms of PPP provision is the criteria for reimbursement. With an availability model, this risk remains on public side. Rather than depending on traffic volumes, the contractor has to ensure the availability of its asset in qualitative terms. Both forms of reimbursement have in common that the payment rate is reduced in case that the execution of the project does not comply with the specifications in the contract. Another idea is that, as the rate of reimbursement is fixed in the contract, the contractor can further optimize his processes within the project to ensure higher profitability.

Stakeholder Complexity

The internal complexity is simultaneously influenced by the increased collaborative characteristics. Keeping the selected PPP infrastructure assets of this research project in mind, they force contractors to form consortia and to take risks that they cannot bear alone. Following NLR1, the only way to do so is the segregation of duties among more contractors, which will make the structure only more inflexible. The complexity of contracts is based on increased collaboration of both actions and decision-making within PPP provision models. During the interviews, expectations of German waterway managers and observations of the other sectors diverged. The underlying reason is the existence of two different perspectives on the project. In line with Hague & Harrop (2007), German waterway managers referred to the freedom of choice on contractor’s side that would decrease bureaucratic structures within the project itself. In contrast to this, critiques relate more to the external dimension around such contracts. As the contract is concluded for upcoming decades, changes outside of the contract are difficult to implement in the future. The project is already paid for its future functions and costs for changes will only be incurred on top of this. From an internal perspective, interviewees mentioned the web of subcontractors as being detrimental to PPP infrastructure provision.

The provision models in this project, DBFM, V-Modell and A-Modell, all include a partial funding through private capital. Given the large investment volume, necessary capital is delivered by financial institutions, therewith adding another group of actors to the private sector, the banks. Summarized under the category ‘Shadow of Banks’, a mixed picture of this actor arose during the interviews. From public perspective, the original advantage was the ability to realize infrastructure projects with low public budget. Additionally, PPP provision granted the opportunity to share the control function of the public authorities with financial institutions. However, while NLG2 stated the advantages of the bank’s ‘*due diligence on the contract in terms of risk evaluations*’, NLW1 and NLR1 convicted the banks of not fulfilling their control obligations. Following their argumentation, financial institutions have no incentive to guarantee quality, because they assign the risks towards the contractor. As general motive, financial institutions aim at having as much certainty as possible on their return on investment in infrastructure. Implying a low risk profile, ‘*the idea of pushing technology and innovations and steepening the learning curve is also held back by the financial institutions behind it*’ (NLW1).

As already stated, the IAD framework identified that the choice and aggregation rules or actions and decision-making significantly differ between the selected conventional and PPP provision models. Table 18 formulates ‘*points of considerations*’ for practitioners that plan or consider the realization of projects under a PPP scheme. The points are based on the findings from the four categories of this section. The next section elaborates on the ‘points of considerations’ and transfers them to the example of the navigation lock in Scharnebeck. Basis for this consideration are the choice and aggregation rules of the IAD framework that were comparatively different for conventional and PPP

provision models. The section will also evaluate what has to change in the model for a successful project realization.

Table 18: Points of Consideration for PPP Provision Models from Research Findings

<i>Determined Categories</i>	Points of Consideration
<i>External Environment</i>	- Diminish complexity around the project
<i>Control Function of Public Authority</i>	- Clear definition of project result(s) - Determination of core & non-core function(s) of project
<i>Risk Allocation</i>	- Guarantee compliance of project with desired core function(s) - Ensure accountability of contractors for non-core service(s)
<i>Stakeholder Complexity</i>	- Keep complexity of stakeholder low during implementation and realization - Evaluate implications of the ‘Shadow of Banks’ for project

4.4 A Dutch DBFM Contract for German’s Navigation Lock in Scharnebeck? – What Needs to Be Changed?

This chapter turns back to the original problem statement of the navigation lock in Scharnebeck. Together with information from German waterway managers, the option of private involvement for the given project is evaluated. Before starting the application of the research findings, the openness of infrastructure sectors was measured. Following Matos-Castaño & Mahalingam, there are *‘two factors that can be used as predictors of the direction of institutional change: a long-term orientation towards institutional change and a willingness to learn and modify institutions’* (Matos-Castaño & Mahalingam, 2014, p. 47). The German waterway sector considered itself more reluctant to change. Nevertheless, when talking about the success of their project, the sector raised doubts about the success of their current working procedures. DW2 stated that they are forced to slowly reconsider their conventional contracting system. Current issues and problems of the German waterway sector leading to such reconsiderations are summarized in the following section. Together with the ‘points of consideration’ from the previous section, the required change in the institutional setting as well as the feasibility is evaluated.

4.4.1 Problems in Current German Waterway Management and Concerns towards Private Involvement

During the interviews with the German waterway managers, two general concerns about the private provision of infrastructure were identified. First of all, the aging of infrastructure was issued. Many German waterway assets reached an age between 70 and 80 years. This is in line with what Hijdra et al. (2014) concluded for the Dutch case, that *‘major reinvestment is needed in order to maintain the transportation function of these waterways’*. This statement was also confirmed by DW2, who mentioned that the maintenance and lifespan of waterway assets are issues that have not really been accounted for in the last 20 to 30 years. Together, the maintenance of all waterway assets increases the number of projects that have to be processed by the executive agency, which is challenging their work capacities. A current issue with the working practices in the WSV is that the detailed technical specifications by governmental agencies give incentives for consortia to search for legal reasons to invoke amendments in a way that will benefit the profit-seeking behavior of the market party in the current contracting arena in German waterway planning. DW2 referred to situations in which public authorities were *‘overwhelmed by legal arguments of the consortia and their legal advisories’*, incurring re-planning, interruption of construction work and payments of amendments.

Keeping those circumstances in mind, DW2 raises doubts on whether the conventional form is the most forward-looking alternative for the future and is cheaper than PPP provision models, because these amendment procedures and conflicts consume work force within the authority. Following DW2, a solution could be to find a way to involve the contractors in a different way, right from the beginning, to eliminate the legal basis for such amendments procedures. From a theoretical point of view, such a changing provision model is feasible, but DW2 also mentioned that the real challenge is maintaining the security and control function of the public agency. DW2 stated that the advantage must be that there is no disadvantage in terms of quality. DW1 is in doubt whether this ensures the quality of the project, if public authorities ‘cannot entirely ensure their control function anymore’ (DW1). Thereby, the source of discontent is ‘the gap between plan-making and realization’ (DW1). Within the agency, there is doubt whether the private implementation would ensure the desired functionality of the asset in the aftermath, including its operation phase.

4.4.2 Application of Findings to Navigation Lock in Scharnebeck

Following the research process of this project, the main question is to identify the necessary changes for an implementation of a PPP provision model in the planning process of the German navigation lock. In order to evaluate a Dutch DBFM contract against the background of the navigation lock in Scharnebeck, the upcoming section will cover the different phases between the preparation and implementation of the project: Planning, design, built, finance, and maintenance. The projection is

Table 19: Necessary Change in Terms of Choice & Aggregation Rules from IAD Framework (Ostrom, 2011)

Navigation Lock in Scharnebeck		
	<i>Conventional Status Quo</i>	<i>Prospective PPP Provision</i>
<i>Choice Rules</i>	<i>Planning:</i> - WSV as executive agency	<i>Planning:</i> - WSV as executive agency
	<i>Design:</i> - WSV responsible for detailed design	<i>Design:</i> - Contractor responsible for detailed design
	<i>Built:</i> - Contractor responsible for realization	<i>Built:</i> - Contractor responsible for realization
	<i>Finance:</i> - Financed through public budget	<i>Finance:</i> -Reimbursement through government
	<i>Maintenance:</i> - WSV responsible for maintenance	<i>Maintenance:</i> - Contractor responsible for maintenance for 30 years
<i>Aggregation Rules</i>	<i>Executive Agency:</i> - Maintains strict control and accountability through detailed project specifications	<i>Executive Agency: WSV</i> - Delivers reference specifications
	<i>Contractor(s):</i> - Distinct decision-making through amendments	<i>Contractor(s):</i> - Freedom of decision as long as authority’s specifications are fulfilled

displayed in Table 19. The Dutch waterway sector implemented PPP provision models, while the German counterpart is more resistant. Apart from being located in two different national systems, two further differences arise. First of all, German road and waterway planning is located on two different administrative levels, while the Dutch sectors are administered on the same national level. The Dutch system goes even further in that both the management of roads and waterways is located in the same executive agency ‘Rijkswaterstaat’ as indicated in the choice rules of the Dutch IAD frameworks. In

this respect, NLW1, NLW2 and NLG2 referred to spillover effects from the Dutch road sector towards the Dutch waterway sector. The scope rules or results of infrastructure planning in the IAD framework underlined different degrees of complexity for road and waterway actors, but NLG2 mentioned that, apart from technical specifications, *'the principles of a DBFM contract in road and waterway are the same'* (NLG2). In the German case, increased institutional distance hampers synergetic effects.

Comparable to the selected PPP provision models, the *planning* process for the navigation lock in Scharnebeck remains in public authority's hand, more specifically, in the hand of the WSV. The role as network manager is a state authority's task by law. The WSV will also remain the principal agency for determining the most appropriate provision model for its waterway assets, together with the preparation of the tender and bidding process. In contrast to conventional provision models, the initial procurement process for PPP provision models is more complex, as it does not only cover the construction, but also the detailed design and the maintenance for a long period of time. DR4 stated that he *'would not recommend to implement every project as a PPP, but only the ones that ask for high reliability and traffic volumes'*. In line with that, two factors favoring a PPP project come in mind for the navigation lock. First of all, the proximity to the harbor of Hamburg and therewith its role as facilitator for the hinterland traffic of one of the busiest ports in Europe and respective transport volumes has to be emphasized. Secondly, the reliability that is necessary for the accessibility of the Elbe Lateral Canal. Given the breakdown time of the neighboring ship lift that was mentioned in the problem statement, these can be considered as arguments that favor considerations of PPP provision models. Furthermore, NLW2 mentioned that a highly innovative construction should never be done via a PPP contract. It therefore has to be identified what innovative degree really is at stake in the case of the navigation lock. Generally, NLW2 said that *'if you can build a navigation lock of e.g. 30 meters, you can also construct one that is 10 meters higher in a DBFM contract'* (NLW2). For the WSV this implies more labor resources and longer preparation periods at project start, which is said to pay off in both respects in the realization and operation phases. The environment around infrastructure projects is complex anyway. For a successful PPP provision model, a stable environment is important, given the duration of the contract. Public authorities need to be able to reduce the complexity around the project. In reference to Table 19, this stage of the realization process is the most crucial one for the public authorities under a PPP provision model, because most of the *'points of consideration'* resulting from the previous section need to be reflected at this early stage. The contract is fixed for around 25-30 years, while the uncertain project environment in the future challenges PPP provision models. Because of this, the WSV already needs to be clear about the project functions and the ultimate goal of the project before the conclusion of the contract. However, the goals are mainly treated as reference that determines the project boundaries for the contractor. Following NLW2, such specifications need a different mindset within public authorities, which is more conceptual, leaving room for the private sector to use their *'great deal of creative innovative potential'* (de Jong, 2008, p. 318). The transfer of project-related parts makes the reference specifications of public authority crucial for the project success. As this is the basic information that is delivered to the contractor, public authorities need to be really clear about the definition of the project results, including feasibility and functions, because *'if you as a principal don't know, if there is a technical solution for the problem that you are asking or for the function that it has to fulfill, then a DBFM is extremely dangerous'* (NLW2). Underlying reason is that if pressing issues from outside the project force changes to the contract, these become difficult to implement due to the transfer of project-related parts towards the private sector and the related inflexibility in contractual arrangements.

As indicated, the *detailed design* shifts to the contractor, which is one of the most radical changes for the conservative waterway authority. Keeping the gap between planning and realization in mind, the solution the clear definition of the reference specifications. Located in the planning phase, public authorities have the possibility to determine what NLR2 called the size of the 'D' in PPP provision models. From theory, this relates to the distinction between core and non-core services by Grimsey & Lewis (2004), with the former being state responsibility and the latter leaving room for private involvement. Public authorities need to distinguish between services on an individual, project-related basis, which requires an experienced public authority for the conceptualization. From a conceptual point of view, DW1 abstracted PPP provision models with *'standardization'* and concluded that this

approach might be a solution. Public authorities deliver standard assemblies for the core functions of waterway assets and leave freedom of design to non-core services. ‘Standardization’ together with a PPP provision model give authorities a distinct degree of control of sensitive features of waterway assets, while delivering freedom for the private sector to design non-core functions. Keeping the aforementioned amendment procedures to conventional contracts in mind, the transfer of design responsibilities towards the private side comes along with a similar shift in risks and accountability.

The *building* stage remains in private hands as the construction contractor in collaboration with its subcontractors from the consortia will be responsible for realization. DW2 mentioned that the advantage of PPP provision models must be of equal or better quality compared to conventional procedures, which together with a quick project realization was generally confirmed by the observations of the PPP sectors.

In terms of *finance*, the controversial issue relating to the ‘Shadow of Banks’ was invalidated by DW2, who mentioned that there currently is no public budget deficit in Germany and therewith no serious demand for external finance in Germany’s waterway sector. Apart from the financing scheme, the reimbursement of PPP provision models, however, incurs benefits for public authorities. In comparison to conventional procedures, it establishes a control measure for public authorities during the entire contracting period. Thereby, the calculation for waterway assets becomes much more complex, because they are not only fulfilling transport functions, like their peers in road infrastructure, but also social functions, such as fresh water supply and flood protection. If a specified function is not fulfilled under a PPP provision model, you can point towards the contractor and reduce his reimbursement for that period respectively.

In terms of *maintenance*, the contractor becomes the responsible actor, which, in line with the detailed design, becomes one of the major changes for the WSV. As mentioned earlier, the transfer of the ‘M’ is an argument for PPP provision models as it closes the lifecycle consideration. In the light of optimization of total cost, the contractor’s ambition to deliver quality will change, because he will also be responsible for maintaining its construction for a determined period of time. Change management in the future becomes a crucial issue for successful PPP provision models. Based on this, NLW1 referred to the Dutch court of auditors, which determined several changes in Dutch DBM contracts. This diminishes their financial advantage over conventional provision models. However, following NLR2, the tail of the contract has to be considered thoroughly, as the contractor will lose the incentive to invest in the tail of the contract and therewith has to be controlled by the WSV again.

As a concluding remark, NLG1 emphasized that, for the *detailed design, construction and maintenance*, a transfer of competences really has to take place and the public authority has to build a trust relationship with the contractor. Such trust is not emerging automatically, but trust building has to come from the private side as well. The close control function of public authorities need to change, which was indirectly underlined by NLG2 as well, who mentioned that ‘*we have some older types of contracts, where we also had some strict relationship with the contractors, which was not beneficial for both parties*’ (NLG2). For the WSV, the main change in project management is that, while in conventional provision models changes to the environment are simply tendered as new projects, potential changes need to be covered as much as possible in the reference specifications of PPP projects already.

When turning back to the original question of risking more private involvement through a Dutch DBFM contract for the navigation lock in Scharnebeck, the clear answer is ‘No’. Even though this research project underlined the advantages in terms of internal project management of infrastructure assets through increasing private involvement, major concerns in terms of the control function of public authority arise. Inflexibility of the project contract, the role of external financiers, risks of non-aligned networks, and uncertain future scenarios all pose challenges on executive agencies, even those that are already experienced in the selected PPP provision models. A different, more conceptual mind-set is necessary in public authorities to entangle these problems better. A process that cannot be changed overnight, but expects a continuous institutional change. During the interviews, German

waterway managers hold out the prospects of realizing the navigation lock in Scharnebeck under a conventional provision scheme. Still the question remains whether this is the most appropriate solution today. The 'No' to DBFM contracts is thereby not meant to discourage considerations around private involvement in infrastructure planning. Based on Grimsey & Lewis (2004), Figure 3 provided a continuum of different PPP provision models. Keeping the current problems of the neighbouring ship lift but also increasing amendment procedures and large tailbacks in maintenance in mind, transfers of project-related responsibilities towards the market can enhance the setting significantly. This section gave indications for practitioners what has to be considered in terms of actions and decision-making, when increasing the involvement of private actors. As DW2 currently sees no pressure from the political side, an objective evaluation of the 'degree of private involvement' possible.

5 Conclusion

Historically, waterways in Germany and the Netherlands have contributed considerably to the national infrastructure sectors, while simultaneously fulfilling more societal functions, such as fresh water supply for citizens. To account for the diversifying interests surrounding the treatment of water, infrastructure planning with its different stages from agenda-setting to implementation involves a multitude of different actors. Ranging from politicians, community action groups and citizens in the early planning stages up to public authorities and contractors in the implementation and realization stage, its conventional provision is usually described by a predominant role of governmental authorities. Up to today, Germany's waterway planning regime is largely following such a conventional approach, but at some points facing difficulties in the maintenance of its assets. In the Netherlands, however, a recent shift towards a more privatized provision of waterway assets occurred. Summarized as PPP provision models, several project-related parts are contracted towards the market. The underlying argument is that, due to the lifecycle consideration the contractor's ambitions for a correct implementation increase, because he is held accountable for his construction for a long period of time, which in turn is considered beneficial for the whole waterway sector. Following Flyvberg et al. (2003), experiences of private involvement mainly deviates from conventional provision models in terms of contracting, accountability, and the interest for private capital. In order to analyze the arguments behind private involvement, this research project selected representative cases from both waterway and road infrastructure to understand characteristics of private involvement in infrastructure in general. Starting with the navigation lock in Scharnebeck as conventional project, comparable PPP provision models from the other three infrastructure sectors were selected respectively.

Following Grimsey & Lewis (2004), two statements summarized the beneficial characteristics of private involvement. Relating to advantages of market competition over bureaucratic organizational forms and greater efficiency for infrastructure provision, the findings of this research project indicated that the beneficial assumptions are only partially true. Important in this respect is the distinction between internal and external factors. Internally, market mechanisms imply better allocation of risks towards the actors that can be considered more efficient in project execution. All interviews on PPP provision models, mentioned the high quality and fast implementation. However, the contracting of projects indicates major concerns regarding the control function of public authorities. Adaptability to future scenarios that fall outside of the contract will always incur additional pressure to public authorities. In dealing with a fragmented network in the future, diminishing incentive of contractors to invest in the tail of contracts as well as ensuring flexibility of contracts to future scenarios, such as climate change, raise doubts on whether the private involvement is the most appropriate instrument in today's environment.

When turning back to the initial question of transferring a DBFM contract to the case of the navigation lock in Scharnebeck, the clear answer is 'No'. During the interviews, inflexibility of the contracts in future and the role of the banks as partial financier were mentioned as major concerns not only in the DBFM. Nevertheless, this should not imply a general rejection of private involvement. Implications of risk allocation can significantly alter the current problems, such as excessive amendments to the project from private side or tailbacks in the maintenance of current infrastructure that were mentioned by German waterway managers. However, to implement successful PPP provision models, practitioners in the field need to consider a variety of aspects beforehand. First of all, the external, environmental complexity has to be diminished to reduce the inflexibility of PPP contracts with regard to future events. Secondly, the control function of public authorities' changes, as non-core services of the project are transferred towards the market. Together, this leads to the requirement of a clear definition of project results, which needs to be specified by the public authorities before the implementation. This definition must comply with public authorities' core functions, such as its role as network provider. As project risks are transferred towards the private sector, the accountability of them must be ensured in the contractual arrangement. The contractor will usually form complex consortia, but public authorities need to consider ways to keep the number of stakeholders small, because they form subcontracts, which in the end only contribute to the inflexibility of PPP provision

models. Especially, the role of private financiers like banks has to be evaluated carefully. All of these factors must be considered for the contract in the strategic planning stage of the project implementation phase. After the conclusion of the contract negotiations, changes become very expensive and should be avoided by all means. This finding underlines the importance of a clear requirements specification as part of the contract. Essential for the provision of infrastructure is the contract between the public and private side in the project preparation and implementation phase, which always needs to be evaluated on an individual basis, because *'PPP provision models are not a panacea'* (DR4).

The analysis of the IAD framework identified that, in terms of the institutional background, the actions and decision-making considerably differ in conventional and PPP infrastructure provision and respectively expect a careful reconsideration of civil servants in public authorities. The key instrument is the project specifications that are delivered by the authorities. The PPP provision model is a 'surface' contract, meaning that only the desired results have to be defined by authorities, while the project-related execution, such as detailed design, construction and maintenance, is entirely shifted towards the contractor. In contrast to conventional provision models, this demands a different, more conceptual mindset in public authorities, such as the WSV. The clear definition of a requirements specification is of utmost importance as *'otherwise you get a solution that you don't want'* (NLW2). The requirements specification remains the major instrument in terms of control function of public authorities. It therefore needs to comply with the aforementioned points of consideration. However, given a long-lasting routine in the waterway agency the question of how to structure such a policy change remains unanswered. Stone conducted research on the translation of policy. This research project can be considered as basis for such a transfer, because *'important forces behind policy change, innovation and reform originate from outside the state'* (Stone, 2012, p. 490). Doubts in the waterway authority were related to its quality requirements and role as supervisor of the waterway network.

In relation to theory, the research project expected a positive assessment of private involvement. Both Flyvberg et al. (2003) and Grimsey & Lewis (2004) provided a deliberate picture on the positive implications of private involvement. During the interviews, however, several negative factors were mentioned. From public administrative perspective, these factors become pivotal for selecting a PPP provision model. Issues such as non-aligned infrastructure assets in the network, inflexibility to external, environmental changes, but also increased stakeholder complexity have to be evaluated more thoroughly in future research projects. As public authorities always follow public interest, the question on private involvement is not only a matter of the project itself, but also of the integration into the overall public network. While the reduction of stakeholder complexity was considered positive in this research project, also negative implications such as market shifts towards big companies have to be evaluated in economic terms more thoroughly in future research. Projects could benefit from a market shift, but would exclude smaller companies from the participation in the tender processes. In economics terms, the major shortcoming also for this research is that to date no PPP project is finished. This makes a final assessment to conventional procedures impossible for now, but is only based on assumptions. Once the first PPP provision models are finished, this will give an interesting prospect for future academics.

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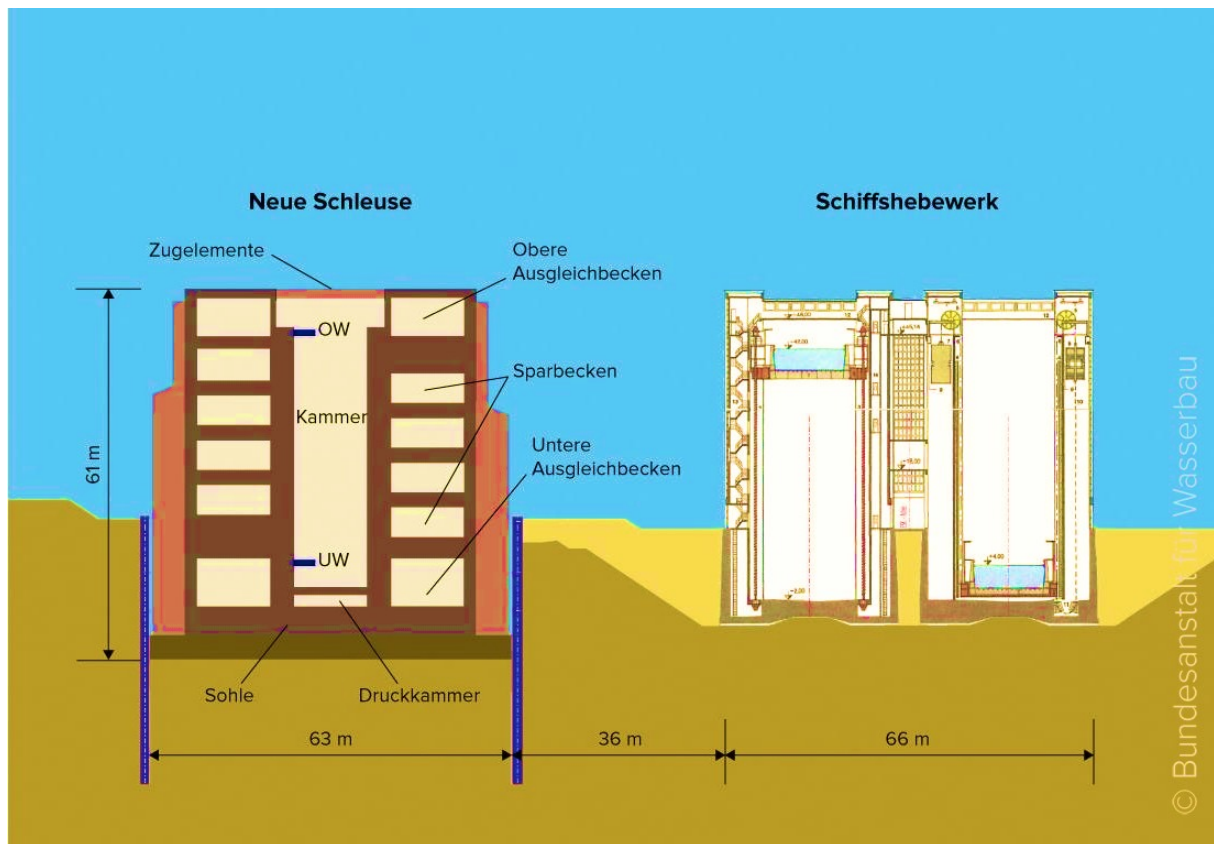
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7 Appendix

Appendix 1 - Design of Navigation Lock in Scharnebeck



Source: Bundesanstalt für Wasserbau (2013)

Appendix 2 – Conventional Procurement Process

Steps in Conventional Approach to Project Development Based on Flyvberg et al. (2003, p. 87)

Step	Action	Responsibility
1.	- Identify Alternatives	Government
2.	- Draft terms of reference; recruit consultants for feasibility study	Government
3.	- Undertake feasibility study <ul style="list-style-type: none">• Preliminary design and cost estimates• Market analysis• Economic analysis• Financial analysis	Consultants
4.	- Draft terms of reference; recruit consultants for evaluation of safety aspects of different alternatives	Government
5.	- Carry out Safety study	Consultants
6.	- Draft terms of reference; recruit consultants for environmental impact study	Government
7.	- Undertake project appraisal: make recommendation to government	Consultants
8.	- Make decision (supplementary studies possible before final decision)	Government/ Parliament
9.	- Establish state-owned enterprise (SOE) to implement project	Government
10.	- Application for required permits (1 st phase: approval of preliminary design); preparation of documentation	SOE
11.	- Mobilize finance	SOE/ Government
12.	- Recruit consultants to prepare detailed design and for supervision	SOE
13.	- Preparation of detailed design	Consultants
14.	- Application for required permits (2 nd phase: approval of detailed design)	SOE
15.	- Recruit contractors	SOE
16.	- Supervise	Consultants
17.	- Commission and initiate operations	SOE

Appendix 3 – Procurement Process under a PPP scheme

Steps in Procurement Process under PPP Scheme Based on Grimsey & Lewis (2004, p. 82)

Step	Action
1.	- Undertake Policy Study
2.	- Appraise Options
3.	- Publish Policy Document
4.	- Prepare Terms of Reference
5.	- Draft Performance Specifications (Consultants)
6.	- Commission Consultants to Undertake Feasibility Study
7.	- Direct Consultants to Prepare Plan for Public Involvement (Public Hearings, Stakeholder Group Involvement, Peer Review etc.)
8.	- Evaluate Feasibility Study
9.	- Consultation Document Issued for Wide Consultations with Public and Stakeholders
10.	- Consultation with Public, Stakeholders and Regulatory Bodies
11.	- Involve Consultants in Proposed Regulatory Regime; Further Analysis of Associated Costs; Risk Management Plan
12.	- Second Consultation Document for Consultation with Public and Stakeholders
13.	- Decision Document to Identify: <ul style="list-style-type: none">• Performance Specifications• Financing Conditions for Operation• Risk Management• Mode of Operation• Tender Procedures• Regulatory Regime• Cost Estimates and Financing Conditions for Associated Costs
14.	- Legislation to go to Parliament
15.	- Undertake Pre-Qualifications of Bidders
16.	- Prepare Shortlist and Ask for Bids (Consultants Involved)
17.	- Evaluate Bids
18.	- Select Concession Holder, Negotiate and Sign Preliminary Agreement (Consultants Involved)
19.	- Circulate Information Document subject to Review by Auditor-General
20.	- Selected Private Party to Initiate Final Designs to Obtain <ul style="list-style-type: none">• Final Permits from Regulatory Authorities• Bids from Contractors
21.	- Negotiated Agreement to Be Approved by Relevant Authorities and Concession Holder
22.	- Detailed Design
23.	- Final Clearance from Environmental and Safety Authorities
24.	- Implement Agreement
25.	- Audit and Manage Contract

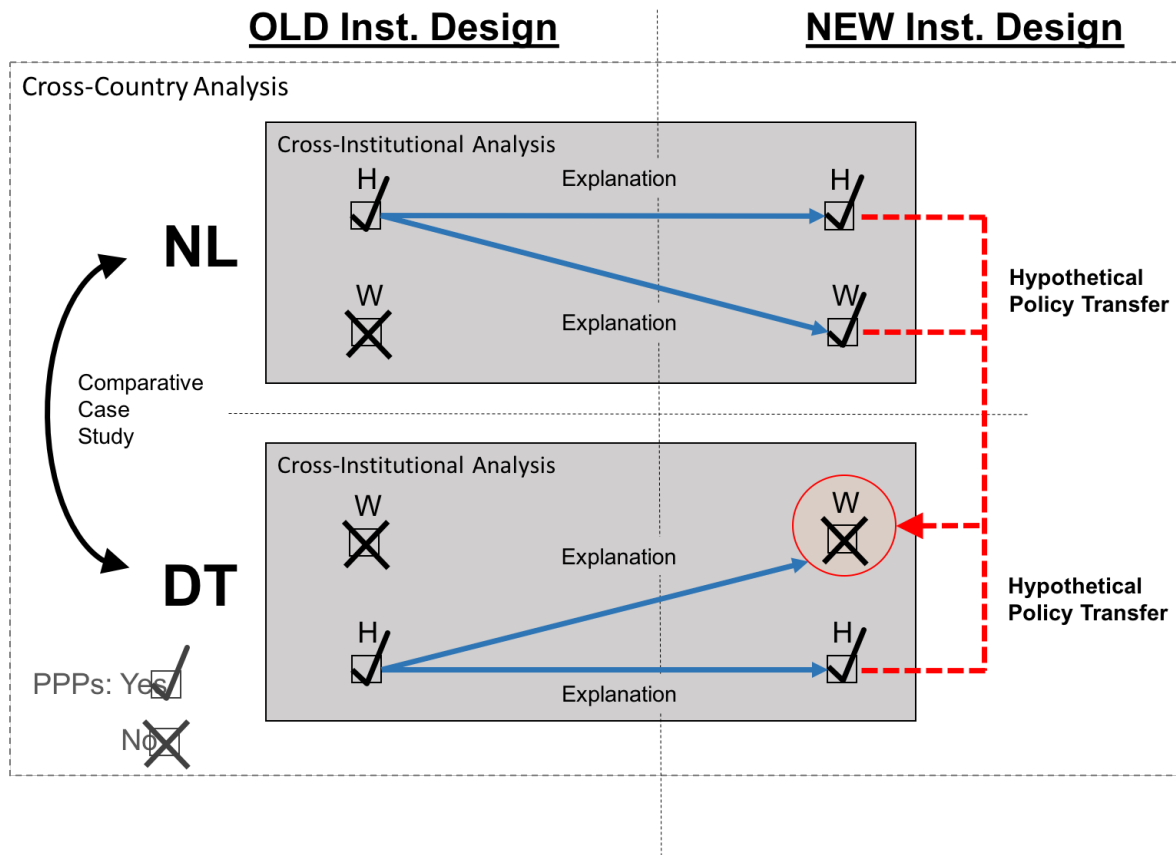
Appendix 4 - Risks, Their Origins in Infrastructure and Treatment in PPP

Based on Grimsey & Lewis (2004) and authors assumptions

Category of Risks	Source of Risk	Public Sector/ Private Sector Investments
<i>Site Risks</i>		
- Site Conditions	- Site Conditions, Supporting Structures	- Construction Contractor
- Site Preparation	- Site Redemption, Tenure, Pollution/ Discharge, Obtaining Permits, Community Liaison	- Operating Company/ Project Company
- Land-Use	- Pre-Existing Liability	- Government
<i>Technical Risk</i>	- Native Title, Cultural Heritage	- Government
	- Fault in Tender Specifications	- Government
	- Contractor Design Fault	- Design Contractor
<i>Construction Risk</i>		
- Cost Overrun	- Inefficient Work Practices & Wastage of Materials	- Construction Contractor
	- Changes in Law, Delays in Approval etc.	- Project Company/ Investor
- Delay in Completion	- Lack of Coordination of Contractors, Failure to Obtain Standard Planning Approvals	- Construction Contractor
	- Insured <i>force majeure</i> Events	
- Failure to Meet Performance Criteria	- Quality shortfall/ defects in Construction/ Commissioning Tests Failure	- Insurer - Construction Contractor/ Project Company
<i>Operating Risk</i>		
- Operating Cost Overrun	- Project Company Request for Changes in Practice	- Project Company/ Investors
	- Industrial Relations, Repairs, Occupational Health and Safety, Maintenance, Other Costs	- Operator
- Delays or Interruption in Operation	- Government Change to Output	- Government
	- Operator Fault	- Operator
	- Government Delays in Granting or Renewing Approvals, Providing Contracted Inputs	- Government
- Shortfall in Service Quality	- Operator Fault	- Operator
	- Project Company Fault	- Project Company/ Investors
<i>Revenue Risk</i>		
- Increase in Input Prices	- Contractual Violations by Government-Owned Support Network	- Government
	- Contractual Violations by Private Supplier	- Private Supplier
	- Other	- Project Company/ Investor
- Change in Taxes, Tariffs	- Fall in Revenue	- Project

- Demand for Output	- Decreased Demand	Company/ Investor - Project Company/ Investor
<i>Financial Risk</i>		
- Interest Rates	- Fluctuations with Insufficient Hedging	- Project Company/ Government
- Inflation	- Payments Eroded by Inflation	- Project Company/ Government
<i>Regulatory/ Political Risk</i>		
- Changes in Law	- Construction Period	- Construction Contractor
	- Operating Period	- Project Company with Government
- Political Interference	- Breach/ Cancellation of License - Expropriation - Failure to Renew Approvals, Discriminatory Taxes, Import Restrictions	
- Force Majeure Risk	E.g. Floods, Earthquake, Riots or Strikes	- Shared
<i>Project Default</i>		
-	- Combination of Risks - Sponsor Suitability - -	- -

Appendix 5 - Research Plan



Appendix 6 - Interview Guide

Name of Interviewer:
Jan Mackenthun (s2720108), B.Sc.

Degree Program:
M.Sc. in Environmental & Infrastructure Planning

Title of Master Thesis:

‘Risking More Market Involvement in Waterway Infrastructure? -
Evaluating a Dutch DBFM contract in case of German’s Navigation
Lock in Scharnebeck’

Introduction:

‘The upcoming research aims to understand the institutional background of privatization within waterway & road infrastructure. I am conducting this research as part of my Master thesis at the University of Groningen, the Netherlands. I am especially interested in the public administrative position on the private involvement in hard infrastructure such as road and waterway infrastructure. Everything you will mention in the interview will be treated confidentially, and will respectively not be shared with anyone outside of this research project. Furthermore, your name will be anonymized, so that no one can relate your answer to you as a person. As you have consented to the interview already, I would like to know whether you have any further questions?’

Interview Structure:

A. Opening Questions

1. Do you think there is information exchange between road and waterway planning authorities in your country in terms of project management styles?

Probes: Collaboration between authorities, best-practices

2. In what way would you consider your infrastructure sector open for new forms of procurement?

Probes: A-Modell, F-Modell, DBFM

B. Questions about the Degree of Private Involvement within Project

3. Which form of contract and what is the intention?

4. What is the reason for choosing the respective contract form in your specific case?

Probes: D&C; PPP model; New Form of Public Management; Budgetary Aspects

5. What are the advantages of a PPP model?

Probes: Risk Allocation; Efficiency increases,

6. What are disadvantages of a PPP model?

Probes: Accountability and Control, Complex Role of Government

Covered Concepts – Deductive Codes:	Related RQ:
- Cross-Institutional Analysis	I.ii
- Willingness of Private Involvement	II.ii
Dependent Variable: Case-Based	I.i.
- Descriptive Question	I.i.
- Contracting	I.i.
- Contracting: Public- Private Partnerships	I.i.
- Contracting Public- Private Partnerships	I.i.

C. Questions about the Project's Institutional Background		Independent Variable:	I.ii.
7. What would you consider the general aim of procurement in your infrastructure project? <i>Probes: Economic solution, Profit-Based</i>	- Scope Rules		I.ii.
8. What other parties are involved in the process of contracting and what are their interests? <i>Probes: Contractors want profit, authorities want welfare</i>	- Position Rule		I.ii.
9. What was the role of the governmental authority in each project phase (Planning, Construction, Maintenance, After-Life)? Does it change with different contract forms? <i>Probes: New Roles of Government in Planning Process</i>	- Choice Rules		I.ii.
10. Can contractors exit/ leave the procured project? What would happen? <i>Probes: A matter of contracting</i>	- Boundary Rules		I.ii.
11. How are decisions between government and contractors usually made in your project? <i>Probes: Legal guidelines, superiority of public authority</i>	- Aggregation Rules		I.ii.
12. What information is or must be shared among actors in your project? <i>Probes: Legal aspects, project-related information</i>	- Information Rules		I.ii.
13. Which involved actors are benefitting the most from your form of contract? Public authorities or Contractors? <i>Probes: Public authorities; contractors; banks</i>	- Pay-Off Rules		I.ii.
D. Closing Questions			II.i.
14. From a current point of view, do you consider your form of contract a success? Why? <i>Probes: Different Aspects such as finance, agenda,</i>	- Evaluation/ Learning		II.i.
15. What are the most valuable lessons from the planning process with your contract so far? <i>Probes: More collaboration, more power to market</i>	- Evaluation/ Learning		II.i.
16. Would you consider an earlier involvement of the contractor in the planning process possible? <i>Probes: Risk Allocation, Involvement of Construction Company</i>	- Early Market Involvement		II.i.
17. Would you consider the topic of 'Public-Private Partnerships' Politicized in your Country? <i>Probes: Institutional Resistance</i>	-Political Motivation		II.i.

Appendix 7 - Selection of Interview Partners, their Institutions, and their Labels (Confidential)

	The Netherlands	Germany
Road	- [REDACTED], RWS ¹ (NLR1)	- [REDACTED], NLS ³ tBV ³ (DR1)
Infrastructure	- [REDACTED], RWS (NLR2)	- [REDACTED], NLS ³ tBV (DR2)
		- [REDACTED], NLS ³ tBV (DR3)
		- [REDACTED], BMVI ⁴ (DR4)
Waterway	- [REDACTED], RWS (NLW1)	- [REDACTED], WSV ⁵ (DW1)
Infrastructure	- [REDACTED], RWS (NLW2)	- [REDACTED], BMVI (DW2)
General	- [REDACTED], Movares ² (NLG1)	
	- [REDACTED], RWS (NLG2)	

¹ Rijkswaterstaat

² Involved Contractor

³ Niedersächsische Landesbehörde für Straßenbau und Verkehr

⁴ Bundesministerium für Verkehr und Digitale Infrastruktur

⁵ Wasser- und Schifffahrtverwaltung des Bundes

Appendix 8 – List of Public-Private Partnerships in the Netherlands and Germany

The Netherlands¹

<i>Project Name</i>	<i>Sector</i>	<i>Phasing</i>	<i>Contract Form</i>
Canal Zone - Gent-Terneuzen	WT	Potential PPP	DBFM
Expanding the Capacity of the Volkerak Locks	WT	Potential PPP	DBFM
A1 - Area	RT	Potential PPP	DBFM
A10 - South Axis	RT	Potential PPP	DBFM
Ring Road Utrecht	RT	Potential PPP	DBFM
A27 - Hooipolder-Lunetten	RT	Potential PPP	DBFM
Lock Eefde	WT	Prepared for Tender	DBFM
Afsluitdijk	RT/WT	Prepared for Tender	DBFM
A13/A16/A20 - Rotterdam	RT	Prepared for Tender	DBFM
ViA15 - Accessibility of Arnhem & Nijmegen	RT	Prepared for Tender	DBFM
A6/A9 - Schiphol-Amsterdam-Almere	RT	Prepared for Tender	DBFM
A15/A20 - New Blankenburg link road	RT	Put out for Tender ²	DBFM
3rd Beatrix Lock	WT	Put out for Tender	DBFM
N18 - Varsseveld-Enschede	RT	Put out for Tender	DBFM
Limmel Lock	WT	Implementation	DBFM
A12 - Ede-Grijsoord	RT	Implementation	
A27/A1 - Utrecht-knooppunt Eemnes-Amersfort	RT	Implementation ³	DBFM
Sealock IJmuiden	WT	Implementation ⁴	DBFM
A10 - Second Coen Tunnel & Westrandweg	RT	Operation	DBFM
A12 - Utrecht Lunetten-Veenendal	RT	Operation	DBFM
N31 - Construction of the Haak om Leeuwarden	RT	Operation	DBFM
N33 - Assen-Zuidbroek	RT	Operation	DBFM

Note: RT = Road Transport; WT = Waterway Transport; n.d. = not determined; if not indicated differently, the information is drawn from the general sources of the respective country

Sources:

¹General Source - The Netherlands: Government of the Netherlands (2012)

²Rijkswaterstaat (2016)

³Rijksoverheid (2016)

⁴Rijksoverheid (2015)

Germany⁵

<i>Project Name</i>	<i>Sector</i>	<i>Phasing</i>	<i>Contract Form</i>
A3 - AK Biebelried - AK Fürth/Erlangen ⁶	RT	Potential PPP	n.d.
A4 - AS Gotha - Landesgrenze Thüringen/Sachsen ⁶	RT	Potential PPP	n.d.
A6 - AK Weinsberg - AK Feuchtwangen/Crailsheim ⁶	RT	Potential PPP	n.d.
A8 - Rosenheim - Bundesgrenze D/A ⁶	RT	Potential PPP	n.d.
A57 - Köln - Moers ⁶	RT	Potential PPP	n.d.
A20 - Elbquerung ⁶	RT	Potential PPP	n.d.
A26 - Hamburg (A1) - Rübke ⁶	RT	Potential PPP	n.d.
A281 - Weserquerung	RT	Potential PPP	F-Modell
A1/ A30 - Münster - AK Lotte/ Osnabrück - Rheine ⁷	RT	Potential PPP	V-Modell
A44 – Diemelstadt – Kassel-Süd ⁷	RT	Potential PPP	n.d.
A61, A650/A65 – AS Worms – Landesgrenze Rheinland-Pfalz/Baden-Württemberg ⁷	RT	Potential PPP	n.d.
A6 - Wiesloch / Rauenberg-Weinsberg	RT	Put out for tender	V-Modell ⁷
A10/A24 - AS Neuruppin - AD Pankow/Landesgrenze Brandenburg ⁶	RT	Put out for tender	A-Modell
A7 - Salzgitter - Göttingen ⁷	RT	Put out for tender	V-Modell
A7 - Neumünster-Nord - Hamburg-Nordwest	RT	Implementation	V-Modell ⁷
A94 - Pastetten - Heldensteinroad	RT	Implementation	A-Modell
A1/A226 - Herrentunnel Lubeck PPP toll road in Germany	RT	Operation	F-Modell
A9 - Lederhose - LandesgrenzeThüringen/Bayern ⁷	RT	Operation	V-Modell
A9 - Triptis - Schleiz section	RT	Operation	V-Modell
A8 - Ulm-Augsburg	RT	Operation	A-Modell
A1 - Bremen - Hamburg	RT	Operation	A-Modell
A4 - Landesgrenze Thüringen/Hessen - Gotha	RT	Operation	A-Modell
A5 - Malsch - Offenburg	RT	Operation	A-Modell
A8 - Augsburg - München	RT	Operation	A-Modell

Note: RT = Road Transport; WT = Waterway Transport; n.d. = not determined; if not indicated differently, the information is drawn from the general sources of the respective country

Sources:

⁵General Source – Germany:

Bundesministerium für Finanzen (2016)

⁶Bundesministerium für Finanzen (2015)

⁷Bundesministerium für Verkehr und Digitale Infrastruktur (2016d)