BACK TO THE FUTURE? Ex durante analysis of past failure in future mega-projects

The institutional complexity of an international shift to sustainable mobility

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Master thesis Spatial Planning
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Utrecht, 28 June 2020

Preface

Dear reader,

I am so unbelievably happy and proud to finally write this preface to you. With a background of studying Human Geography and Urban & Regional Planning in Groningen, I decided to continue my studies with the master Spatial Planning in Utrecht. The size of the city was not the only scale-up I was looking for; whereas my bachelor thesis was about the 'quality of life' on the Dutch Wadden island Vlieland, in my master thesis I wanted to research international projects.

Since high-school I have been amazed by large projects, expressed in example by writing my 'profielwerkstuk' on the future of Schiphol. Now, the future of Schiphol is contested due to the emissions, that should be reduced to limit climate change. For my generation of 'millennials' this particularly is a dilemma: we want to travel the world, but we are also concerned about the planet and climate change. I was curious to research more sustainable forms of transport, and the substitution of air traffic to High-Speed rail traffic within Europe seemed like a perfect subject for my master thesis: a means to maintain the same mobility, but with less emissions.

I wondered: if we know how to implement such lines, from a technical and governmental managerial perspective, why isn't there a European High-Speed Railway network yet? It seems that one thing that is holding us back, is the failure that frequently occur in these projects, and the burden that these failures place on society. With this thesis I hope to contribute to the understanding of and, possibly in the future, the preventing of failures in such projects. Then, projects that help societies move forward, in example by a shift from conventional to sustainable mobility, know less resistance and might succeed in proving their positive effects on society as well.

This thesis has known some failure that caused delays as well, as happens in most projects. I would like to thank anyone who has helped me the past year, content-wise or mentally. There are some people I would like to thank in particular: Tejo Spit from Utrecht University. Thank you for your critical view and pointing me in the right directions. I would also like to thank Elmer van Buuren and Barth Donners from Royal HaskoningDHV. Barth, even though we were condemned to each other, I really liked our meetings. Thank you for your contributions in content and fun in this process, even when the road looked rough ahead. And finally, I would like to thank Fokke Dijkstra for his mental support. Through this preface, I would also like to express my gratitude to all respondents who were kind enough to free up time for my research. This past year I have learnt more about trains than I would ever imagine.

Met deze scriptie komt ook een eind aan een prachtige studententijd in Groningen en Utrecht. Ik wil iedereen die daaraan heeft bijgedragen onwijs bedanken, zonder jullie was het me niet gelukt. Lieve papa en mama, bedankt voor jullie onvoorwaardelijke steun, vooral de afgelopen 2 maanden. En oneindig bedankt Joost, niet alleen voor het proeflezen.

Nienke Buikema
Utrecht, 23 June 2020

"… daarom flitsen in m'n hoofd allemaal lijnen, voorbij als HSL-treinen
Of sneller, Concordes, waarschijnlijk
Nergens spijt van, alles was mooi,
ook de dalen en die andere zooi"
Sef – de Leven (2011)

Summary

Due to increased levels of greenhouse gasses, resulting in unequivocal climate change, the Paris Climate Agreement was set up in 2015 to limit the increase in global temperature to 2 degrees Celsius. The transport sector is one of the sectors with the biggest contribution to the emissions (15%), and thus can contribute to reaching the goals of reducing emissions as set in the climate agreement. The Sustainable Mobility Approach by Banister (2008) is developed to help policy-makers in the challenge of mitigating CO_2-emissions. A m*odal shift* to sustainable modes of transport is one of the components of this approach, which can be caused by changes on the macro level in transport supply, and on the micro level in the individuals' choice for a mode of transport. A comparative advantage of the one mode over the other then can cause a modal shift. The choices made on a micro level are affected by the supply of the macro level, and thus changing supply (e.g. by implementing more infrastructure) is a way to reach a modal shift. Increasing infrastructure goes through different project-management phases: initiation, decision-making, construction and commissioning. Throughout these phases, existing uncertainties and risks are reduced, while new uncertainties and risks might appear.

Sometimes, these projects are of such dynamic and complex nature that these projects are ***mega***-projects. Scott & Levitt (2017) describe 4 factors that can make a 'regular' project into a mega-project: the amount of sub-projects involved, the degree of innovative technology used, the impact on surroundings and the involvement of key delivery partners from different national institutional frameworks (i.e. a cross-border component). Mega-projects over the past have built up a negative image, caused by the frequent occurring ***failure:*** *delays, exceeded budgets and disappointing quality.*

Mega-projects can be analyzed on different levels: *technical, strategical* and *institutional.* Over the past decades, the institutional level has increased in complexity due the shift from government to governance, of which as a result policy is set up in networks that consist of institutional linkages between actors from the state, market and civil society. Another observed trend is the increasing international collaboration within projects, due to intensified globalization. Considering that projects with an international component are always considered to be mega-projects and thus run more risk on failure, this calls for a better understanding of the drivers of failure in mega-projects. This understanding might eventually lead to preventing failure in future projects.

The institutional level of project considers the project within its business and social context and is concerned with the organization of the environment of the project, for the project to be implemented successfully (i.e. without delays, exceeded budgets or disappointing quality). Improving the institutional level forms the basis to improving the technical and strategical level of the project, and improvements on the institutional level can thus contribute to preventing failure in future projects. In order to understand how the institutional level of projects can be managed, insight should be gained in the institutions involved in the project. Semi-structured interviews are conducted among actors involved in reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin, and with experts on Dutch-German rail connections and relations. Institutional theory is used in this research to understand institutions, and how organizations attain and preserve their characteristics.

Institutions are built up of 3 pillars: regulative, normative and cultural-cognitive frameworks.

- **Regulative frameworks** consist of laws of both countries, the relation between national and local and regional entities, corporate hierarchies.

- **Normative frameworks** consist of professional standards, norms and values.
- **Cultural-cognitive frameworks** consist of beliefs, schemas and frames, economic and religious ideologies, differing ethnicities and languages.

In this research, factors that have caused failure in past projects are uncovered using theory and the past project of the HSL-Zuid. The resulting frame of analysis consists of 13 *failure factors* that are known to cause delays, exceeded budgets and disappointing quality. The failure factors are assessed to the extent to which these are expected to reoccur or disappear in the future project of reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin. The trajectory of the former HSL-Oost is seen as one of the alternatives that is promising reaching travel time savings between Amsterdam and Berlin.

Result of the analysis of possible reoccurring past failure in the future project of the HSL-Oost are that 3 of the 13 failure factors might reoccur: *international collaboration of parties, Forecasts: realistic estimation of timeframe, and Decision-making disconnected from spatial context.* The disappearance of the 10 remaining failure factors is caused by the application of the lessons learnt of the HSL-Zuid. These are interwoven in the processes in the Dutch Ministry of Infrastructure and Water Management. Other explanation for the disappearing failure factors is rooted in the development of the actor involved in the management of Dutch rail infrastructure ProRail.

The failure factor of international collaboration of parties was expected to reoccur, because a cross-border aspect is known to cause such complexity that this characteristic makes a project a mega-project. An international aspect makes the project more complicated on every level: technical, strategical and institutional. This can be explained using institutional theory. With cross-border projects, there are differences in all frameworks, but the cultural-cognitive differences are the most importance. Cultural-cognitive frameworks are impossible to overcome, because the countries are situated in their own national definitions. The regulative controls and normative prescriptions that institutions are involved with, are involved by the cultural systems, because these are institutionally constituted entities (Scott, 2010). The cultural differences thus create differences in all 3 pillars of institutions, which can create dilemmas, tensions, misunderstandings, conflicts and confusion between institutions involved(Scott, 2010), and create a risk on failure that cannot be eliminated with international projects.

The other reoccurring failure factors that concern the national level, however, were not foreseen to be reoccurring. Line infrastructure is spatially dispersed. Taking all lower governments into account in the first phases in which alternatives are weighed up would be would increase the number of actors involved explosively. This increases the risk of these actors to exert blocking power in the early phases of the process if the implementation of the project would not benefit their governmental entity enough.

Due to the shift from government to governance, the role of the spatial planner has transformed into being a node in the institutional network of collective action. As a consequence, the spatial dimension is often involved later in the process, when there is already committed to alternatives. A more central role for spatial planning in the early stages is proposed as means to overcome the reoccurrence of failure factors concerning the national level and prevent other failures from occurring in later phases. In order to prevent failure in future projects, the focus should shift from looking *back to the future* to looking forward into that which is to come.

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1. Introduction: Institutional complexity of an international sustainable mobility shift

1.1 Need of Sustainable Mobility

Over the past two centuries, concentrations of carbon dioxide (CO_2) and other greenhouse gases in the atmosphere have increased with an exceptional speed (Etheridge et al., 1996). This increase is amongst others caused by human activities, mainly due the usage of fossil fuel and land use change (Reay, Sabine, Smith, & Hymus, 2007). The emission of CO_2 engenders an enhanced greenhouse effect, resulting in unequivocal climate change perceptible as an increased global temperature. Consequences involve extreme weather and rising sea levels due to melting ice. In 2015, the need to address and tackle this problem was demonstrated with the signing of the United Nations Paris Climate Agreement by 186 countries worldwide (see Vinet & Zhedanov, 2011). This 'Paris Agreement' deals specifically with the mitigation of greenhouse gas emissions, climate adaptation and financing of the measures necessary to limit the increase in average global temperature to 2 degrees Celsius.

The transport sector is held responsible for a large share (around 15%) of the global CO_2 emissions (World Resources Institute, 2017; Chapman, 2007; Sims et al., 2014), and can therefore be seen as a sector with one of the biggest contributions sectors to climate change. The absolute emissions within the sector keep growing (by 3% in Europe comparing 2015 to 2016 (EEA, 2018)), and the sector has the fastest increase in emissions compared to other sectors (Barbier, López, & Hochard, 2016). When the transport sector substitutes polluting means of transport by more sustainable forms of transport, the absolute numbers of the sectors' contribution to total CO_2 emissions could be reduced.

More sustainable forms of transport thus can help policy-makers in the challenge of mitigating CO_2-emissions (Chapman, 2007). Banister (2008) developed a Sustainable Mobility Approach, that can help shift from conventional transport methods towards sustainable transport methods. The approach requires

- action to reduce the need to travel,
- reduce trip lengths,
- encourage greater efficiency in the transport system and
- *encourage a modal shift* towards sustainable forms of transportation.

A modal shift is reached by a growth in the demand of one mode of transport at the expense of another mode of transport (Rodrigue, 2016). As a result of this changed demand, if transport supply is sufficient for this increased demand, a relative shift in the used modes of transport from point A to B can be observed.

1.2 Reaching a Modal Shift

Modal shift thus is one of the approaches to change the shares of conventional forms of mobility to sustainable mobility to reduce CO_2 emissions and reach the goals of the Paris Agreement. Modal shift takes place in a context where from macro (i.e. transport supply) and micro perspective (i.e. individual's choices for a transport mode) changes occur. These changes from the macro perspective imply an increase or decrease in the amount and quality of transport supply (e.g. infrastructure), whereas the changes from a micro perspective imply a changed preferred transport mode for an individual. The changes from macro perspective are driven by cost factors for transport providers and the government, regulations and policies regarding the infrastructure (Rodrigue, 2016). From a micro perspective, the individuals' choice for a certain mode of transport is based on costs, capacity, travel time, flexibility and reliability for the user (Rodrigue, 2016). A comparative advantage from one mode over another for the user in one of these parameters can then cause a modal shift. These factors on which an individual bases its choice on are affected by attributes of the total transport supply, which are decided for on the macro level. The micro-perspective is thus for a large extent determined by the decisions taken at the macro level, and thus transport providers and the government are prominent actors in achieving a modal shift. These actors decide for the quality and quantity of different transport modes.

1.3 Increase infrastructure supply using Mega-Project management

To create a modal shift from conventional to sustainable transport forms to contribute to reducing CO_2 emissions, the quality and quantity of that sustainable transport mode should be changed. Whereas increasing the quality of a transport mode requires upgrading of the current transport supply, an increase in the quantity of supply of a transport mode often implies the implementation of new infrastructure. Increasing transport supply by implementing new infrastructure consequently has a spatial impact and thus involves spatial planning.

Implementing new infrastructure is controlled using project-management. Infrastructure development goes through the different phases of project-management, after which the new infrastructure can be used. These different phases of project-management are conceived differently throughout different fields of research (see e.g. Turner, 1993; Westland, 2007). Even though the conceptions of the distribution of the content of the project management lifecycle differ, broadly the same phases are identified. The phases of **initiation, decision-making, construction and commissioning** are distinguished and used to analyse projects. Throughout these different stages of projects, existing uncertainties and risks are reduced. At the same time, new uncertainties and risks might appear during the implementation process as well (Priemus, Bosch-Rekveldt, & Giezen, 2013).

Occasionally, projects have a large size and scope. This larger size and scope can make these projects more problematic to manage and makes that this type of projects due to their more dynamic and complex nature run more risks than 'regular' projects. The complex nature of projects is a result of the several complex interfaces of the project (Priemus et al., 2013, pp. 84):

- the state of the project itself,
- the complicated decision-making process that is involved,
- the complicated dynamic relations between actors and stakeholders involved in this decision-making process,
- the complicated state of relevant markets and the political environment in which the decision-making process takes place.

These projects form a category of their own: mega-projects. Mega-projects are defined differently in literature. Mega-project are conceived described as large socio-technical undertakings that involve coordinated applications of capital, sophisticated technologies, intense planning and political influence (Biesenthal, Clegg, Mahalingam, & Sankaran, 2018; Kardes, Ozturk, Cavusgil, & Cavusgil, 2013). This conception, however, is broad and makes it hard to distinguish which project is a 'regular' project, and which project is a mega-project.

Flyvbjerg (2014) describes the general rule of thumb that applies in the distinction between projects and mega-projects: 'regular' projects are measured in millions and tens of millions, mega-projects typically cost a billion dollars or more. The implementation of completely new infrastructure will often cost more than one billion dollars and thus are mega-projects. Scott & Levitt (2017) specify more detailed characteristics of projects and determine 4 factors that, in addition to the cost aspect distinguished by Flyvbjerg (2014), can make a project into a megaproject:

- High degree to which project is split up in sub-projects;
- High degree to which innovative technology is used;
- High impact on surroundings in terms of environment and populations;
- Different national frameworks that actors originate from[1].

When a project complies with one or more of these characteristics, it can be expected to be more complicated than a regular project. The implementation of mega-projects is a high-risk process, where things only happen with a certain probability, and rarely turn out as originally intended (Miller & Lessard, 2008; Richmond, 2005). As a result, mega-projects often know a contested course before being finalized. Over the last decades, the complexity of mega-projects has become clear in the many ***failures*** that occur in past mega-project management[2] (Biesenthal et al., 2018; Flyvbjerg, 2011; Flyvbjerg, Garbuio, & Lovallo, 2009; Tijdelijke Commissie Infrastructuurprojecten, 2004):

- the frequently occurring ***delays***,
- exceeding of predetermined ***budgets*** and
- disappointing ***quality*** of finished projects generates a negative image for mega-projects.

Because of these delays, exceeded budgets and disappointing quality, mega-projects have built up a negative image (Tijdelijke Commissie Infrastructuurprojecten, 2004).

1.4 Technical, strategical and institutional risks: *governance* of *cross-border mega-projects*

To understand the failure of mega-project management, the risks involved in this process should be unbundled. Risks in mega-project management can be divided in technical risks, strategic risks and institutional risks (Flyvbjerg et al., 2009; Miller & Lessard, 2008; Morris & Geraldi, 2011). In this research, the institutional level of mega-projects is used to analyse the extent to which past failure might reoccur with future mega-projects.

The institutional level of (mega-)projects has over the past decades become more complex. Traditionally, governing was seen as the task of the (national) government (Figure 1). The formal institutions of the state decided in hierarchical structures which projects were developed and which were not. However, current problems have become more 'wicked'[3] than before: government institutions are losing capacity for action and for dealing with the ongoing transformations in society. The increasing

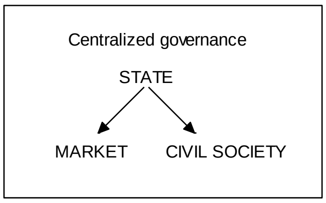

Figure 1: State sovereignty (Lange et al., 2013)

[1] Scott & Levitt dub projects in which there is more than one different national framework involved 'Global Mega-projects'. In this research the term 'cross-border' is used, because this research is about infrastructure that physically crosses a border.
[2] Cost overruns and benefit shortfalls of 50 percent are common, above 100 percent are not uncommon (Flyvbjerg et al., 2009).
[3] Wicked problems are problems for which the solutions found generate new problems. These can be defined as problems that generate new problems. They are multifaceted and subject to continuously changing and

complex and dynamic real world make that policy makers struggle to find effective solutions (van Brussel, 2018, pp. 31-32).

In response to this 'crisis in governability' (Crespo & Cabral, 2016) in the management of societal issues, *Governance* has arisen as a concept in political and sustainability science to the growing awareness that governments are no longer the only relevant actors. Instead, the relationships between all institutions and actors participating in networks that produce and implement policies have become more important (Crespo & Cabral, 2016; Lange, Driessen, Sauer, Bornemann, & Burger, 2013). As a result of this shift from government to governance, policy is now set up in more non-hierarchical forms, such as actor networks.

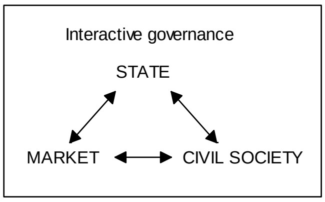

Figure 2: Interactive governance (Lange et al., 2013)

These networks are a set of formal and informal institutional linkages between governmental and other actors, structured around shared interests in public policymaking and implementation. The implementation is characterised by complex multi-actor interactions across state, market and civil society, which occur at multiple levels (Figure 2). The role of the spatial planner has transformed into being a node in this institutional network of collective action. The role of the state involves coordination of priorities and interests, and define the objective for achieving collective goals (Crespo & Cabral, 2016). There is thus no longer a 'single locus of sovereignty' by the state, and instead more different parties from the market and civil society are pulling the strings for the opening of a window of opportunity for new policies.

Another observation of increased institutional complexity is the increasing international collaboration in mega-projects, due to intensified globalization. As a result, supply chain structures are more complicated, with suppliers from different countries. This involves an increasing amount of partnerships of private and public actors from different countries (Kardes et al., 2013). As can be read in paragraph 1.3, when the amount of countries in a project and thus different national frameworks that actors originate from is above 1, Scott & Levitt (2017) declare this projects immediately as mega-projects. The complexity derived from the cross-border aspect of projects makes that the actors from different national institutional frameworks must find a way to resolve and overcome their differences between national frameworks. The complexity derived from the increasing amount of international mega-projects due to globalization, brings up questions about the possibilities of preventing failure in such cross-border projects, or that the international aspect will always create complexity that causes failure in mega-projects.

Both the shift from government to governance and increasing international aspect of mega-projects, of which as a result various actors and policy fields are attached to mega-projects, have made these projects more complicated and at risk for failure. Adding that these projects are developed within ever changing conditions and environments, makes the transition from conventional to sustainable mobility a wicked problem (van Brussel, 2018).

uncertain setting of which conditions frequently change and sometimes become contra dictionary (van Brussel, 2018). Solutions should be sought in different and multiple directions.

1.5 This research

In this research, the role of the international aspect on failure of mega-projects is investigated. We look into the extent to which failure within past cross-border mega-projects can be prevented in future projects, and what the role of the international aspect is on the reoccurrence or disappearance of failure factors that cause the negative image of delays, exceeded budgets and disappointing quality. Institutional theory, that explores how organizations gain and maintain their characteristics (Scott, 2008), is used as independent variable to possibly explain the reoccurrence or disappearance of past failure factors in future mega-projects.

With less hierarchic organizations, where policy is set up in actor networks, the government's usual set of instruments are not applicable (van Doorne & Cordeweners, 2018), and makes a systemic approach not sufficient, nor applicable. Working with the complexity of a wicked problem, which is the sustainable mobility transition using mega-projects, demands an approach that focuses on throughput instead of inputs and outputs (de Roo, 2012). Adaptive policy-making can serve as a tool to focus on this throughput, and due to increased complexity will in the future be an essential characteristic of public administration that can handle the rapid developments of governing in networks (van Doorne & Cordeweners, 2018). A tool to help make policy adaptive is ex durante evaluation. Other than ex ante (*before*) or ex post (*after*) evaluations, ex durante evaluation takes place during the implementation process and uncovers the changes that have occurred during the lead time of the implementation of policies or projects (Buitelaar, Sorel, & Opdam, 2010).

Mega-projects are characterized by having a relative long lead time: these projects take many years of developing and building (Flyvbjerg, 2014). This long lead time implies a longer time for new uncertainties and risks to appear during the management of the project. Other characteristic is that these mega-projects transform landscapes greatly: mega-projects have a spatial component, and thus the uncertainties and risks that might appear during the process are also derived from a changing surrounding of the project during that lead time. With line infrastructure, such as rail infrastructure, the chance of new uncertainties and risks is generally bigger. Line infrastructure is spatially dispersed, and thus has a bigger surrounding environment in which these uncertainties and risks can come up than in spatially 'focused' projects (WRR, 1994). The long lead time and large surrounding area make ex durante evaluation a valuable tool to uncover the reoccurrence of past failure in this research. Based on the ex durante evaluation, there can be anticipated on the current situation of the project, which might prevent failure.

In this research, an ex durante evaluation will be conducted of the reoccurrence or disappearance of past failure factors in improving the rail connection between Amsterdam and Berlin. Previously, the approach for improving this line was to implement a High-Speed Railway line between Amsterdam and the German Ruhr area (i.e. the HSL-Oost). Currently, more alternatives are being researched in order to reduce travel time between Amsterdam and Berlin. The development of the connection between Amsterdam and Berlin should encourage a modal shift from the airplane to the High-Speed Train, to reduce CO_2 emissions and reach the goals set in the Paris Agreement. However, with High-Speed Rail mega-projects, cost overruns and delays are more of a norm than an exception (European Court of Auditors, 2018). This project is currently in the initiation phase, and thus extent to which failure factors are expected to reoccur can be analysed, in order to adjust the process accordingly. Making the policy adaptive to the current situation then might prevent past failure in this possible future project.

The experiences of past failure in international rail projects from the Dutch perspective are derived from the HSL-Zuid. This Dutch part of the High-Speed Railway line between Amsterdam and Brussels is one of the largest infrastructure projects ever implemented in the Netherlands. The project was heavily delayed (4 years) and more expensive (3.9 billion euros) than initially estimated (Algemene Rekenkamer, 2014). Besides, the performance of the line was in 2015 and 2016 (6 years after start of commissioning) still seen as inadequate (Cauvern, Geitz, & Tjalma, 2018). In this research, the factors that contributed to the failure (delays, exceeded budget and disappointing quality) of the HSL-Zuid are uncovered and researched to the extent to which these failure factors might occur with the possible future implementation of measures to reduce travel time between Amsterdam and Berlin, possibly by implementation of the HSL-Oost. This research aims to uncover the role of the cross-border aspect of mega-projects in the reoccurrence or disappearance of mega-projects, and by extension, the role of the cross-border aspect in (not) being able to eliminate past failure in future projects. Institutional theory is used to possibly explain the reoccurrence or disappearance of past failure in future projects.

The main research question used to be able to conduct this research is:

"Why are the same failure factors expected to reoccur or disappear between past and future cross-border infrastructural mega-projects?"

This question is answered using the following sub-questions:

1. What does the process of accomplishing (cross-border) infrastructure mega-projects look like?
2. How can mega-projects be analyzed?
3. What are theoretically and empirically observed failure factors of past cross-border infrastructure mega-projects?
4. To what extent can the same past failure factors be expected to reoccur or disappear with future cross-border infrastructure mega-projects?

1.6 Relevance

Societal Relevance

The failure of past and future mega-projects exposes impacts on society. The delays, excess spending and disappointing quality of past mega-projects form burden on society. The excessive spending on mega-projects go at the cost of public funding, that otherwise could contribute to developing other policies and projects. The negative image that is created by the failure of mega-projects might prevent future projects from being built, which prevents the positive sides of mega-projects from being realized. Refraining to build future projects due to their negative image might prevent societies from developing progressively and face challenges such as climate change using mega-projects. Biesenthal et al. (2018) state that understanding the institutional framing, underpinnings and logics of mega-projects can provide the key in the successful delivery of mega-projects. That is why in this research an institutional lens is applied. Institutions and institutional design are central to the planning practice of creating more just, liveable and sustainable cities. Failure in mega-projects impose great effects on society, and thus gaining knowledge on preventing failure contributes to creating more just, liveable and sustainable cities.

Scientific Relevance

The scientific relevance of this research is to contribute to the understanding of failure in international projects, by understanding the different institutions involved in such cross-border mega-projects using institutional theory. Due to todays globalized environment there are more and more international collaborations within (mega-)projects. In this research, the extent to which the international aspect of such projects creates failure and thus limits the extent to which failure can be prevented in international projects is researched. Institutional theory is used to understand why this failure can or cannot be prevented in such projects. Institutional theory is a useful tool because it contributes to the understanding of institutions on both sides of the border. The theorization of institutions is an important factor in the generation of planning theory (Sorensen, 2017). This research provides an insight into institutions involved in cross-border infrastructural mega-projects, and thus might form a puzzle piece in understanding institutions within cross-border mega-projects.

1.7 Conceptual Model - introduction

In the conceptual model on page 20 (Figure 3), this research is visually depicted. The model starts very broad, with climate change that is enhanced by the emissions, that for a large share come from the transport sector. A shift towards sustainable mobility can be encouraged by implementing new infrastructure. Projects are implemented through the (mega-)project lifecycle of initiation, decision-making, construction and commissioning. Complicating factors such as many sub-projects, using innovative technology, the impact on the surroundings and a cross-border component make these 'regular' projects into mega-projects. Mega-projects have a negative image, due to the frequent delays, exceeded budgets and disappointing quality that occur with these projects. The delays, exceeded budgets and disappointing quality are in this research seen as failure of these projects.

One of the complicating factors in the wicked problem that is the (sustainable) mobility transition are the various actors and policy-field that are involved in this process. This research looks at the role of understanding institutions in preventing failure from taking place, with special attention to the cross-border aspect of mega-projects. Institutional theory is used in order to understand the institutions involved in mega-projects.

Another characteristic of the wicked problem of a (sustainable) mobility shift are the ever-changing conditions that occur during the implementation of a policy or project. With mega-projects this specifically is a problem, due to the long lead time. During the implementation of the mega-project, the surroundings of that projects are prone to ongoing spatial processes. As a result, the project should be anticipated on those changes to prevent failure. With line infrastructure, this specifically is a problem, because this type of infrastructure is spatially dispersed and thus more of direct surroundings of the project to consider. A way through which can be prevented that projects are overtaken by reality, is by using adaptive policymaking.

In this research, ex durante evaluation is used to facilitate adaptive policymaking. An ex durante evaluation of past failure derived from theory and the HSL-Zuid is conducted to the policymaking on reducing travel time by implementing new infrastructure between Amsterdam and Berlin, possibly by implementing the HSL-Oost. Semi-structured interviews are conducted with actors involved and with experts on Dutch-German rail connections. The result of this research will be an overview of the failure factors derived from the HSL-Zuid, and the reoccurrence or disappearance of those failure factors with the possible implementation of the HSL-Oost.

In paragraph 4.3, in the methodology chapter, a detailed version of this conceptual model can be found. The conceptual model in chapter 4 is extended with the knowledge gained from chapter 2, the theoretical framework, and chapter 3, the operationalization of this research.

1.8 Outline

In this **chapter 1: the introduction** of this research, the societal and scientific relevance and most important concepts used in this thesis are presented. In **chapter 2: the theoretical framework**, the theoretical concepts of this research (mega-project management and institutional theory) are elaborated. In **chapter 3: operationalization**, the variables used to measure the reoccurrence or disappearance of failure factors is laid down. These are uncovered using theory and the empirical case of the HSL-Zuid. These factors have caused failure in the past and are used as frame of reference for expected failure in future cross-border mega-projects. In **chapter 4: the methodology**, the preliminary findings thus far are presented. The methods that are used to assess past failure in future cross-border mega-projects are also presented in this chapter. These methods include *ex durante evaluation* that is executed not before (*ex ante*) or after (*ex post*) but *during* an implementation process, and semi-structured interviews as a form of data-gathering. In **chapter 5: the context**, the context of the case study used in this research is uncovered. This case study is reducing travel time by implementing new infrastructure between Amsterdam and Berlin, by possibly implementing the High-Speed Railway line the HSL-Oost. In **chapter 6: the results of the ex durante analysis**, the findings of the ex durante analysis on past failure in future cross-border mega-projects then are presented, after which the theoretical lens is applied to these results in the conclusions of this research in **chapter 7: the conclusion, reflection & discussion**.

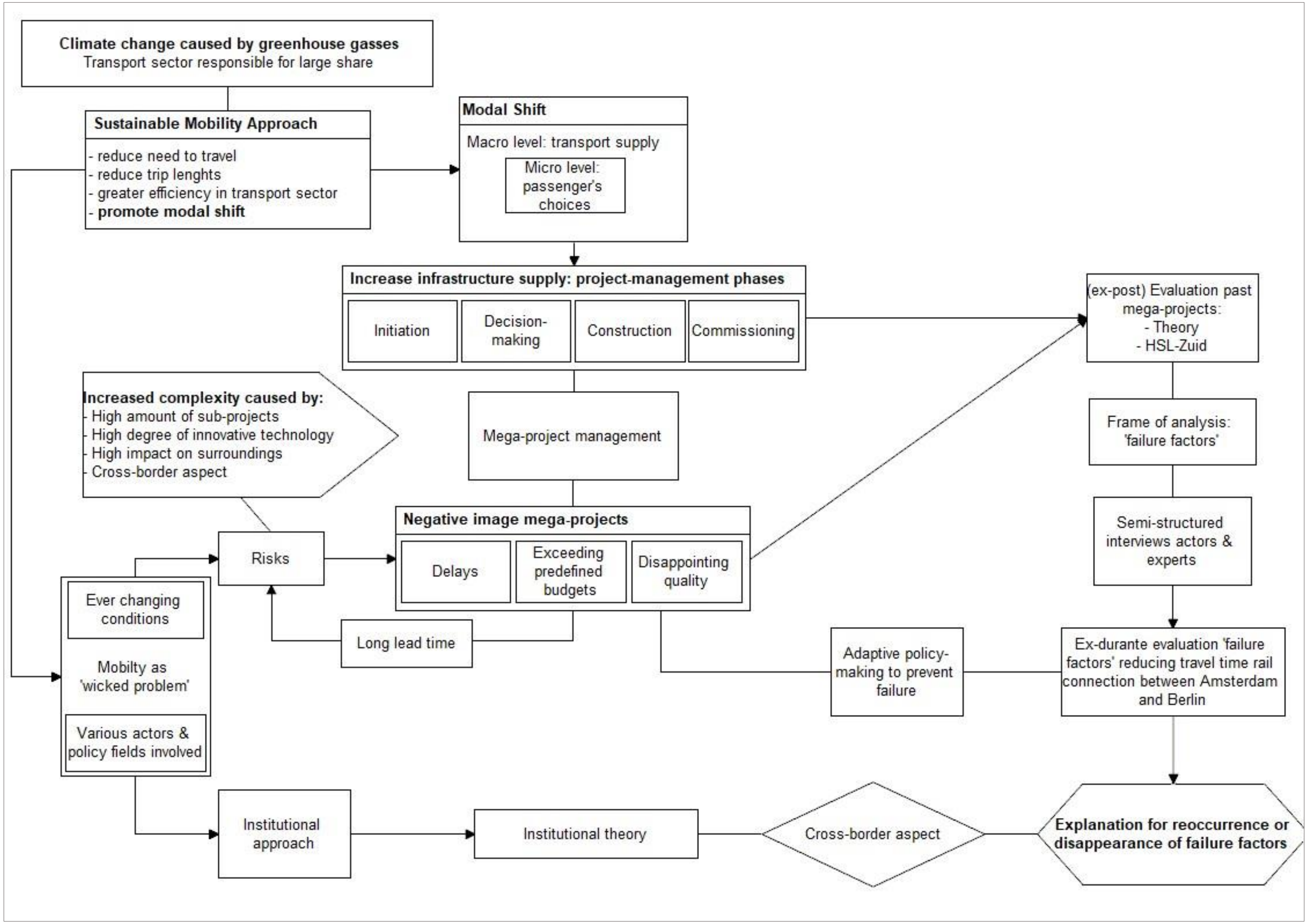

Figure 3: Conceptual Model of this research

2. Theoretical Framework: applying institutional theory to mega-project management

In this chapter, the theoretical lens applied in this research is presented. This research focuses on the institutions involved in mega-projects, and their role in the possible reoccurrence and disappearance of past failure in future projects. It is stated by Scott & Levitt (2017) that cross-border megaprojects are more complicated than projects within borders, due to their long-duration, multi-phase project lifecycle. That is why in paragraph 2.1, theory on mega-project management is shown, as these projects form the context in which failure takes place. Theory on the characteristics, structure and levels of analysis of mega-projects are laid down in this paragraph. This leads to understanding how these projects are created, and how these can be analyzed in order to understand the roots of failure.

The second and third aspect why cross-border projects are more complicated than national projects, as described by Scott & Levitt (2017), are the more diverse set of participants and varying degrees of local embeddedness. That is why in this research, institutional theory is used as independent variable to possibly explain reoccurring or disappearing past failure in future projects. In paragraph 2.2, there is looked deeper into institutions, their importance in opening windows of opportunity for policies and institutional theory on the different frameworks of institutions.

2.1 Megaproject management: phases and levels

Adjustments to infrastructure, or the building of new infrastructure is managed through (mega-)project management. The implementation of (mega-)projects is a process in which spatial planning and project planning come together: the process of changing a landscape goes through the phases of (mega-)project management. In this paragraph, we will investigate the characteristics and structure of (mega-)projects and the different levels on which (mega-)projects can be analyzed.

2.1.1 Characteristics

Westland (2007) defines projects as ‘a unique undertaking to produce a set of deliverables within a specified time, cost and quality’. Projects are unique in nature, have a defined timescale and approved budget, limited resources, involve an element of risk and achieve beneficial change. When the complexity of a project is of such great magnitude, these projects can be called mega-projects. (Gellert & Lynch, 2003) differentiate four categories of mega-projects: infrastructure, extraction, production and consumption. In this research, the focus is on infrastructure mega-projects. Frick (2008) describes typical characteristics of mega-projects in transportation infrastructure in 6 C’s:

1. Colossal in size and scope;
2. Captivating in size, architectural performance and aesthetic design;
3. Costly;
4. Controversial, caused by finance, mitigating measures and impact on third parties;
5. Complexity due to risks and uncertainties in design, financing and construction;
6. Control issues.

Megaprojects are defined differently throughout the literature field. Some of these definitions are rather broad, such as: “involving coordinated approaches of capital, sophisticated technology, intense planning and political influence” (Kardes et al., 2013, pp. 906); or: “large-scale sociotechnical undertakings that are complex and embedded in institutional frames” (Biesenthal et al., 2018 pp. 43). Others are already more explicit, e.g.: “temporary endeavors (i.e. projects) characterized by: large investment commitment, vast complexity (especially in organizational terms), and long-lasting impact on the economy, the environment and society” (Brookes & Locatelli, 2015 pp. 58). Flyvbjerg, (2014) attaches a measurable component, with as definition: “large-scale complex ventures that typically cost €1 billion or more, take many years to develop and build, involve multiple public and private stakeholders, are transformational and impact millions of people”. In sum, these projects can be seen as being of large scale, involving a high number of stakeholders and have a long lead time. Due to their longer life cycle, these projects often exceed the lives of companies, legislators or political parties. As a result, the risks of projects with a longer lead time are higher than short-term projects: these create a set of management challenges that are complicated to anticipate upon, even with a careful executed risk analysis beforehand (Scott & Levitt, 2017).

Scott & Levitt (2017) differentiate large projects from mega-projects using four characteristics of the complexity of the project and emphasize that not only increased size and scope make a regular project into a mega-project. The four complexities they distinguish are:

- **Spatial/technical configuration complexity**
  The number and importance of subprojects within the project. This complicates the project management, because a subproject require ‘intensive and continuous information sharing between the parties to ensure alignment of components’ spatial and functional interfaces with each other’ (Scott & Levitt, 2017, pp. 2). These are coordination-intensive interdependencies, where conflicting goals of actors require negotiation between parties involved, in order to reach agreement on the specifications of the project.
- **Maturity of involved technologies**
  New, innovative technologies bring about more uncertainties on the outcome, whereas conventional technologies bring less uncertainties. As a consequence of using conventional technologies, the project’s ambitions can fall short.
- **Scale of the project’s regional and political impact**
  The degree to which the project has an impact on its surroundings (environment and human populations), social movements can be mobilized, that will attempt to block or influence the project. This causes political complexity due to limited ‘social license’ for the project (Scott & Levitt, 2017). Political and public relations skills are required to rectify for this. A higher degree of social and political support for the project can prevent resistance against projects.
- **The cross-institutional complexity of ‘global mega-projects’**
  This occurs when key project delivery partners come from different national institutional frameworks, who as a result must find a way to resolve their differences so they can work effectively together to bridge their regulative, normative and cultural-cognitive differences.

Due to the complexities, such as these determined by Scott & Levitt (2017), mega-projects often know a longer lead time than ‘regular’ projects. During this long lead time, there is more time for uncertainties and risks to be created during the process. Especially with projects that are spatially dispersed (such as line infrastructure (WRR, 1994)) this can be a problem, as these projects know a large surrounding area in which these changes might occur. These are new, unforeseen risks that are revealed during the process and not known beforehand. The ‘existing’ risks of the project are those that are foreseeable in the beginning of the project. Both the foreseen and unforeseen risks are the drivers for eventual failure, that occurs as delays, exceeded budgets and insufficient quality (Biesenthal et al., 2018; Flyvbjerg, 2011; Flyvbjerg et al., 2009; Tijdelijke Commissie

Infrastructuurprojecten, 2004). The risks involved in a project depend on its difficulty, outcome variability, non-linearity and (non-)governability (Lessard, Sakhrani, & Miller, 2014).

Even though existing uncertainties and risks are reduced during the project-management (Priemus et al., 2013), it is stated by Eweje, Turner, & Müller (2012) that the seeds of underperformance in projects are planted early in these projects, and nurtured throughout the project. There is thus some kind of differentiation to be made between different phases the project passes through, in which different risks on failure might reach the surface and become reality (i.e. foreseen risks can become reality, or unforeseen 'new' risks might be created).

2.1.2 Structure of implementing mega-projects

The different phases of the creation of a project are theoretically defined in the project-management life cycle. The different phases contain the different tasks needed in order to finish the project and use it for what it initially was set up for. In this section, the contents of the different phases are laid down. It should be noted that these phases are no 'discrete elements' (Miller & Lessard, 2008a in Priemus et al., 2008, pp. 145), but these might somewhat overlap towards the finalization of the project. The phases used in this research are initiation, decision-making, construction and commissioning.

The definition of the (mega-)project management lifecycle, like the definition of mega-projects, varies through literature. Westland (2007) determines four phases: initiation, planning, construction and operation. Between construction and operation, the formal act of completion takes place. After this initial life-cycle the project can be evaluated and after the commissioning period be renovated, demolished or recycled. Scott & Levitt (2017) describe the phases in mega-projects as: shaping; design and construction; start up and commissioning; operations, maintenance & renovation; and demolition or recycling. Samset (2008) visually depicts the structure of mega-project management as is shown in Figure 4.

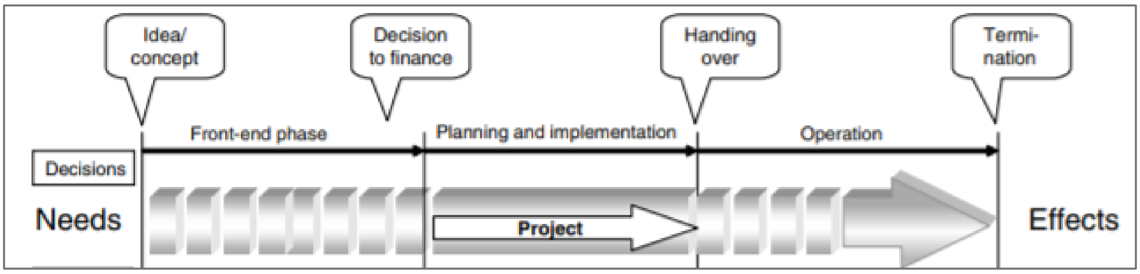

Figure 4: Project planning structure: decision and analysis (Samset, 2008)

Even though the conceptions of the distribution of the content of the different phases differ, broadly the same phases are identified: the different definitions all consider a 'front-end phase', in which the foundation for the project is laid and the initial idea becomes a commitment for the implementation. This is the phase idea becomes more specific, and alignment is sought with the actors involved. Then, when the idea is developed and a project is built, the idea should be formally approved, after which implementation of the physical project can begin. Ultimately, the construction finishes, and the project can be used for the initial cause. The project-management can be seen as successful when the project is implemented in line with the agreed budget and schedule, greatly contributes to the agreed objectives, has minor negative effects and brings about long-term benefits (Westland, 2007).

Initiation

The initiation phase is a melting pot in which the project is conceptualized and formed. This shaping episode has great impact on the outcome of the project, because in this phase the plans are developed in a project that actually will be built. As a result, in this phase the roots of success or failure of the project are planted (Eweje et al., 2012). The phase starts with a 'client', that wants a project to be built. With infrastructure projects, this often is the government. There should be decided whether the project should be continued, by looking at alternative solutions for the foreseen problem that the project should solve. Then, when there is decided to continue the project, the client should create a plan, that contains an outline of objectives, a clearly demarcated scope and structure of the plan. The scope of the plan is the definition of the boundaries within which all project activities will take place and tasks are accomplished (Westland, 2007). In example, the actors involved in the process are demarcated in the scope.

Then, if there is decided to continue the project, the participants involved should in collaboration, create a holistic proposal of the plan. This is often a time-consuming process. The holistic plan eventually should contain the business case, problem definition, selected solution and a timeframe in which the project can be realized. This phase should then lead to the presentation of a final recommended solution for the problem. After this final recommended solution has been proposed, this solution will go to the next phase, which involves seeking approval with several rounds of political decision-making.

Decision-making

In this phase, the formal decision-making on the final recommended solution of the initiation phase takes place. This will determine whether the final recommended solution will be approved, needs some adjustments or is discontinued. The proposed solution goes through several rounds of political decision-making. When the plan is approved by the Parliament, the practical implementation is elaborated on the lower governmental levels.

In order for the project to be approved, it should comply with the requirements for policymaking. This contains that policies should be legitimate, efficient, effective, politically feasible and socially acceptable (de Vries, Harbers, & Verwest, 2007; WRR, 2003).

- *Legitimacy:* mega-projects should have a legal basis, for 'legal subjects' to be protected against the arbitrariness of the government. Principles such as legal certainty and equality, transparency and democratic accountability of the decision-making process should ensure the legitimacy of the plans. These principles are established in the extensive process legislation of decision-making for spatial mega-projects. These procedures should be followed on all different levels of government involved.
- *Efficiency and effectiveness:* a proper understanding of the problem is a necessity when assessing whether the proposed solution will have the desired effects. This means that scientific knowledge, such as insights in transport flows, is indispensable (de Vries et al., 2007).
- *Political feasibility and social acceptability:* This requirement refers to the support (or opposition) that exists for the project within national politics. Political/strategic considerations should not hinder the cooperation with relevant stakeholders. The social acceptability depends on the extent to which projects provide a solution to socially experienced problems (de Vries et al., 2007).

When the project plan meets these requirements, the project is approved in political decision-making, and will be implemented in the spatial planning laws on lower governmental levels. During this process, the preparation of the physical construction of the project can start. Then, when the spatial implementation of the plans is finished, the construction phase can begin.

Construction

In this phase, the building of the approved project is prepared and executed. The execution and management are processed and monitored, in order to realize the plans that are formed in the initiation phase and approved in the decision-making phase. This monitoring should be capable of identifying change, risks and other issues during the construction, after which anticipating on these risks should be considered. The monitoring of the project also concerns the recognition of possible delays and over-budgeting, and complementary reconsideration of the schedule and budgets (Westland, 2007).

The physical construction of the project, the quality and correspondence to the proposed plans should be assessed after finishing the construction. Then, formal completion can take place. In the formal completion, after the approval of the quality by the customer or key stakeholder, the project is formally transferred to the new owner, who can then take the project into commissioning (Westland, 2007).

Commissioning

After the formal owner gets access to the constructed parts of the project, the initial goals of the project can be realized. Sometimes, such as with new rail infrastructure, this requires testing of the equipment. After approval of the equipment, the project then can be taken into commissioning. When the project is no longer considered suitable to achieve its goals with regards to the commissioning, it can be renovated, demolished or recycled.

2.1.3 Analysing mega-projects

Mega-projects thus are created through different phases, that together make up the (mega-)project-management lifecycle. In order to analyze the failure that might occur within these projects, we need to know the types of failure that can occur within mega-projects. This is done by looking at the different levels of mega-project analysis by Morris & Geraldi (2011). They identify 3 levels that over time have been given more importance in the process of analyzing projects. These levels are derived from Parsons' (1951, 1960) 'Three Levels of Rational Action', that acknowledge a 'inner' and 'outer' nature of project analysis. The technical and strategic level consider the 'inner' field of the project, while the institutional level is outside and around the project.

In the 50s and early 60s of last century, these projects were analyzed on *a technical level:* operational and delivery oriented. This stance towards project performance is critiqued by the lack of considering the developmental nature of project front-end management. As a result, in the late 60s and 70s project failures increased as projects lacked effective project management.

Consequently, the *strategic level* gained importance in the 80s, due to an increasingly complicated project environment. This level considered the importance of the front-end management of projects, with a project approach of organizational holistic entities (Morris & Geraldi, 2011). This approach ultimately also became obsolete, with critiques such as unclear objectives, poor project definition and unsupportive political environment. Engwall (2003) determines that the failure of projects is rooted in treating projects in isolation. Improvements to project management analysis could involve aligning strategy with the sponsors, influencing stakeholders, scheduling, and ensuring appropriate governance and control (Morris & Geraldi, 2011).

As answer to treating project in isolation at the strategic level, the *institutional level* of analysis of projects is enriched with considering the project beyond delivery, execution and management, and considers what must be managed in order to develop and deliver a project successfully in the definition stage and during the construction phase. The project then is seen as an organizational entity which must be managed successfully within both its business and social context. Managing the institutional context of projects can create 'the support for projects to flourish and their management to prosper' (Morris & Geraldi, 2011 pp. 1). On the institutional level, managing the project is focused on creating the conditions to support and foster projects, both in its external environment as in its organizational environment. Compared to the strategic level of analysis that focuses on 'the organization in its environment', with the institutional level the focus shifts to the organization of the environment (Scott, 2008, pp. 436).

When projects are analysed on an institutional level, the improvements that are being made are not improving one project, but improve the whole organizational environment of the project, that is the parent organization or the wider external context of the project (Morris & Geraldi, 2011). The improvements can be created by developing the appropriate context for projects in order to facilitate and accomplish effectiveness for the project itself. Developing the appropriate context for project asks for leadership that has a strong role in steering the interaction between 'a context that shapes management and a management that shapes context' (Morris & Geraldi, 2011, pp. 12).

Understanding the institutional level more as an independent area of investigation of projects, increases the understanding of how we can improve the performance of projects (Morris & Geraldi, 2011 pp.12). Then, as a result, the technical and strategic level of mega-projects can benefit and improve as well. By creating understanding of the project environment around those levels, and how the technical and strategic work is conditioned, constrained and supported by the environment around them (Morris & Geraldi, 2011).

2.2 Institutional Theory: understanding actors within policy-making processes

Understanding and improving the institutional level of projects thus contributes to increasing possibilities for improvement on <u>all</u> project levels. Understanding institutions thus can form an important catalyst in improving overall project performance and limit the (re)occurrence of failure. Institutional theory explores how organizations gain and maintain their characteristics (Scott, 2008), and thus forms a means to grasp the dynamics at the institutional level of projects. Institutions and institutional design are central to the planning practice of creating more just, liveable and sustainable cities (Sorensen, 2017). The theorization of institutions is thus an important factor in generating planning theory. That is why, in this paragraph, institutional theory is presented as the theoretical lens for this thesis.

2.2.1 Relevance Institutions for (mega-)projects

Projects are shaped by institutional factors, such as experiences from shared activities, politics and institutional norms, values and routines (Engwall, 2003). Researching the institutional context of projects contributes to the understanding of these institutional factors. Understanding institutional factors creates understanding of how projects are shaped, and might contribute to the understanding of how to improve project performance. Biesenthal et al. (2018) underline this, by stating that understanding the institutional framing, underpinnings and logics of mega-projects can provide the key in the successful delivery of mega-projects.

Window of opportunity: complexities due to fragmentation of power

The change from government to governance and increasing international collaboration(see paragraph 1.5) have led to a high degree of fragmentation of social, political and economic objects (Crespo & Cabral, 2016). The complementary opacity of the state and formation of networks within policymaking have raised complexity in creating windows of opportunity for policy agenda setting. The opening of a policy window then is the opportunity to create a project from government perspective.

These windows of opportunity are derived from Kingdon's (1995) theory on political agenda setting. Kingdon (1995) describes that 3 concurring streams are a critical condition for policy transformations: societal problems, policy situations at hand and political endorsement. Matching these streams are required for the opening of a policy window. Buitelaar, Lagendijk, & Jacobs (2007) describe in their research that first policy window then can be reached by an institutionally, politically & discursively defined critical moment, with pressure for change from the external societal developments and institutional reflections from parties attached to the prospected policy (Figure 5). A second window of opportunity then is reached by the alignment of powerful alternatives and problem perceptions of the actors involved in the policymaking. The understanding of institutions within a policy process can thus contribute to the understanding of the performances of such policy-making processes. That is why, in the next paragraph institutional theory is explained, as this contributes to the understanding of characteristics of institutions. This understanding of institutions is then applied to mega-projects in this research, which then is used as explaining variable in the difference of occurring failure factors between past and future mega-projects.

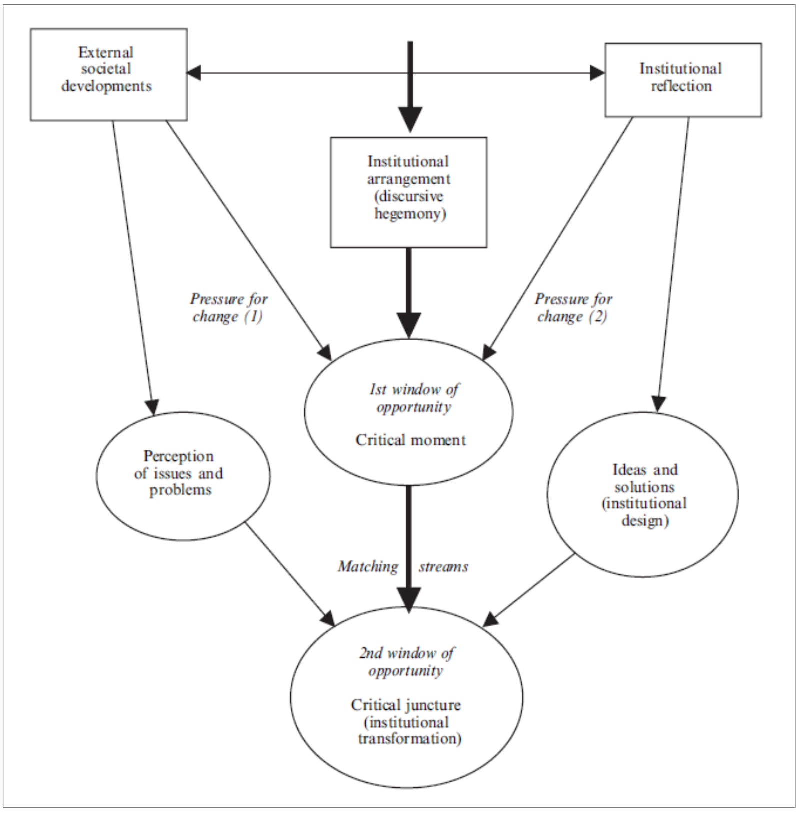

Figure 5: A model of institutional change by Buitelaar et al., (2007)

2.2.2 Institutions & their three pillars

Institutional theory explores how organizations gain and maintain their characteristics (Scott, 2008). It assumes that the environment of an organization affects this organization, and that this environment is a social construction that is deeply historically sedimented (Engwall, 2003). Institutions are the rules of the game that govern social exchanges undertaken by individuals and organizations. Institutional theory highlight the overarching values, traditions, norms and practices that shape or constrain political behaviour and give meaning and understanding to political processes (Pierre, 1999). It is a means through which the values and objectives that give these processes direction and meaning can be understood.

Mega-projects can be seen as an organizational field (Scott & Levitt, 2017). An organizational field is defined as a full range of relational elements (i.e. stakeholders) but also important symbolic aspects that inform and motivate the actions of participants (Scott & Levitt, 2017 pp. 8). Seeing a mega-project as an organizational field allows us to treat it as the focus of research, as it is a complex or diverse organization that is operating in the same 'small world'. It can be assumed that the organizations in the organizational field share the same or related institutional habits. In order to understand mega-projects, we should first understand institutions that are involved in such processes.

> "Institutions comprise regulative, normative and cultural-cognitive elements that, together with associated activities and resources, provide stability and meaning to social life" *(Scott, 2013, p. 56)*

According to this definition of institutions by Scott (2013, pp. 56), institutions consist of three type of elements: regulative, normative, and institutional elements. In this section, the origin and content of the various elements will be examined in more detail. The theory on the different elements of institutions is called the 'Pillars framework', as each element can be seen as one pillar of an institution. All institutions are composed of different combinations of elements from the 3 pillars or frameworks. The composition of the elements on which institutions are based vary among themselves and over time in which elements are dominant (Scott, 2013). The three pillars influence social order independently and appear in varying combinations to collectively make up and support existing social arrangements. Differences among elements can create dilemmas, tensions, misunderstandings, conflicts and confusion between institutions (Scott, 2010).

The 3 types of pillars dealt with in this paragraph are:

- Regulatory frameworks (i.e. rules, laws and orders)
- Normative (i.e. norms and values)
- And Cultural-Cognitive frameworks (i.e. beliefs, schemas and frames)

Of these frameworks, regulative controls and normative prescriptions are affected by cultural systems, because norms and rules exist in institutionally constituted entities (Scott, 2010). These cultural and normative systems are slow-moving: they evolve as the result of unintended, interdependent actions of collections of individuals over long periods. On the contrary, regulative frameworks are more rapidly changed by changing legal circumstances (Roland, 2004; Scott, 2013).

It is stated by (Scott, 2010) that cultural-cognitive elements shape the normative prescriptions and regulation controls of institutions, because norms and rules must refer to institutionally constituted entities.

In the next section, the frameworks are briefly discussed on their most important characteristics. In Figure 6 on page 30 a simplified overview of all characteristics of the frameworks is provided. For a complete overview of the contents of the characteristics of each framework, see Scott (2013, pp. 55-85).

Table 3.1 Three Pillars of Institutions

	Regulative	*Normative*	*Cultural-Cognitive*
Basis of compliance	Expedience	Social obligation	Taken-for-grantedness Shared understanding
Basis of order	Regulative rules	Binding expectations	Constitutive schema
Mechanisms	Coercive	Normative	Mimetic
Logic	Instrumentality	Appropriateness	Orthodoxy
Indicators	Rules Laws Sanctions	Certification Accreditation	Common beliefs Shared logics of action Isomorphism
Affect	Fear Guilt/ Innocence	Shame/Honor	Certainty/ Confusion
Basis of legitimacy	Legally sanctioned	Morally governed	Comprehensible Recognizable Culturally supported

Figure 6: Three Pillars of institutions (Scott, 2013, pp. 60). For more details on the principal dimensions (left column) that make up the rows, see Scott (2013, pp 60-70).

Regulative Frameworks

The regulative pillar of institutions is based on an instrumental logic individuals craft laws and rules they believe will promote their interests. Laws and rules are created, because individuals and actors want to be valued with rewards or want to avoid sanctions. From the regulative perspective, institutions constrain and regulate behaviour of actors. The focus thus is on rational choice and design (Scott, 2013). Then, there is a need for clear objectives and rules. Surveillance on obeying the rules is an important method to steer and regulate behaviour. According to Scott (2013) force, sanctions and expedient responses are central ingredients, that then should be justified by authority. This implies that power is institutionalized. Many different types of regulation enable & empower actors and actions. The public sector is capable of creating such actors and their according powers of action. The role of the state is to be a rule maker, referee and rule enforcer. The state in this sense cannot be neutral due to its interests and being autonomously from other societal actors (Scott, 2013). From the regulative perspective, formalized administrative structures and legal systems are created to manage political and economic behaviour (Scott, 2013; Scott & Levitt, 2017).

Normative Frameworks

The normative pillar of institutions emphasizes normative rules that describe a prescriptive, evaluative and obligatory dimension of social life. Importance is given to the social order of social obligations and binding expectations; it provides the moral undergirding to social life (Scott, 2013; Scott & Levitt, 2017). Normative systems impose constraints on social behaviour and empower & enable social action. Values and norms are important with normative frameworks. Values are the preferred or desirable ends, and values are the legitimate means through which values are to be pursued.

Whereas the regulative pillar is seen as instrumental and useful in managing political and economical behaviour, the normative pillar emphasizes appropriateness and explains the social embeddedness of political and economic behaviour. Actors are not seen as rational, but as social persons who care deeply about their relations to others and adherence to guidelines provided by their own identity (Scott, 2013). With the regulative pillar, the focus is on the rational choice and design. The normative pillar is researched by sociologists, who examine institutions where common beliefs and values are more likely to exist (Scott, 2013).

Whereas regulative pillar focuses on power, normative pillar focuses on roles. Roles decide to whom values and norms are applicable. These can formally be constructed or emerge informally. Roles form the prescriptions that are normative expectations how specified actors are expected or supposed to behave. Social actions are based on reactions of others to one's choices & internalized commitments to the role that is taken (Scott, 2013).

Cultural-cognitive Frameworks

The cultural-cognitive pillar of institutions focuses on the central role played by socially mediated construction of a common framework of meanings. The cultural-cognitive framework is based on shared conceptions that constitute a nature of social reality and create frames through which meaning is made. The cultural-cognitive pillar is based on the idea that internal interpretative processes are shaped by eternal cultural frameworks. Symbolic, subjective processes work to construct social reality, define the nature and properties of social actors and actions. A cultural-cognitive conception of institutions concerns the extent to which social order relies on a shared understanding of the situation (i.e. a shared definition of a local situation, common frames and patterns of belief) (Scott, 2013). The cultural-cognitive framework of institutions is researched by anthropologists, whom research the extraordinary variation that exists over time and space among different tribes and people (Scott & Levitt, 2017).

It is stated by (Scott, 2010) that cultural-cognitive elements shape the normative prescriptions and regulation controls of institutions, because norms and rules must refer to institutionally constituted entities.

2.2.3 International mega-projects and the three pillars of institutions

Mega-projects across borders incorporate and are subject to a diverse, complex and conflicting combination of elements of institutions. Mega-projects that cross borders and/or involved actors from multiple countries must face multiple forms of regulative frameworks (e.g. laws of home and host countries & regulation of regional and local entities), normative frameworks (e.g. professional standards that undergird global construction practices) and cultural-cognitive frameworks (e.g. economic and religious ideologies, differing ethnicities and languages) (Scott & Levitt, 2017).

Scott & Levitt (2017) call the mega-projects that cross borders global mega-project, and define these as 'a temporary endeavor where multiple actors seek to optimize outcomes by combining resources from multiple sites, organizations, cultures and geographies, though a combination of contractual, hierarchical and network-based modes of organization' (Scott & Levitt, 2017 pp. 99). Hallmark of global mega-projects is the wide range of cultural differences they confront. With global mega-projects, there should be found a way to overcome the differences in order for the actors from different countries to work effectively together to resolve multiple challenging technical, contractual and political issues.

2.3 Synthesis Theoretical Framework

In this chapter, the theoretical concepts used in this research are presented. In this research, an institutional lens is applied to mega-projects. Researching the institutional level of mega-projects forms the basis for contributing projects on the technical and strategical level as well. The institutional level can be improved by understanding the institutions and their contexts, which can be done using institutional theory. Institutions consist of three pillars: a regulative, normative and a cultural-cognitive framework.

Mega-projects are created using mega-project management, that is equal to 'regular' project management. The difference between regular projects and mega-projects are that mega-projects have an increased complexity, due to the four factors that are described in this research. The international aspect which makes regular projects into mega-projects makes that differences in national frameworks should be overcome within a project environment. This contains differences in regulative, normative and cultural cognitive frameworks. With international projects, the cultural cognitive frameworks often differ between the countries involved. Differences among elements can create difficulties between institutions, and can result in (the risk on) failure) The cultural-cognitive framework is also the framework that is moving slow towards changes and exerts influence over regulative and normative frameworks. The differences in cultural-cognitive frameworks thus might provide a reason for (re)occurring failure in cross-border mega-projects.

3. Operationalization: deriving failure factors from theory and practice

In this chapter, the operationalization of this research is laid down. The variables that will be measured in the analysis in chapter 6 are uncovered as failure factors that cause delays, exceeded budgets and disappointing quality. In chapter 1 it is stated that mega-projects are large socio-technical undertakings that might bring societies further, in example by creating a means through which sustainable mobility can be achieved. These projects, due to the high frequency of occurring failure have a negative image, of which as a result projects might not be realized, preventing the negative, but also positive impacts of projects from taking place. The failure factors that form the operationalization for this research are derived from literature, parliamentary inquiries and an empirical case of the HSL-Zuid.

In chapter 2 it is stated that failure descends from risks on the technical, strategical or institutional level of projects. In this chapter, the more exact factors that cause risks and lead to failure are laid down. In chapter 2, theory on mega-project management shows that these projects are implemented through phases. That is why, uncovering the failure factors is also divided in the different phases of mega-project management.

3.1 Context of Empirically derived factors: Dutch Mega-projects in international rail connections

In this paragraph, context for the empirical case to uncover the failure factors is set. The context of this case is needed to understand how the failure factors are created. The empirical case that will contribute to the frame of analysis is the HSL-Zuid. In chapter 6, the results, the failure factors derived from the HSL-Zuid and theory are assessed to the extent to which these factors might occur again or disappear with the possible future project of reducing travel time by implementing new infrastructure between Amsterdam and Berlin, possibly by re-opening the plans of the HSL-Oost.

In the recent history of Dutch international rail projects, two projects are extensively researched. These are the HSL-Zuid, a high-speed rail line dedicated for passenger traffic from Amsterdam to Antwerp, and the Betuweroute, a dedicated freight traffic line from the port of Rotterdam to the Ruhr area in Germany. The Temporary Committee Infrastructure projects (2004) found that, even though these projects knew all kinds of differences (e.g. in ambitions, technical characteristics, international collaboration partner, political steering and control), the application of the lessons learnt surpasses these individual projects. Similar patterns and problems were found in both cases. Taking the 'failure factors' one of these projects into account is, for this research, considered to be sufficient. These will be added by theoretical failure factors, and as a result a framework of the most important failure factors for the Dutch context of rail-infrastructure mega-projects is created.

In this research, the HSL-Zuid is used as frame of reference to specify the failure factors on infrastructure projects dedicated for rail passenger services, from a Dutch perspective. This project is taken instead of the Betuweroute, as the actors that are involved in passenger and freight rail services differ considerably. This is important to take into consideration due to the institutional lens that is applied in this research. The analysis in chapter 6 focuses on rail passenger services between Amsterdam and Berlin, and thus the HSL-Zuid is more similar with regards to the Dutch actors involved to the HSL-Oost than the Betuweroute is. The Betuweroute, however, is still of interest for the HSL-Oost, as parts of the plans were created within the same Treaty (also see paragraph 5.1). For more information on the Betuweroute, see Box 1: Betuweroute in short.

3.1.1 HSL-Zuid

The HSL-Zuid is the Dutch part of the High-Speed Railway line between Amsterdam and Brussels. This line was implemented to connect the Netherlands to the European High-Speed Railway network. In order to do so, new High-Speed Railway infrastructure was implemented between Amsterdam and Rotterdam and between Rotterdam and just below Breda, at the Belgian border. To reach the train station of the connected cities, existing conventional tracks were used. The train stations directly connected on the Dutch side are Amsterdam Central Station, Amsterdam Zuid, Schiphol Airport and Rotterdam Central Station (Omega Centre, 2009). The line was supposed to be a 'stand-alone' line, apart from the rest of the Dutch rail network (interview 2). Eventually, the line was integrated in the Dutch national rail network.

> **Betuweroute**
>
> *The Betuweroute is a rail connection from the harbor of Rotterdam towards the Ruhr area in Germany used for freight transport. The decision-making for this route was finished in 1992 through the signing of the Treaty of Warnemünde between Germany and the Netherlands. In this treaty, the countries reached an agreement on, amongst others, the building of this freight line. As a result of ambiguity of the legal status of the Treaty of Warnemünde which seemed to be more based on 'best efforts' rather than implying performance obligations* (van Ham & Baggen, 2015). *As a result, the Dutch part has been finished in 2007, while in Germany construction is just now being started. The foreseen date of finishing was 2023, but that might become 2030, or even past 2030 (interview 7, 16). This delay is partially caused by the fragmentation of power between governmental layers in Germany (interview 7).*
>
> *Problems encountered on the Dutch part include changing regulations on the specifications of tunnels due to a longer lead time, after which the tunnels had to be adjusted to those new specifications again (interview 5). For other problems regarding the implementation of the Betuweroute, see Pestman (2001).*

Box 1: Betuweroute in short

The HSL-Zuid can be considered a mega-project, because it complies with all 4 requirements of Scott & Levitt (2017) that make a project into a mega-project that are uncovered in paragraph 2.1:

- **Spatial/technical configuration complexity:** The implementation of the HSL-Zuid was built using public private partnership (PPP) in the form of a Design-Built-Finance-Maintain (DBFM) contract[4]. With this type of contracting all separate elements are taken care of by one party in the contract. As a consequence, the HSL-Zuid consisted of 3 kinds of 'intersubproject' contracts; 7 for the physical foundation by Infrarail, 1 for the construction of the tracks, signalling and maintenance by the consortium Infraspeed and one for the exploitation by Hispeed Alliance. See Attachment 1 for an overview of the contracts and the parties involved. According to De Bruijn, Heuvelhof, & Veld (2010), the HSL-Zuid illustrates perhaps the most extreme form of splitting up the production chain into individual contracts until then in the Netherlands. The duration of the contract Is from 2006 until 2031. Consequently, the problems that arise from this contract structure that are elaborated on in this chapter will be present until 2031.

[4]For more information on this type of contracting see Koppenjan (2008) in Priemus & van Wee, 2014.

- **Maturity of involved technologies:** the project consisted of around 85 kilometres of new High-Speed Railway tracks, for which the designed speed is 300 km/h. This kind of rail infrastructure was not implemented in the Netherlands before. In order to reach the city centres, existing conventional tracks are used. The equipment used thus should be capable to overcome these differences in technological specifications between High-Speed Railway infrastructure and conventional rail infrastructure, and required new, innovative equipment. The equipment was also the first equipment in the Netherlands to use the new security system ERTMS, without an underlying security system. Another aspect of innovative technology involved in building the HSL-Zuid was the tunnel that was built underneath the Green Heart area, in order to preserve this nature area. This was one of the first tunnels to be built in the Dutch 'soft' soil, requiring a specially built machine for this project (Omega Centre, 2009).
- **Scale of the project's regional and political impact:** the project required a new rail connection to be built, which has a considerable impact on the surroundings of such a line. Line infrastructure is spatially dispersed, involving a bigger physical and social environment than with spatially concentrated projects (WRR, 1994). The implementation of the HSL-Zuid required 85 kilometres of new High-Speed Railway tracks and 170 civil artworks (Algemene Rekenkamer, 2014). Besides the regional impact that the HSL-Zuid has on the surrounding areas along those 85 kilometres, the political impact of the project was considerable as well. The resistance in national politics towards the project eventually led to the building of the Green Heart tunnel (Omega Centre, 2009).
- **Cross-institutional complexity of 'global mega-projects':** the key delivery partners were from both the Dutch and Belgian government and rail sector. The difficulties in resolving differences in institutional frameworks becomes clear from the deadlock on negotiations between the countries between 1994 and 1996. This deadlock can be traced back to a disturbed relationship between the two ministers of Transport involved (Omega Centre, 2009). The differences in institutional frameworks contain differences in political-administrative culture, and differences in conceiving business relationships (interview 1).

Month	Year	Type of decision	Key decision/event
	1977	Report	AmRoBel report: route study for HST Amsterdam-Rotterdam-Belgium
	1979	Structure Scheme	*SVV1*: First government decision that anticipates the HST
	1986	Report	*PBKA* report: viability study train lines between Paris-Brussels-Köln-Amsterdam
	1987	Decision	Starting Note: beginning spatial core decision procedure to establish HST
March	1991	Report	First HSL Green Paper send to parliament
September	1993	Decision	Decision to produce a new HSL Green Paper. The first was insufficiently thought through to be able to survive the decision-making process (interview project leader).
March	1994	Report	Presentation of 'the new HSL Green Paper'
May-September	1994	Consultation	Public consultation
May	1996	Decision	Decision is taken to build a tunnel under the Green Heart
May	1996	Report	*PKB3* decision is sent to parliament
July	1996	Agreement	Belgium and Netherlands reach an agreement about the route. The Netherlands pays EUR 400m as compensation
December	1996	Decision	*PKB3* decision is ratified by parliament
July	1997	Decision	The Spatial Core Decision HSL Zuid comes into force
September	1997	Agreement	Agreement with Belgium is ratified by parliament
April	1998	Decision	Definite decision on precise route
October	1998	Decision	Tender strategy is determined
February	1999	Decision	Start tender infrastructure provider
April	1999	Decision	Start tender transport provider, exclusively for NS
March	2000	Notification	Official start construction HSL Zuid
June	2000	Decision	Decision to public tender transport provider contract
July	2000	Signing	Signing of construction contracts base
December	2001	Signing	Signing of contracts of infrastructure provider and transport provider
July	2002	Decision	Decision to reserve EUR 985m for Betuwelijn and HSL Zuid
November	2003	Decision	Appointment of temporary parliamentary commission on infrastructure projects
May	2004	Decision	Transport provider orders the trains
	2005	Construction	Construction base finished
	2006	Construction	Southern section Rotterdam to the border finished
	2007	Construction	Northern part finished
September	2009	Transport	First paying passengers are transported over the new line

Figure 7: Project timeline HSL-Zuid (OMEGA centre, 2009)

Timeline HSL-Zuid

In Figure 7, an overview of the most important events for the implementation of the HSL-Zuid are shown. In this section, these most important events are explained.

In 1977, a Dutch-Belgian study for routes was the starting point of a Dutch connection to the proposed European High-Speed Railway network. The main objectives of the line were to connect Amsterdam and Rotterdam to the European High-Speed Network in an 'high-quality manner', encourage economic development and provide an alternative to air travel to European destinations. In 1987, the connection was formally included in Dutch policy plans which were revised in 1993 due to the 'old' plans having been considered weakly substantiated. From 1994 until 1996, there was a deadlock in the negotiations on preferred routes between the Belgian and Dutch governments. In 1996 this deadlock was resolved with the arrival of a new minister, who provided Belgium with financial compensation for the fact that the preferred route was lengthier on Belgian territory. In 1997 the final decision, including the construction of a tunnel, underneath the rural Green Heart area, was made, and in 1998 the plans for the definitive route were approved. In 2009 the line was officially taken into commissioning.

The complexities of the HSL-Zuid resulted in expenses of 7.3 billion (in 2013) instead of the proposed 3.4 billion, a 4 year delay in commissioning of the line and a lower frequency of trains than proposed (Algemene Rekenkamer, 2014). These shortcomings created a negative image of mega-projects in the Netherlands and resulted in a parliamentary inquiry of large infrastructure projects (Smith & Bryant, 1975; Tijdelijke Commissie Infrastructuurprojecten, 2004) and the discontinuation of the designated trains (Tweede Kamer der Staten Generaal, 2015). The shortcomings in decision-making and the procedure which led to the choice for the designated, faulty trains have been investigated in parliamentary inquiries. These inquiries were held because "the people are entitled to have a more careful, balanced and democratic management of the decision-making on megaprojects and a more effective political control of the development and implementation than with the HSL-Zuid." (Tijdelijke Commissie Infrastructuurprojecten, 2004). Understanding the factors that contributed to the failure of the HSL-Zuid might contribute to preventing the same failure of occurring in similar projects in the future.

The decision-making on the HSL-Zuid took relatively long time due to both national and international disagreements on the route. In the Netherlands, the preferred choice for a route that would cross the rural area of the Green Heart was heavily contested and faced a lot of opposition within the government, resulting in a relative long lead time of the decision-making process. Other proposals of adjusting and upgrading current infrastructure were preferred by the opposition. Finally, as a compromise, a tunnel was built underneath the Green Heart, of which as a result the nature area remained intact. On an international level, the Dutch and Belgian preferred routes did not correspond and the relations between the ministers of both countries were disturbed, resulting in a 2-year deadlock in the negotiations.

3.2 Uncovering theoretical and empirical failure factors

In this paragraph, the factors of cross-border mega-projects that generate delays, cost overruns and inadequate quality are uncovered. These factors are derived from theoretical and empirical sources: literature on mega-projects, parliamentary inquiries and interviews regarding the HSL-Zuid. The failure factors are divided in the phases of mega-project management as described in paragraph 2.1.2., initiation, decision-making, construction and commissioning.

3.2.1 Initiation phase

In chapter 2 on mega-project management, the initiation phase is defined as the phase in which the project is conceptualized and formed. In this phase it is decided whether there is a project, or that other alternatives can be realized instead. The roots of success or failure are planted early in the process of implementing projects (Eweje et al., 2012). This is thus an important and crucial phase for the eventual failure that occurs in a project. The result of this phase is a business case, problem definition, selected solution & planning. The objectives should be outlined, the scope should be demarcated, and the structure of the project should be made clear. Then, in the next phase, the political decision-making can take place.

I. Targeted tackling of the thoughtfully identified problem

In order to come to the final solution of the project, the different possible alternatives should be inventoried. In this phase, the different possible solutions should be narrowed down to one preferred alternative, that becomes the final solution that will be taken towards the decision-making phase. The selection of the final preferred solution can have a dynamic, iterative course, due to the wishes of the stakeholders that can be chosen to be considered in the selection of the preferred solution. This process is described in the failure factor 'national coordination of parties'.

The strictness of the problem analysis influences the amount and quality of the alternatives that are considered in the process. When the problem is defined very broadly, there are many ways to solve this problem and many stakeholders and their according wishes that can be involved. Involving stakeholders in the selection of alternative is a good way to create a supporting base, but the participation of parties that should not be involved in this process might prevent the project from being built due to exerted blocking power by actors.

The problem of a solution preceding the problem analysis occurs often with large infrastructure projects (Tijdelijke Commissie Infrastructuurprojecten, 2004). A tangible solution is decided on, while the underlying problem often receives insufficient attention. Without proper problem analysis before offering a solution, it becomes difficult to assess the efficiency and effectiveness of the policy, as there is no frame of reference for the problems that should be solved by the project. The lack of problem definition goes at the expense of the societal, political and professional debate, and can result resistance or lack of support in later stages.

With the HSL-Zuid, the final solution of a High-Speed Railway line preceded the problem analysis. On an international level, it was decided that the Netherlands and Belgium would be connected to the European High-Speed Rail network. Argumentation from the Netherlands was to prevent becoming the Jutland of Europe and be cut off the core of the European Union. The decision to join the European High-Speed Railway network implied that the infrastructure built would be suitable for 300 km/h. With the HSL-Zuid, this resulted in resistance in national politics. An alternative that would do less harm to the Green Heart area by following existing infrastructure was cast aside by the Ministry of Transport. This alternative involved too many curves, which cannot be navigated at velocities of 300 km/h. The lack of discussion on the utility and necessity of the project facilitated changing argumentation, which caused opposition in politics and society. As a result, eventually a tunnel underneath the Green Heart area was built, resulting in much higher costs (900 milion euros (Omega Centre, 2009) for the line.

II. Inappropriate objectives

The objective of the HSL-Zuid mega-project was to connect Amsterdam, Schiphol and Rotterdam to the European High-Speed Railway network. In adhering to this goal, it was implied that this would be done by implementing High-Speed Railway infrastructure. Motivation to connect to this network was to encourage economic development and provide an alternative to flying on European destinations (Omega Centre, 2009). There was no goal set for transport objectives. For financial revenues, however, there was. 1.8 billion Guilders of the construction costs should be earned back by the national government. The Parliamentary Inquiry Committee, that researched the process of the establishment of the HSL-Zuid, judged that the government should have let the transport objectives outweigh the financial outcomes (Tweede Kamer der Staten Generaal, 2015).

III. National coordination of parties

This failure factors concerns the coordination of parties involved in the project on the national level. The HSL-Zuid concerns the Dutch part of the connection between Amsterdam and Brussels and thus this factor concerns the coordination of Dutch parties.

The national coordination of parties concerns the parties involved and their bases of collaboration. The coordination of parties on a national level determines the governability of the project: the extent to which projects can be reconstituted and proceed after major changes occur in the project drivers (Lessard et al., 2014). The key stakeholder of a project is usually the commissioning party. This party wishes to arrive at the best choice or concept for their product. This is reached through a process of dialogue with other stakeholders. The key stakeholders promote and shape the project through successive iterations. In these iterations, the desires & constraints of all stakeholders involved should be accommodated by the key stakeholder. Different versions of the project's scale, scope and location should be formulated in order to differentiate between the wishes of stakeholders. The key stakeholder is also responsible for the demarcation of the parties involved in the project. It should be clearly defined **who** the actors involved are and **when** they should be attached to the project. An optimum balance between interaction with actors and accurate redundancy should be characterized through stakeholder management (de Bruijn & Leijten in H Priemus et al., 2008). This way, it can be prevented that external parties can exert blocking power on the project and frustrate the project planning.

With large infrastructure projects, the government is responsible for the development, financing and managing of the project. The government decides on the final recommended solution. However, the transformation from government to governance (see paragraph 1.4), makes that the government operates within a network of dependencies, in which actors operate in different realities, resulting in different wishes and constraints and definitions of the problem. Only when the government recognizes the fact that it is not operating in isolation can a process of discussion and negotiation with other parties be created, doing justice to the mutual dependencies and different roles in the network. This way, a higher consensus about the final recommended solution can be created, enhancing the support for the project.

Through approaching the project from the start as a High-Speed Railway project, this automatically meant the implementation of new infrastructure, as this type of infrastructure did not yet exist in the Netherlands. The implementation of new infrastructure should be done through tendering, in order to create a leveled playing field. As a result, the Dutch railways, whom in that time were responsible for both building rail infrastructure and executing rail services, could not apply for both tenders, as that would create a monopoly position. As a result, the Dutch government chose a form of Public Private Partnership (PPP) in the form of a Design, Built, Finance and Maintain (DBFM) contract[5]. The physical construction of the project was in the hands of two different parties: one for the 'groundwork' such as the foundations, and one for the construction of 'upper work' such as the tracks. Then, the execution of the train services would be in the hands of an alliance of the Dutch Railways and the Royal Dutch Airforce. For an overview of all the parties involved, see attachment 1. As a result of this complicated structure of the stakeholders and actors involved, the party responsible for the commissioning was not involved in deciding on what the tracks looked like. The coordination with these parties took place at a later stage in the process. As a result, not all intentions and ambitions of the parties involved were apparent among all parties involved. When intentions and ambitions are defined clearly beforehand, mutual trust and alignment of the specifications of the plans can be improved.

IV. International coordination of parties

Adding an international aspect to projects makes them more complex than national projects (de Vries et al., 2007). For example, differences in legal procedures can be a source of uncertainties. Coordination should not only be realized with parties within the country of the commissioning party, but also in other countries involved in the project. These countries have their own frame of reference regarding project planning, and their own spatial planning laws into which the projects should adhere. This increased complexity is described in the 'cross-institutional complexity of global mega-projects' by Scott & Levitt (2017). The cross-institutional complexity should be overcome by finding a way to resolve the differences of these national institutional frameworks.

With the HSL-Zuid, the decision to proceed to the initiation of the project was taken on an international convention, after which, the plans had to be 'sold' on a national level. In both Belgium and the Netherlands, acquiring support for these plans turned out to be problematic.

Once the national support was created, the international alignment of the national plans had to take place. This caused contestations on the physical route, driven by a disturbed relationship between the Dutch and Belgian ministers of Transport. Mutual trust could be restored by executing joint studies investigating the best option for the physical route. After a financial compensation of 400 million euros was granted to Belgium by the Dutch Government, the contestations were resolved, and the construction phase could begin.

V. Forecasts: realistic estimation of timeframe

A consequence of the contracting through tendering, is that these public procurement schemes are characterized by providing optimistic forecasts (Priemus et al., 2008). The reason behind this is quite straightforward: should the forecasts not be optimistic; the project would probably not be granted to that party. Then, when during the construction the forecasts have been optimistic (e.g. with the time it takes to build the project), it would be more expensive to stop the building than to continue (interview 15). These forecasts often omit ex post comparisons of similar projects and are calculated according to the 'EGAP' principle; *everything goes according to plan.* The actual risks estimations are thus not taken into consideration when drafting these forecasts.

With the HSL-Zuid, the risks stemming from the surroundings were not considered. For example, the

[5] For more information on these contracts see Koppenjan (2008) in (Priemus & van Wee, 2014).

repercussions for building in the Dutch 'soft' soil, were not accounted for thoroughly enough, resulting in sagging of the foundations underneath the line, which had a negative effect on the performance of the line (interview 14).

VI. Further elaboration of the plan

With mega-projects, ambitions are often set too high, which will not always produce spectacular achievements, but do produce risks that eventually could lead to a disappointing project. As is mentioned by Scott & Levitt (2017), different grades of innovative technology involve different rates of risk. Examples of innovative project components of the HSL-Zuid were the technical and financial elaboration of the plan.

The technical elaboration of the HSL-Zuid in the Netherlands involved around 85 kilometers of new tracks dedicated for the new connection to Brussels. This 'stand-alone' line would only be used for the connection between Amsterdam and Brussels, and was suitable for velocities up to 300 km/h. To reach the city centers, the existing conventional tracks were used. The transitions from High-Speed Railway tracks to existing tracks added to the complexity of the equipment used, as these tracks operate on different voltage systems (interview 1, 2, 3).

The HSL-Zuid is the first and only part of Dutch rail infrastructure suitable for velocities up to 300 km/h. This can thus be seen as innovative technology. On the HSL-Zuid, only the European Security System ERTMS is implemented, without another underlying conventional security systems. These complex technical elaborations of the plan led to ambiguities about the specifications of the tracks, with which rolling stock had to comply. As a result, the order for the rolling stock was placed too late, after which testing could not take place on designated infrastructure anymore. This is described in the failure factor 'testing of the equipment'.

At the time of the HSL-Zuid, the ideology of the free market was eminent. The expectation was that Public Private Partnerships (PPP) would become common, but the institutional system proved no to be ready for such a change. The contracting of the HSL-Zuid 'illustrates the most extreme form of splitting up the product chain into different contract in the Netherlands' (De Bruijn et al., 2010). This led to many parties being involved (see attachment). This caused several obstacles in the management and monitoring during the construction and commissioning phase. More details on the problems caused by this form of contracting can be found in the failure factor 'uniformity throughout phases.

Conclusion: failure factors initiation phase

An overview of the factors that have proven to create failure in the initiation phase in theory and with the HSL-Zuid is found in Table 1.

Variables Initiation
Targeted tackling of the thoughtfully identified problem
Inappropriate objectives
National coordination of parties
International coordination of parties
Forecasts: realistic estimation of timeframe
Further elaboration of the plan

Table 1: Dependent variables Initiation phase

3.2.2 Decision-making phase

As determined in paragraph 2.1.1., in this phase the formal decision-making takes place, and approval of the final recommended solution from the initiation phase is sought. The project is approved when it is legitimate, efficient and effective, and politically feasible and socially acceptable. After approval by the Parliament, the spatial implementation lays at lower governmental layers. Then, the project can be physically constructed in the next phase.

VII. Suitability of plans for political decision-making

In the decision-making of the HSL-Zuid, the first Core Planning Decision (PKB) was withdrawn, due to limited political support for the plans (Omega Centre, 2009). This led to a longer lead time of the decision-making. A longer lead time can lead to changes in the external environment or the support of parties involved. This can increase uncertainties that create risks or delays. The extra risk factor of line infrastructure, is that this type of infrastructure is spatially dispersed (WRR, 1994), and thus knows a large area which can change during this long lead time surrounding the infrastructure.

VIII. Transparency & the role of Parliament

The transparency and accountability of key stakeholders are important factors that contribute to the performance of megaprojects (Priemus & van Wee, 2014). Misinformation can be seen as a major planning and policy problem and is an issue of power and profit. With the HSL-Zuid, the Parliament was misinformed at certain times, and were presented with accomplished facts. As a result, the role of the Parliament was marginalized, due to the limited opportunities to propose adjustments to the plans. The accountability of the Ministry of Transport, Public Works and Water management could have been increased through transparency and public control (de Vries et al., 2007).

IX. Political courage

Due to the lack of transparency and a limited role of the Parliament in the first stage of decision-making, there were limited adjustments made to the plans by the political opposition. Then, when the project was approved, the opposition was only eager to push through adjustments, such as the tunnel underneath the Green Heart area. This political struggle then created less objectively established information. The major interests (e.g. money, (administrative) power relations, commercial concerns and number of citizens involved) that are at stake with these projects require that they are handled with special attention, resulting in this political pressure (van Gelder & Rijsenbrij, 2010).

The Green Heart tunnel is one of the drivers of the failure of the HSL-Zuid, resulting in unforeseen spending. This could have been prevented in two ways: the first is to have excluded such an option in the final recommended solution (interview 14), and the second is by leaving room for the opposition to make adjustments in the first stage of decision-making.

X. Disconnected from spatial context

A reason why the HSL-Zuid currently still has to deal with underperformance, is the soil on which it is built. Due to this relative soft soil, the line was built on concrete blocks on the whole trajectory. The soil, however, is so soft, that even though these far-reaching foundation measures are taken, the ground is still prolapsing (interview 2, 14). Due to the complicated contracting, each adjustment must be renegotiated, resulting in long procedures before the problem will be solved.

The final recommended solution selected from the different alternative routes must be implemented in local spatial plans. With the Tracéwet of 1994, the Minister can overrule local spatial plans in order to accelerate large infrastructure projects which are of national importance. This enhances the balance between local and national concerns. Before the implementation of the Tracéwet, projects could be withheld by local stakeholders, that did not want the project 'in their backyard'.

Conclusion: failure factors decision-making phase

An overview of the factors that have proven to create failure in the decision-making phase in theory and with the HSL-Zuid is found in Table 2. These factors involve the quality of the plans that were taken to decision making, the role of the parliament and the opposition, and the local implementation.

Variables Decision-making
Suitability of plans for political decision-making
Transparency & the role of Parliament
Political courage
Disconnected from spatial context

Table 2: Dependent variables Decision-making phase

3.2.3 Construction phase

As defined in paragraph 2.1.1., in the construction phase the preparation of the construction and the actual physical construction take place. The execution of the constructing of the project is monitored, in order to make sure the predefined timeframe and budget are reached, or that adjustments in the project, timeframe or budget should be made.

XI. Uniformity throughout phases

This failure factor is emerges from the fact that the contract for the HSL-Zuid was divided in 3 different parts. These parts are the foundation, the tracks and the exploitation. These contracts were granted to different parties (see attachment 1). This form of contracting was chosen because the HSL-Zuid then was seen as a 'stand-alone' connection, apart from the existing Dutch railway network. As a result of this choice, the line had to be tendered.

A part of the delays are due to this complicated contracting: due to the complicated contract structure that grants every individual part of the project in a different contract, communication is required between many parties. In example with the chosen innovative security system ERTMS, the tracks communicate with the trains, requiring alignment between the parties involved in the building of the tracks and the commissioning of the rail services (interview 1). Because of the complicated contracting and the communication that was required due this contracting, the dedicated trains for the HSL-Zuid were not tested on the dedicated infrastructure. The specifications of the infrastructure were known too late, after which the trains were ordered too late and testing could not take place anymore (interview 14). In section 3.2.4, the failure factor 'testing of equipment' goes further into detail about this.

XII. Slow pace of realization

The slow pace of realization of the HSL-Zuid was caused by the technical & contractual complexity of the project. Due to the liberalization of the European railway market the HSL-Zuid could not be both constructed and commissioned by the Dutch Railways. The Dutch Railways ultimately became responsible for the rail services, together with the Royal Dutch Airlines (KLM). The construction of the tracks was tendered and granted to the consortium Infraspeed. This party, however, had no experience with the construction of rail infrastructure, let alone High-Speed Railway infrastructure.

As a result of this inexperienced-ness, voltage locks are now located on a slope (interview 2), resulting in trains stagnating in these locks. This leads to the outage of trains, and not being able to let other trains pass these locks. This results in delayed trains, and thus underperformance and insufficient quality of the usage of the line.

Conclusion: failure factors construction phase

An overview of the factors that have proven to create failure in the construction phase in theory and with the HSL-Zuid is found

Variables Construction
Uniformity throughout phases
Slow pace of realization

Table 3: Dependent variables Construction phase

3.2.4 Commissioning phase

After the formal owner gets access to the finished product, the preparation of the product for usage takes place. Regarding infrastructure, and especially innovative techniques, this involves a testing phase of the equipment. After approval of the equipment the project can be taken into commissioning. The HSL-Zuid was completed in 2007. In 2012 the dedicated equipment was taken into operation, only to be taken out of operation in 2013 after an accident with one of the trains. The failure of these trains and the process in which there was decided to use these trains led to a parliamentary inquiry (see Staten-Generaal, 2015).

XIII. Testing of the equipment

Due to the innovative character of the security systems of the HSL-Zuid, the designated High-Speed Trains could not be ordered on time due to uncertainties on the technical specifications the trains should comply with (interview 1, 2, 8). Due to the complex separation in the contracting of management and operation, the communication about these specifications was complicated and highly bureaucratic between the managing and operating parties. In the period in which the designated trains had not yet been delivered, other trains were used instead. Once the designated equipment had been delivered, these could not be tested anymore, because the infrastructure was already being used (interview 14). An accident happened with the designated trains, after which these were taken out of operation for good. This incident led to the parliamentary inquiry on the designated trains of Fyra.

XIV. Uncoupling management & operation

The Dutch Infrastructure Managers (ProRail) are responsible for resolving issues on the entire Dutch rail network. The entire Dutch rail network is property of ProRail, with exception to the HSL-Zuid. Thus, when outage occurs on the HSL-Zuid, ProRail needs to ask the consortium Infraspeed for permission each time that this happened. Also, when the Ministry wants to overcome the underperformance by replacing the voltage locks, renegotiations of the contract will have to take place. As a result, solutions for the underperformance take longer to be approved then on the rest of the Dutch rail network.

Conclusion: failure factors commissioning phase

An overview of the factors that have proven to create failure in the commissioning phase in theory and with the HSL-Zuid is found in Table 4.

Variables Commissioning
Testing of the equipment
Uncoupling management & operation

Table 4: Dependent variables Commissioning phase

3.3 Synthesis Operationalization

In this chapter, the operationalization of this thesis is presented. The operationalization consists of the dependent variables of this thesis, that will be measured to their appearance in a future project in chapter 6. The failure factors that are uncovered in this chapter are presented in Table 5. The table of failure factors will be the input for the ex durante evaluation that will be conducted on the future mega-project of reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin in chapter 6.

In this chapter, the causes of past failure are untangled, using theoretically observed and empirically experienced failure factors. These failure factors have proven to cause delays, exceeded budgets and disappointing performance in the past. Looking at this table, it stands out that most failure factors can be observed in the first phase. Also, the factors that cause failure in later phases, often are based on choices made in the first phase. This underlines the statement by Eweje et al., (2012) that the roots of failure are planted in the early phases of the project, and nurtured throughout the project.

Initiation	**Decision-making**	**Construction**	**Commissioning**
Targeted tackling of the thoughtfully identified problem	Suitability of plans for political decision-making	Uniformity throughout phases	Testing of the equipment
Inappropriate objectives	Transparency & the role of Parliament	Slow pace of realization	Uncoupling management & operation
National coordination of parties	Political courage		
International coordination of parties	Disconnected from spatial context		
Forecasts: realistic estimation of timeframe			
Further elaboration of the plan			

Table 5: Theoretical and Empirical failure factors: frame of analysis

4. Methodology: ex durante evaluation of failure-factors

This chapter contains the research methods used in this investigation and entails an overview of the results thus far. The chapter begins with an overview of the knowledge gained thus far. In paragraph 4.1, the problem definition, research aim and research question are repeated, after which in paragraph 4.2 the sub-questions are answered with the knowledge derived from the theoretical framework and operationalization. The additional knowledge then is incorporated in the conceptual framework of chapter 1, which creates a more detailed version of the conceptual model. Then, the research methods of this thesis are described in paragraph 4.3. This chapter contains more information on ex durante evaluation, case study research and qualitative research methods using semi-structured interviews. Then, the justification and limitations of this research are highlighted in paragraph 4.4.

4.1 Problem Definition & Research Question

In chapter 1 the research problem has been defined. This research aims to uncover the role of the cross-border aspect of mega-projects in the reoccurrence or disappearance of mega-projects, and by extension, the role of the cross-border aspect in (not) being able to eliminate past failure in future projects. This is done by assessing past failure factors of the mega-projects HSL-Zuid, to the future possible mega-project the HSL-Oost. The extent to which the same factors are expected to reoccur or to disappear then are explained using institutional theory.

Due to increased levels of greenhouse gasses, resulting in unequivocal climate change, the Paris Climate Agreement was set up in 2015 in order to limit the increase in global temperature to 2 degrees Celsius. The transport sector is one of the sectors with the biggest contribution to the emissions (15%), and thus can contribute to reaching the goals of reducing emissions as set in the climate agreement. The Sustainable Mobility Approach by Banister (2008) is developed to help policy-makers in the challenge of mitigating CO_2-emissions. A m*odal shift* to more sustainable modes of transport is one of the components of this approach, which can be caused by changes on the macro level in transport supply, and on the micro level in the individual's choice for a mode of transport. A comparative advantage of the one mode over the other then can cause a modal shift. The choices made on a micro level are affected by the supply of the macro level, and thus changing supply (e.g. by implementing more infrastructure) can be seen as a way to reach modal shift (Rodrigue, 2016). Increasing infrastructure goes through different project-management phases: initiation, decision-making, construction and commissioning. Throughout these phases, existing uncertainties and risks are reduced, while new uncertainties and risks might appear.

Sometimes, these projects are of such dynamic and complex nature that these projects are 'mega-projects'. Scott & Levitt (2017) describe 4 factors that can make a 'regular' project into a mega-project: the amount of sub-projects involved, the degree of innovative technology used, the impact on surroundings and the involvement of key delivery partners from different national institutional frameworks (i.e. a cross-border component). Mega-projects over the past have built up a negative image, caused by the frequent occurring ***failure:*** delays, exceeded budgets and disappointing quality.

Mega-projects can be analyzed on different levels: *technical, strategical* and *institutional.* Over the past decades, the institutional level has increased in complexity due the shift from government to governance, of which as a result policy is set up in networks that consist of institutional linkages between actors from the state, market and civil society. Another observed trend is the increasing international collaboration within projects, due to intensified globalization. Considering that projects with an international component are always mega-projects and thus run more risk on failure, this calls for a better understanding of the drivers of failure in mega-projects. This understanding might eventually lead to preventing failure in future projects.

This research problem is investigated using the following research question:

> "Why are the same failure factors expected to reoccur or disappear between past and future cross-border infrastructural mega-projects?"

In order to divide this research into manageable sections, sub-questions have been formulated. In the next chapter, these sub-questions and their preliminary conclusions, derived from the theoretical framework and operationalization chapter, can be found.

4.2 Preliminary answers to sub-questions

In this chapter the sub-questions as formulated in paragraph 1.5 are enriched with the preliminary findings from chapter 2 & 3.

1. What does the process of accomplishing infrastructure mega-projects look like?

As can be read in paragraph 2.1, 4 different phases can be distinguished in the implementation of a (mega-)project: initiation, decision-making, construction and commissioning. The contents of the different phases can be found in Table 6.

Mega-project management			
Initiation	**Decision-making**	**Construction**	**Commissioning**
Problem definition, solution, timeframe, final recommended solution	Formal decision-making, legitimacy, efficiency & effectiveness, political feasibility & social acceptability	Preparation, building, formal completion	Testing & taking into use

Table 6: Contents of mega-project management phases

When a project complies with one or more of the 4 complicating factors as described by Scott & Levitt (2017), this can be seen as a mega-project. The 4 complicating factors they distinguish that make a 'regular' project into a mega-project are:

- Spatial/technical configuration complexity: the amount of sub-projects used to realize the 'main' project
- Maturity of involved technologies: the degree to which used technologies are innovative
- Scale of the project's regional and political impact: the impact a project imposes on its surroundings in terms of environments and human populations
- Cross-institutional complexity of 'global mega-projects': a cross border aspect.

2. How can mega-projects be analyzed?

Projects can be analyzed at the technical, strategic and institutional level.

The technical level is operational and delivery oriented. This stance is critiqued by the lack of considering the developmental nature of the project and its front-end development. The strategic level considered the importance of front-end management of projects, but became obsolete with critiques such as having unclear objectives, poor project definition and an unsupportive political environment. Project should not be treated in isolation, and improvements should involve aligning strategy with the sponsors, influencing stakeholders, scheduling and ensuring appropriate governance and control (Morris & Geraldi, 2011). The institutional level what must be managed in order to develop and deliver a project successfully in the definition stage and during the construction phase. Improving the institutional level creates the fundament based on which the technical and strategical level can be improved.

The institutional level can be improved by understanding the institutions and their contexts, which can be done using institutional theory (Scott, 2013). Institutions consist of three pillars consisting of regulative, normative and cultural-cognitive frameworks.

The contents of these frameworks are described in section 2.2.2 as:

- **Regulative frameworks:** laws of both countries, the relation between national and local and regional entities, corporate hierarchies.
- **Normative frameworks:** professional standards, norms and values.
- **Cultural-cognitive frameworks:** beliefs, schemas and frames, economic and religious ideologies, differing ethnicities and languages.

3. **What are theoretically and empirically observed failure factors of past cross-border infrastructure mega-projects?**

In chapter 3, the operationalization of this research, the factors that have caused failure in past projects are uncovered using theory and the empirical case of the HSL-Zuid. The failure factors that have proven to cause delays, exceeded budgets and disappointing quality are presented in Table 7.

Initiation	Decision-making	Construction	Commissioning
Targeted tackling of the thoughtfully identified problem	Suitability of plans for political decision-making	Uniformity throughout phases	Testing of the equipment
Inappropriate objectives	Transparency & the role of Parliament	Slow pace of realization	Uncoupling management & operation
National coordination of parties	Political courage		
International coordination of parties	Disconnected from spatial context		
Forecasts: realistic estimation of timeframe			
Further elaboration of the plan			

Table 7: Theoretical and Empirical failure factors: frame of analysis as uncovered in chapter 3.

These failure factors are used as input for the ex durante analysis. The extent to which past failure occurs in the future project of reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin is measured, after which the policymaking on this subject can be adjusted according to the expected failure. In the conclusion of this thesis, the reoccurrence and disappearance of past failure in future projects is explained with the independent variable, that is institutional theory.

The failure factors also form the foundation for the topic lists of the interviews (see *Attachment 3: Topic lists interviews*).

4. **To what extent can the same past failure factors be expected to reoccur or disappear with future cross-border infrastructure mega-projects?**

The extent to which the factors might reoccur in the future project of the HSL-Oost is analyzed in chapter 6. In chapter 5, the context of this case study is laid down.

It is expected that, due to the experiences of failure with the HSL-Zuid, a large share of the failure factors will disappear. The HSL-Zuid has been researched extensively (e.g. by two parliamentary inquiries), and thus the factors that caused failure are known by the actors involved in the HSL-Zuid. Because with the process of reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin, some same actors are involved with the HSL-Zuid, it is expected that actors take into account the failure from the HSL-Zuid and want to prevent these in the future.

The failure factor of international collaboration between parties is expected to re-occur with the HSL-Zuid. Scott & Levitt (2017) mention the cross-border aspect as one of the aspects that makes a project into a mega-project, and thus the cross-border aspect can be expected to cause a certain extent of failure in projects.

On page 50, these preliminary findings are applied to the conceptual model as presented in chapter 1. As a result, a more detailed conceptual model is created. In the extended conceptual model, the dependent variables (i.e. the failure factors) are marked red and the independent variables (institutional theory) are marked blue. In the next paragraph, the methods used to analyze failure in a future project (right in the conceptual model) are presented.

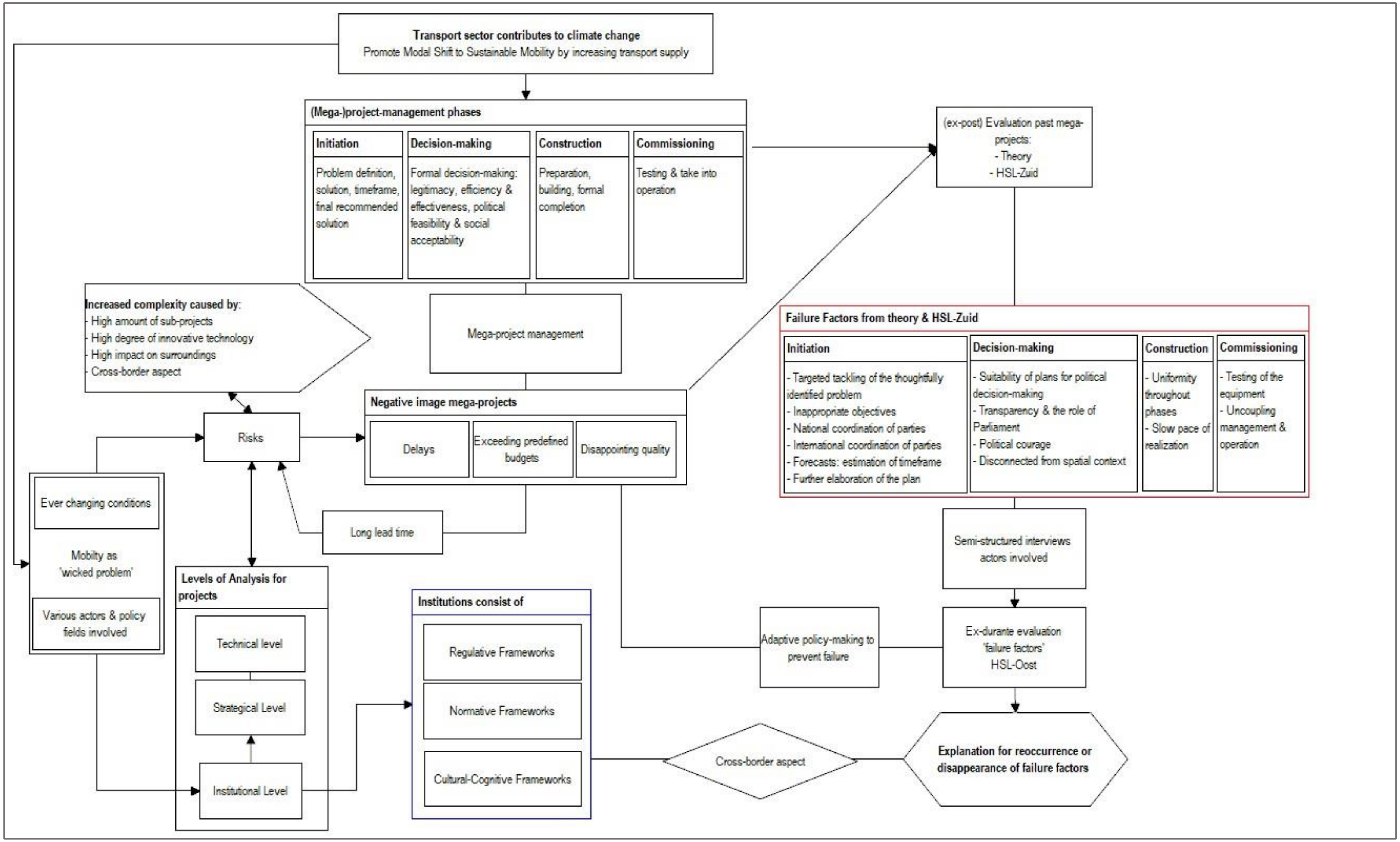

Figure 8: Detailed version of Conceptual Model as presented in paragraph 1.8

4.3 Research Methods

In this paragraph, the methods used in this thesis are elaborated upon. This research consists of an ex durante evaluation of the failure factors within the case study of reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin, possibly by implementing the HSL-Oost. The data used in order to conduct this ex durante evaluation is gathered with semi-structured interviews with actors involved and experts on Dutch-German rail connections.

4.3.1 Case-study Research

Case study research is concerned with the complexity and particular nature of a case in question. It is an inquiry that focuses on describing, understanding, predicting and/or controlling the individual (i.e. process, animal, person, household, organization, group, industry, culture or nationality) (Woodside & Wilson, 2003). The case is a location, such as a community or organization. The case is an object of interest in its own right and the researcher aims to provide an in-depth examination (Bryman, 2016). The researcher is concerned on the one hand to reveal the unique features of the case (i.e. idiographic approach) and on the other hand to generate statements that apply regardless of time and place (i.e. nomothetic approach).

This intensive examination of a single case should be seen in relation to which they then engage a theoretical analysis, or: how well do the data support the theoretical arguments that are generated. This method is suitable for theory testing. In this research, the theoretical arguments used are institutional theory as independent variable (blue block in conceptual model on page 50) The dependent variables that make up the operationalization of this research are failure factors derived from failure in past projects in theory and practice in chapter 3 (red table in conceptual model on page 50). This case study is seen as a critical case: a well-developed theory (i.e. explaining the reoccurrence of the framework of failure factors using institutional theory) is tested. A case is chosen that will allow better understanding of the circumstances in which the hypothesis will and will not hold (Bryman, 2016).

Bryson (2016) states that cases should be selected based on their appropriateness rather than on representativeness. The goal is to understand the case or cases in depth, and those individuals who are members of the case study have to be sampled according to criteria too.

The case study that is subject to this research is reducing the travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin, possibly by implementing the HSL-Oost. This project entails different alternatives, of which the HSL-Oost that was proposed in the same time as the HSL-Zuid is one of the options. This line should connect Amsterdam, Utrecht and Arnhem to the German Ruhr area, so that a Dutch connection to the German network of High-Speed Railway lines was created. This line, however, was never fully implemented. More information on the context of the rail connection between Amsterdam and Berlin and the alternatives to improve this connection can be found in chapter 5, Context Case Study: from HSL-Oost and Traject Oost to Toekomstbeeld OV 2040.

4.3.2 Ex durante evaluation

Bryman (2016) describes evaluation research as the research that is concerned with the evaluation of real-life interventions in the social world. It enables us to answer questions about the goals achieved by interventions.

The roots of ex durante evaluation lay in the call for a more central role of scientific knowledge in the policy process. This kind of evaluation is more process-oriented than ex ante (*before)* and ex post (*after*) evaluations, which mainly extrapolate data from the past (Steunenberg, 2018). Although the knowledge derived from ex ante and ex post evaluations can be useful, these are not able to uncover the changes occurring during the lead time of the process. Due to the close connection with the execution of the policy, ex durante can account for this, making it possible to adapt to the policy process. Other than ex ante or ex post evaluations, ex durante evaluation takes place during the implementation process and uncovers the changes that have occurred during the lead time of the implementation of policies or projects (Buitelaar et al., 2010). Based on the outcomes of an ex durante evaluation, there can be anticipated on the current situation of the project, which might prevent failure that would otherwise have reoccurred. Ex durante analysis makes it possible to uncover changes and make according adjustments during the implementation process, leading to a better fitted process during the rest of the lead time of these projects.

The wicked problem that is a (sustainable) mobility transition, due to the variety of actors and policies involved and the long lead time, are prone to ever changing conditions. These conditions also change *during* the implementation process. In order to fill the gap between ex ante and ex post evaluations, ex durante evaluation was created in order to focus on the time between ex ante and ex post evaluations. Mega-projects are well fitted to ex durante research, due to their long lead-time in which social settings and external environments can change (Biesenthal et al., 2018; van Brussel, 2018). Mega-projects know a long lead time, implying a long time in which changes can occur. The complexity of mega-projects makes a focus on input or output not sufficient and requires that attention is given to throughput (de Roo, 2012). That is why in this research an ex durante evaluation is conducted.

Ex durante evaluation is performed using a predefined list of indicators, which are examined regularly. These indicators can involve either the policy performance (output) or the results of the policy (outcomes). Examination of these indicators can indicate how the execution progresses and whether there the project or policy should be adjusted for any reason. The direct connection of the evaluation to the policy process makes that ex durante evaluations generally provide input on the process sequence, reviewing the process so far using the information on hand.

Ex durante evaluation is used as a method in this research to uncover the currently occurring or expected occurrence of failure factors (i.e. policy performance) of the process of reducing travel time by implementing new infrastructure between Amsterdam and Berlin, possibly by implementing the former HSL-Oost. These failure factors are uncovered in chapter 3 using theory and the practice of the HSL-Zuid. The table that is the overview of failure factors within mega-project management phases forms the predefined list of indicators that is used in this research to measure past failure in a possible future project.

4.3.3 Qualitative methods

Bryman (2016) describes qualitative research as having focus on words rather than on numbers. Qualitative research implies an inductive view of the relationship between theory and research. An inductive approach uses specific observations to generate more broad generalizations. These are used for the researcher to keep an open mind about the shape of what he or she needs to know, so that concepts and theories can emerge out of data. This implies an inductive approach to theorizing and conceptualization. The epistemological position described as interpretivist emphasized the stress that is on understanding the social world through an examination of the interpretation of that world by its participants Bryman (2016, pp. 375). The ontological position of social research is described as constructionist: social properties are outcomes of interactions between individuals, rather than phenomena being 'out there' and separated from those involved that is the case with natural sciences (Bryman, 2016, pp. 375).

Qualitative methods are used in this research to be able to conduct comprehensive and in-depth analyses among different actors, in order to uncover which past failure might reoccur, and how this reoccurrence or disappearance can be explained. A list of failure factors is created using theory and an empirical case, after which the extent to which reoccurrence or disappearance of this past failure in future projects can be explained using theory. In order to attain a comprehensive analysis of the case study, interviews are conducted among involved actors of improving the rail connection between Amsterdam and Berlin, and experts on Dutch-German rail connections and the international affair between the two countries involved.

4.3.4 Semi-structured interviews with actors & experts

Interviews are a suitable exploratory tool when describing and emphasizing the context or setting of a case (Walliman, 2011). The personal aspect of interviews makes that not only formal relationships, procedures and customs are identified, but that the informal aspects of implementing mega-projects could be uncovered as well.

First, the sample of the case study was chosen. This process started with the possibility of substituting air traffic by movements by High-Speed train. HSL-Zuid compares to Belgium, know about that → now know about Germany in order to see patterns with all international collaboration and not just Belgium.

Then, the participants for the interviews within this case study had to be sampled. There was looked at parties within the state, market and civil society that are involved in reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin. This was partially done by snowballing (Bryman, 2016 pp. 188); some actors were uncovered during the interviews, after which interviews with the new actors were conducted (e.g. the spatial implementation by ProRail). Then, interviews with experts were conducted in order to uncover an explanation for possible reoccurrence or disappearance of failure factors. These interviewees were reached using purposive sampling. An overview of the interviews that are conducted for this research can be found in Attachment 2. Lower governmental levels that are currently not involved in the formation of the plans of improving the rail connection between Amsterdam and Berlin are excluded from this research, because this would involve many municipalities due to the high number of different alternatives that currently are being considered. As a result of the many alternatives, many municipalities possibly are crossed by this line. These municipalities are overruled by the Tracéwet (interview 18, Gierveld (2016)), and thus not considered in this stage of the formation of plans. For more information on the limitations to this research created by excluding lower governmental levels, see paragraph 4.5.

Topic lists ensure that in semi-structured interviews the same topics are covered throughout all interviews (Walliman, 2011). Before data-gathering, topic lists are distilled from the desk research that has been presented in the first 3 chapters. In this research, the basis for the topic lists was formed by the table of failure factors, as presented in the conclusion of chapter 3. The topic lists for both the interviews with actors and experts can be found in Attachment 3. Because the interviews were conducted with different types of actors, different actors were better informed on different topics. As a result, with different actors, different factors were looked deeper into. This corresponds with the statement by Bryman (2016) that the interviewer has some latitude to ask further response to significant replies by interviewees.

17 of the 18 interviews were conducted physically, and one is conducted using a phone call. According to Bryman (2016), there is some evidence that there are few differences in the kinds of answers that are given physically or on the phone. Because the actor that was interviewed in that phone call was not considered to be one of the key stakeholders, these differences are not expected to cause any problems in the further analysis.

After the interviews, these were transcripted and coded. The codes used were partially predetermined and partially made up after transcribing. The predetermined codes were the variables as uncovered in chapter 3, the failure factors of past projects. The statements of the interviews on the explanation of reoccurrence or disappearance of failure factors were during the process of coding divided in different groups, which was were not foreseen before the coding process. The transcriptions that were made of the interviews can be found in Attachment 4. Interview 17 was not transcribed, because it entailed a formal conversation which was not recorded. In order to limit misconceptions, the findings of that conversation were written down quickly after the conversation.

4.4 Justification & Limitations

In this paragraph, the justification & limitations of this research are laid down. Bryman (2016) describes ***reliability, replication*** and ***validity*** as the most prominent criteria for the evaluation of qualitative methods used in social research (Bryman, 2016 pp. 41-42).

4.4.1 Reliability

The reliability of the research concerns whether the results of the study are repeatable or not. The reliability social research can be divided in *external* and *internal* reliability.

External reliability

Concerns the degree to which a study can be replicated. According to Bryman (2016, pp. 83) this is a difficult criterion to meet within qualitative research, because it is impossible to ‘freeze’ a social setting. That means that the settings that are researched can change over time, which makes that in example small differences in the outcomes of semi-structured interviews cannot entirely be eliminated. In this research topic lists are used with the semi-structured interviews to ensure that, when replicating this research, the same subjects can be handled. These topic lists can be found in Attachment 3.

Internal reliability

Concerns the correspondence on observations between researcher when there are more then one. This research is executed by one researcher, of which as a result no problems with internal validity are encountered.

4.4.2 Replication

Replication of the research concerns the procedures that are used in order to come to the results, and to what extent these are spelled out in detail (Bryman, 2016). The replication of social research is 'almost impossible' (Bryman, 2016, pp. 398), because it is unstructured and relies on the researcher's ingenuity, as the researcher is the main instrument of data collection.

The procedures used in this research are elaborated upon in this Methodology chapter. The process of creating the independent and dependent variables (i.e. in chapter 2, the theoretical framework as independent variables and chapter 3, the operationalization as dependent variables) is described in those chapters as well. Sources of literature and other written sources are listed in the bibliography on page 102.

4.4.3 Validity

Validity concerns the integrity of the conclusions that are the result of this thesis (Bryman, 2016). Validity concerns the fluctuation of results and is divided in *external* and *internal* validity.

External validity

External validity concerns the degree to which findings can be generalized across social settings. Bryman (2016) emphasizes that a single case cannot be representative to be applied more generally to other cases. He adds that single case studies cannot be used to represent a certain class of objects.

The generalizations that are made in this research thus cannot be applied to all mega-projects. The findings of this research apply specifically to Dutch-German rail infrastructure projects. The institutions and procedures of such projects will be very alike the institutions and processes involved in this research. Because the focus is on institutions from the Dutch perspective in such projects, the outcomes can be applied to other international rail projects from a Dutch perspective (i.e. with Dutch-Belgian collaborations) , but there should be noted that the international context and thus the institutions on the other side of the border work differently. With Dutch-Belgian collaboration in rail projects, the outcomes of this research could thus partially be applied.

Internal validity

Internal validity concerns the causality of this research: isn't there something else that is producing an apparent causal relationship between the dependent and independent variables. In this research, this is limited as much as possible by asking the actors involved why they suspect failure factors to reoccur or to disappear. That way, an as complete as possible overview of the possible explanations for reoccurrence or disappearance of failure factors is given. The chances that something else causes the causal relationship are limited, due to the empirical bases of the findings. However, the chance is not zero, and thus the possibility on other factors explaining reoccurring or disappearing failure cannot be eliminated.

4.4.4 Limitations

Main limitation for this research is that a frame of analysis is created from failure factors from the past. There might exist other factors that can cause failure within the future mega-project of the HSL-Oost, but these are not taken into account, and cannot be uncovered due to these factors being in the future.

Another limitation is that the Dutch municipalities without a stop are not involved in the semi-structured interviews. Currently, there are 4 different routing options considered (see paragraph 5.3) in reducing travel time by implementing new infrastructure between Amsterdam and Berlin. As a result, the number of municipalities that could be involved is very high in the current initiation phase of the project. This research focuses more generally on all institutions involved in creating the plans of reducing travel time by implementing new infrastructure between Amsterdam and Berlin. The results of this research are thus more general on the level of the actors involved in that process. In further research, a more specialized perspective on one of these actors can create a deeper understanding of the roots of reoccurring or disappearing failure, and how reoccurring failure in the future could be prevented.

4.5 Synthesis Methodology

In this chapter, the problem definition, aim and research questions are repeated and enriched with the knowledge gained in the theoretical framework and operationalization chapters of this research. In following chapters, the methods presented in this research (i.e. semi-structured interviews for ex durante analysis) are applied to the case study of HSL-Oost. In the next chapter, the historical and institutional context of the case study of this research are laid presented.

5. Context Case Study: from HSL-Oost and Traject Oost to Toekomstbeeld OV 2040

In this chapter, the context of the case study of this research is presented. The case-study of this research is the rail connection between Amsterdam and Berlin. Improving this connection is currently being considered by the Dutch government. Increasing the speed on a rail connection between the Netherlands and Germany is not new. The plan to improve the connection between Amsterdam and Germany date back to the same time as the HSL-Zuid. The HSL-Oost, from Amsterdam via Utrecht and Arnhem to the German border, and then continuing to the Ruhr area and Frankfurt, was never completely upgraded to the intended speeds of 200 km/h. However, currently the plans to reduce travel time between Amsterdam and Berlin are being considered, re-opening the possibilities for a possible new HSL-Oost.

In paragraph 5.1, the past, present and future of the connection between Amsterdam and Berlin are outlined. Understanding the history of the project contributes to the understanding of the extent to which failure factors might occur in this future possible re-opened project. This research applies an institutional approach, and thus knowledge on the actors involved in the process is needed to be able to explain the reoccurrence or disappearance of failure factors with the rail connection between Amsterdam and Berlin. The actors involved in this process are shown in paragraph 5.2. Then, in paragraph 5.3 the possible alternatives in reducing travel time by implementing new infrastructure between Amsterdam and Berlin are outlined. The contents of these alternatives imply different degrees to which failure factors might re-occur, and thus are important to consider when analyzing the possible future failure factors of the development of this connection. Then, the preparation for the analysis is complete and can the ex durante evaluation of the failure factors of the possible partial creation of the HSL-Oost take place in the next chapter, chapter 6.

5.1 Setting the scene: past, present and future of the HSL-Oost.

The case study used in this research is the intended improvement of the railway line between and Berlin to a High-Speed Railway line, that in the past was limited to the trajectory from Amsterdam, via Utrecht and Arnhem, towards the Ruhr area and went with the name of the HSL-Oost. Currently, there

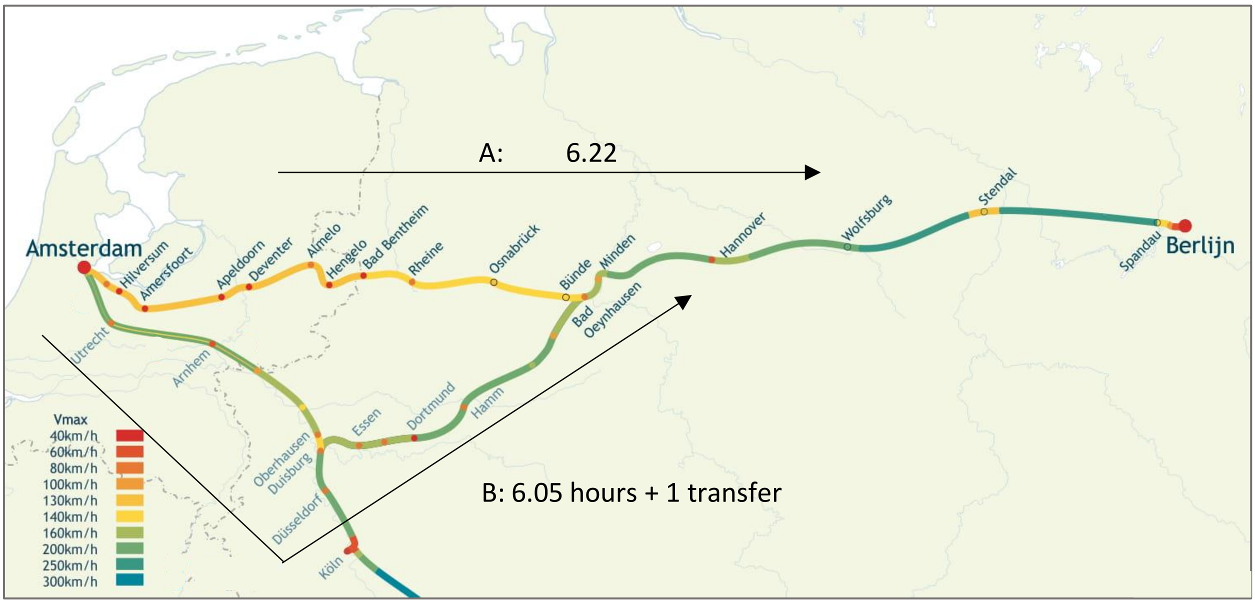

Figure 9: Current routes & corresponding stops and speeds between Amsterdam and Berlin (AT Osborne & Royal HaskoningDHV, 2018)

is one trajectory that directly connects Amsterdam and Berlin, which takes 6 hours and 20 minutes from Amsterdam Centraal Station to Berlin Hauptbahnhof (connection A in Figure 9). The train departs 7 times a day in both directions.

The foreseen HSL-Oost was in the same time as the HSL-Zuid foreseen as an upgrade of the rail infrastructure between Amsterdam, Utrecht, Arnhem and the border with Germany (see paragraph 5.1). This trajectory is currently used by the international train between Amsterdam and Frankfurt. With one transfer in Duisburg, this trajectory can currently also be used to travel from Amsterdam to Berlin (route B in Figure 9). Using this trajectory reduces the travel time with 15 minutes to 6 hours and 5 minutes from Amsterdam to Berlin, but the transfer makes using this direction for traveling to Berlin unattractive. Due to the relative long travel time and low frequency (7 times per day) van Ham & Baggen (2015) declare the trajectory of the HSL-Oost as being underutilized.

Currently, the Dutch government aims to reduce travel time on the connection between Amsterdam and Berlin in order to promote modal shift between the airplane and the High-Speed train (interview 3, 9). The measures that can be taken in order to reduce travel time range from involve small adjustments to existing stations and infrastructure (interview 2, 9) to as most far-reaching alternative a stand-alone High-Speed Railway line (see paragraph 5.3).

5.1.1 Historical Context: from Trans-European Express to High-Speed Railway line?

The train connection of the Netherlands and Germany already knows a considerable history. In this paragraph, a short overview of the most important events concerning the HSL-Oost are summarized. It should be noted that the HSL-Oost concerns the Dutch trajectory currently used for the connection of the Amsterdam and Frankfurt. This is one of the promising alternatives in reducing travel time by implementing new infrastructure between Amsterdam and Berlin (interview 9). The history of the HSL-Oost[6], however, is contested (interview 2, 8, 9), and thus might be useful in order to prevent past failure from reoccurring with the current foreseen infrastructure developments.

1945-1992: European linkages

The idea of cross-border trains for long distance travel started after the Second World War, the ground-breaking idea of a Trans-European Express was conceived: the then president-director of the Dutch Railways envisioned a train network that would connect main European cities. From 1960 to 1993 onwards, the Netherlands was connected to this network through a line from Hook of Holland to Moscow[7]. This trajectory had a short revival from 2007 until 2013.

In the 1970s, as can be read in Box 1 in chapter 3, the idea to create a European High-Speed Rail network was created. The Netherlands wanted to prevent becoming the 'Jutland' of Europe and be cut off the core of the European Union. In 1977 this wish was translated into concrete forms with the 'Eerste Structuurschema Verkeer en Vervoer', which contained the notion that the Netherlands should be connected to the European Network of High-Speed Railway lines. Towards the south, the Randstad should be connected with Belgium and France, and towards the east with Germany. These connections should serve as contribution to the European High-Speed Network, which implies that these lines should be High-Speed Railway lines as well. However, the document contained no further elaboration

[6] For a more detailed overview of the historical context of the HSL-Oost, see van Ham & Baggen (2015).
[7] Note that this is the route that is currently being used by the train between Amsterdam and Berlin, depicted as route A in Figure 10.

on the plans in terms of speed or other characteristics. The only criterium mentioned was that these lines should be financially viable.

In 1988, the 'Tweede Structuurschema Verkeer en Vervoer' concretized the plans to connect to the European High-Speed Railway network: this should be done in a 'high-quality manner'. This criterion, however, is rather vague and leaves room for individual interpretation. In the south direction, the plans were further elaborated that a new trajectory should be created between Amsterdam, Rotterdam and the Belgian border. This line should be constructed before 1998 and be adopted for speeds of 300 km/h. As can be read in chapter 3, these plans developed into the controversial HSL-Zuid. The laid-out plans in this policy document, were less explicit about High-Speed Railway infrastructure on the axis towards the east, which was called the HSL-Oost. The plans did nonetheless contain the purpose that the number of tracks between Amsterdam, Utrecht, Arnhem and the German[8] border should be doubled from 2 to 4 tracks. The plans on the Dutch side were therefore not explicit about the connection to Berlin but upgrading the connection to the Ruhr area also benefited the connection to Berlin, as more tracks meant more capacity for all trains, including international trains.

In 1991, after the fall of the Berlin Wall, the existing train from Amsterdam to Hannover was extended to Berlin, as a partial continuation of the Trans-European Express to Moscow which was disbanded in 1993. As a result, the first direct connection from Amsterdam to Berlin was created (route A in figure Figure 9). However, this was a different trajectory than the intended HSL-Oost (route B in Figure 9).

1992-2001: impulses and interruptions

With the signing of the Treaty of Warnemünde (Bundesministerium für Verkehr, 1992) between the Netherlands and Germany in 1992, the plans for the HSL-Oost were given an extra impulse. This was unintentional: the Treaty served as an agreement for the development of the freight route the Betuweroute from the harbor of Rotterdam towards the Ruhr area. This plan involved the development of a third track along the existing tracks from the Dutch-German border towards the Ruhr area (see Figure 10). As a result of the implementation of an additional track for freight in Germany, more capacity would be freed up for national and international passenger trains on the existing tracks. This meant that there was room to further develop the international rail connections between the Netherlands and Germany on this line. The elaboration of this development of the international train product was initiated by means of upgrading the existing infrastructure to 200 km/h.

> ab) für den Schienenpersonenfernverkehr:
>
> – Ausbau der Route Amsterdam–Utrecht–Arnheim–Zevenaar–niederländisch-deutsche Grenze für den Hochgeschwindigkeitsverkehr überwiegend bis auf 200 km/h;

Figure 10: Agreement for increasing the speed of the HSL-Oost to 200 km/h as mentioned in the Treaty of Warnemünde Article 2 (Bundesministerium für Verkehr, 1992)

In 1994 the Dutch Railways and Dutch Government included the involved provinces and intermunicipal partnerships in the process of improving the connection between the Randstad and Ruhr area by using the existing route from Amsterdam via Utrecht and Arnhem to the Dutch-German border. In 1995 this resulted in a 'Probleemschets' and in 1996 to an elaboration of the plans in the 'Verkenningsnotitie',

[8] Note that this is the then foreseen HSL-Oost, which uses connection B in Figure 10

within which the usefulness and necessity of the line were found to be 'in line with prevalent spatial policy' and transport forecasts indicated the compliance with the condition of 'financial viability' (van Ham & Baggen, 2015). Tracks with 300 km/h were the starting position of these documents. These documents, however, did not possess any legal status.

In contrast to the 'Probleemschets' and 'Verkenningsnotitie', the 'Startnotitie' of 1997 does possess formal status. The document distinguishes 3 alternatives to upgrade the corridor from Amsterdam to the Ruhr area:

1. Doubling of the tracks from 2 to 4 between Amsterdam and Utrecht, and making this infrastructure appropriate for 200 km/h[9];
2. Doubling of the tracks between Utrecht and Arnhem from 2 to 4 and making this infrastructure appropriate for velocities between 200 and 300 km/h, depending on local circumstances;
3. Enable 300 km/h on the entire route, using the existing track with measures such as curve widening, or by using new parallel tracks to the existing connection of Amsterdam – Utrecht – Arnhem – Dutch-German border.

The first alternatives then were involved in the 'Trajectnota/MER', in which the environmental impact assessment was laid down. The third alternative of the 300 km/h tracks along the existing connection is, with approval of the provinces, a cooperation of the municipalities involved, the Dutch Railways, the Ministry of Transport and Water and Rijkswaterstaat exchanged for 'utilization options'. These contained possibilities to increase speeds on the current infrastructure to 200 km/h. The expectation was that international rail passengers' flows could be accommodated with one High-Speed Train to Germany per hour, for which capacity would be available with each of the alternatives. For the actors involved, 300 km/h infrastructure was therefore not seen as viable option anymore.

In 2000, the plans for the connection from Amsterdam to Berlin were investigated in a Societal Cost-Benefit Analysis (MKBA). In this assessment, the 200 to 300 km/h option was taken into consideration, while that option was not considered to be effective in reaching the goals of the actors involved anymore, as these actors exchanged the idea of a High-Speed train for 'utilization options' that involved maximum speeds of 200 km/h. The substituted 'utilization options' were however not considered in the cost benefit analysis, as these were not included in the 'Startnotitie'. The Cost-Benefit Analysis turned out to be negative, with a limited contribution of annual passengers, most of which most would substitute their car trips, and only 20.000 passengers per year substituting their air travels with the train connection created by the HSL-Oost (van Ham & Baggen, 2015). The actors involved commissioned a consultancy firm to research the 'utilization' variants, with the alternative of a velocities of 140 km/h as most profitable, and 160 km/h and 200 km/h turning up imbalanced cost and benefits.

With the Cost-Benefit Analyses, the findings of the 'Trajectnota/MER' and the public consultation, the government concluded in the 'Standpuntsbepaling' in 2001; refrain from construction of a new High-Speed Railway line along the existing route of Utrecht-Arnhem-German border. The existing velocity of 140 km/h was maintained. The option to realize improvements on the line and create better use of the existing line, however, were not excluded for the future.

[9] The doubling of the tracks between Amsterdam has been realized between 1999 and 2007.

5.1.2 Present Situation: re-opening of the plans

In 2009 the Dutch House of Representatives urged the Minister of Transport to re-open the investigations into the HSL-Oost, since the circumstances with regards to passenger volumes and concerns about the environment had changed since the previous investigations. A new opportunity had opened for the plan with the extension of the Dutch multi-annual Infrastructure and Transport plans 'MIRT' (Meerjarenplan Infrastructuur Ruimte en Transport) from 2020 to 2028. The House of Representatives saw the opened timeframe between 2020 and 2028 as time in which the infrastructural measures to increase the speed of trains between Amsterdam and the Ruhr area could be taken. The resolution to re-open investigation was successful, resulting in the project being added to the MIRT-program as 'Traject Oost'. This did not necessarily assume the implementation of High-Speed Railway infrastructure for 300 km/h, but could also entail smaller infrastructural measures to current infrastructure that reduce the travel time and increase capacity between Amsterdam and Frankfurt.

'Traject Oost' is currently still part of the MIRT-program, as MIRT will be in function until 2028. This project contains various infrastructural measures to improve and exploit the existing Railway line between Utrecht, Arnhem and the German border, in order to solve problems with the pressure on the existing capacity between Amsterdam and Frankfurt (Ministerie van Infrastructuur en Waterstaat, 2020). The Parliament has decided to refrain from building a High-Speed Railway infrastructure on this corridor in MIRT program, after researching the transport value, economic effects, construction costs and new insights to the possibilities of using the existing track. New opportunities could arise within the program planned after MIRT: Toekomstbeeld OV 2040 that is currently being formed (see paragraph 5.1.3. and 'Contouren Toekomstbeeld OV 2040' by Ministerie van Infrastructuur en Waterstaat (2019).

The corridor Amsterdam-Utrecht-Arnhem is also involved in the 'Programma Hoogfrequent Spoor' (Program High-frequency rail) (ProRail, 2020). This is the program in which the Dutch Infrastructure Managers (ProRail) elaborate on the plans of the multi-annual infrastructure and transport plans (MIRT). The program involves improving several corridors without constructing new infrastructure before 2028. These improvements can be realized by implementing the new European Safety System ERTMS[10] and reducing switches and level crossings. These measures have already resulted in a higher maximum velocity (from 140 to 160 km/h) between Amsterdam and Utrecht. ProRail states that with PHS 'the dream of fewer airplanes and more High-Speed Trains is getting closer and closer'(ProRail, 2020). The program also covers improvements to the central stations of Utrecht and Arnhem, such as an additional platform for international trains.

5.1.3 Future Plans: strategy Amsterdam – Berlin

The plans for public transport after the MIRT era, that ends in 2028, will be laid down in Toekomstbeeld OV 2040 (Ministerie van Infrastructuur en Waterstaat, 2019). In this policy document, the plans presented pertain to the development of a national public transport network. Currently, the contours of the content of public transport policies are determined, considering the ambitions of the Dutch national government, the provinces, metropolitan regions, carriers and the Dutch Infrastructure Managers. This approach is used to create support for the upcoming policy to act from a shared urgency. In that way, a smooth implementation with less failure (e.g. delays, exceeding budgets,

[10] European Railway Traffic Management System. For more information see European Commission (2017).

disappointing quality) is facilitated. Connecting the governmental world (nationally and regionally) to that of the public transport sector has proven to be one of the success factors for the long term performance of implementing plans in a network (Venne & van Wijmen, 2019). Throughout 2020, the translation of the ambitions from the government and the public transport sector are translated into distinct plans. The role of trains in substituting air traffic is strongly advocated in Toekomstbeeld OV 2040 (interview 9). The fulfilment of the ambitions in ToekomstbeeldOV 2040 are phased over time, so that adaptations over time can take place according to the changes that occur during the implementation of the plans.

The Parliament's coalition agreement of 2017 included the ambition to improve cross-border transport in general. Since then, in the Netherlands but also in Europe, a lively discussion has arisen on short distance air transport (interview 2, 4 X). A way to replace air transport on short distances is, according to the Dutch government, by (international) rail transport (De Staatssecretaris van Infrastructuur en Waterstaat, 2018).

Concerning the connection of the Netherlands with Germany, there is an ambition to improve the connection between Amsterdam and Berlin. The ambition to improve this corridor for international connections coincides with the need and ambition to improve this axis for national capacity purposes as well. On short term, from 2024 onwards, quality improvements of the product Amsterdam – Berlin are reached through using new equipment of Deutsche Bahn, the German carrier with whom the Dutch Railways operates the current connection between Amsterdam and Berlin. In order to reduce travel time even more considerably and encourage a modal shift, infrastructural measures should also be taken. This could contain small measures to current infrastructure, building new infrastructure parallel to the current infrastructure (e.g. increasing tracks from 2 to 3 or 4), or by building a new stand-alone High-Speed Railway line as most far-reaching measure.

There are broadly 4 routing options between which can be chosen from in order to improve the connection between Amsterdam and Berlin on the Dutch side. The Dutch ministry of Infrastructure and Water Management prefers the alternative in which all international rail connections of national concern between the Amsterdam and Germany are 'bundled' on the corridor from Amsterdam, Utrecht, Arnhem towards the Ruhr area (interview 9). With international connections, however, the Dutch government and rail sector cannot act in 'splendid isolation' (interview 3). That is why, in the next paragraph (§5.2) the Dutch and German actors involved in improving the connection between Amsterdam and Berlin are presented.

5.2 Actors involved in HSL-Oost

In this paragraph, the actors involved in reducing travel time by implementing new infrastructure between Amsterdam and Berlin by train are amplified. The actors involved in policymaking are an important factor in determining the outcome of policy, and in this case the performance of the (mega-)project (see paragraph 2.1.3. on the institutional level of mega-projects). The actors are categorized in national governments, other levels of government, the rail sector and civil society. Their roles, relationships and the effects of those roles on the extent to which that might create failure factors to reoccur are further analyzed in in chapter 6. The focus of this research is on the Dutch perspective, but the fact that two thirds of the route are situated in Germany, coordination between the parties involved is a necessary condition to execute an international rail product and improve that product.

The European Union has no independent authority concerning international rail transport. The tools that nonetheless can be used are laws, regulations and financial tools. The financial tools involve the grants involved with the Trans-European Transport Network (TEN-T) (interview 3, 8). The national governments involved should thus reach agreement on a shared preferred alternative, after which these measures are on a national level are going to be implemented. This has proven to be delaying with the Betuweroute (interview 7, 16). That is why, in this chapter, governmental levels of Germany are presented in addition to Dutch governmental levels as well.

5.2.1 National Government

The governments on the national level are responsible for transport policy of both national and international concern. However, there are differences in how this is arranged between the countries involved in this case study. In example, with rail transport, in the Netherlands this is done by granting a concession for the 'main rail network' that consist of lines important for national traffic. In Germany, no concession is granted for long distance or international rail traffic. In this paragraph, the characteristics of the different national governments and how their tasks are arranged are highlighted.

The order in which the policy on reducing travel time by implementing new infrastructure between Amsterdam and Berlin is made, is that first, the countries investigate the possibilities on the national level, after which there is looked if these independent national preferred solutions can be conjoined in an international preferred solution. Then, these plans will be worked out and implemented on the national level again (interview 1, 9, 18).

The Netherlands: Ministry of Infrastructure and Water Management

The Dutch Ministry of Infrastructure and Water Management grants the concession for the Dutch Main rail network, which consists of the rail connections of national importance. The current concession reaches from 2015 to 2025 and is granted to the Dutch Railways. After 2025, a new concession will be granted.

In reducing travel time by implementing new infrastructure between Amsterdam and Berlin, the Ministry has a helicopter view of all the concerns in implementing policy in this case. The wishes and concerns from the carriers (in this case Dutch Railways) and other levels of government are gathered in the process of coming towards the plans for Toekomstbeeld OV 2040 (Venne & van Wijmen, 2019). Then, these wishes, and concerns are, together with the Dutch Infrastructure Managers, researched to the extent to which it is possible to grant the wishes of the actors and the Ministry itself on the current rail network. Important condition for the eventual preferred alternative is that these measures benefit the regional, national and international mobility (interview 7). This process then results in a national preferred solution, that the Ministry then discusses with the German Federal Ministry, in order to see if this national preferred solution can be adjusted to the German preferred solution.

Once the preferred solution has been approved both on the national and international level, the measures will have to be fitted in spatially, in the provincial and/or municipal zoning plans. The policy on spatial planning is decided by the Dutch Ministry of the Interior and Kingdom Relations, and extends to the local, decentral governments. However, with projects that transcend the municipal level and are of national importance, the Minister of Infrastructure and Water Management can take control using the Tracéwet, which makes her the competent authority[11]. These projects of national concern

[11] Fore more information on the tracéwet see e.g. Gierveld (2016). This law will from 2021 be included in the new Environment and Planning Act (Omgevingswet).

often face resistance from the municipalities that have no interest in such projects; in example with the HSL- or Traject Oost because they will experience the negative effects of such a line crossing their municipality, but not the positive effects of having a stop on such a line. Through the Tracéwet, the Minister can overrule the municipal land-use plans with a land-use plan on the national level (interview 18).

In 2021, Dutch spatial planning policy will thoroughly be revised with the implementation of the Environment and Planning Act (in Dutch: Omgevingswet) (Government of the Netherlands, 2017). In this law, 23 current separate laws concerning Environment and Planning are merged in one law. The Tracéwet will also be included in this new Omgevingswet. The actual spatial integration and procedures that need to be followed in that process is executed by ProRail, the Dutch infrastructure managers. The changes that occur as a result of the implementation of the Omgevingswet thus affect their processes. In paragraph 5.2.3, the role of ProRail and the implications of the implementation of the Omgevingswet that they will face with implementing new infrastructure are laid down.

Germany: Federal Ministry of Transport and Digital Infrastructure

The German Federal Ministry of Transport and Digital Infrastructure does not grant a concession for rail connections of national importance. As a result, on the long-distance travel beyond the regional travel (i.e. above 60 minutes or 50 km), connections are only provided on the routes where this is profitable, then the Federal Ministry of Transport is the client, that orders Deutsche Bahn Fern Verkehr to execute these trips. On a short distance, however, concessions are granted, but by the governments of the individual Bundesländer. The timetables of the regional train services are announced one year before these are implemented and make the biggest claim on the available capacity (interview 2, 3). Consequently, there is not much capacity left for the long-distance and international rail services.

Because the political decision-making on the federal level takes longer than one year, and the regional train services take up the largest share of the available capacity, the Federal Ministry has limited operating elements on the short term. Therefore, the Federal Ministry of Transport and Digital Infrastructure only makes long term plans. These infrastructure plans are laid down in the Bundesverkehrswegeplan 2030. These plans are arranged every 15 years and revised every 5 years (interview 16).

5.2.2 Other levels of Government

Other levels of government, beyond the state, are affected by the decisions made to implement projects on the national level. In this paragraph, the roles of the lower levels of government involved are further explained. The role of Dutch provinces and municipalities is laid down in this section. Because this research is focused on the Dutch side of improving the connection between Amsterdam and Berlin. The fact that Germany is a Federation and that there is an important role for the Bundesländer in transport and infrastructure, makes that this level of government is considered in this research. The competences at the level of the Bundesländer could form a barrier in finishing the project on time (interview 7), and thus can contribute to the understanding of the reoccurrence of failure factors.

The Netherlands: provinces & municipalities

The province grants the concession for the regional train services (i.e. the connections besides the Main Rail network) and thus the province does not want that the development of the international product goes at the expense of the regional product. Requirement from the provinces for the development of international train product consequently is that the development of that international product does not lead to the erosion of their regional connections. This might be the case when, due to reaching the limits of the free capacity, this capacity is used for the international train instead of regional trains. The Ministry of Infrastructure and Water Management has underlined that when this is the case, they will take a stance towards the Dutch Railways in order to come with a substitution for the loss of that regional mobility (interview 9). Then, the concerns of the local governments are taken away as much as possible in the plans of ToekomstbeeldOV 2040.

There can be differentiated between provinces and municipalities with and without a current or future possible stop. On the one hand, the proximity of an international connection in the province might create a positive effect for provinces and municipalities *with* a stop, in terms of economic value and (international) mobility. On the other hand, provinces and municipalities *without* a stop might only experience negative effects of the infrastructural measures, such as nuisance of the new infrastructure or erosion of the regional train product due to the improvement of the international connection. Resistance towards the project might occur in the provinces and municipalities without a stop. The Tracéwet, however, prevents that individual municipalities might block projects, by granting the competent authority to the Minister of Infrastructure and Water Management (interview 18). The fact that this resistance has not created considerable failure with the HSL-Zuid makes that this is not considered as failure factors in this research.

The provinces in the Netherland with a stake in the development of the connection between Amsterdam and Berlin are the provinces Noord-Holland, Flevoland, Utrecht, Overijssel and Gelderland. The fact that Amsterdam will undoubtedly be the starting point of the improved connection makes that the province Noord-Holland has less to lose than the other provinces. These provinces could lose their international connection or might be provided with an additional international train service.

For municipalities, there can also be differentiated between municipalities with and without a stop. For municipalities with an international connection, this might come with positive economic effects of the increased mobility, but for municipalities without a connection, the implementation of new infrastructure might only be perceived as negative. The municipalities with a possible stop are Utrecht, Arnhem, Amersfoort Centraal, Apeldoorn, Deventer, Almelo and Hengelo. Amsterdam will certainly be the Dutch starting point. Amsterdam has included in its coalition agreement that flights on the short distance should be replaced by trains. Amsterdam experiences the negative effects of being in the proximity of Schiphol Airport: as a result of the emissions from Schiphol, in example the number of houses that can be built in the municipality are negatively affected (interview 10). Another argument for the City of Amsterdam to develop this specific connection is that it enhances the economic relationship with Berlin, and depending on the chosen alternative, the Ruhr area. In this research the municipality of Utrecht is also involved, but it is indicated that there is no steering on international trains from the municipality, as this only concerns at most one train per hour and thus does not have a priority for the municipality.

The municipalities that certainly do not get a stop, but which are affected by the plans for the improvement of the connection between Amsterdam and Berlin in example because the infrastructural measures are taken in their municipality, are not considered. As mentioned in the paragraph on the national government, in the Netherlands the Tracéwet makes it possible with big infrastructure projects beyond municipal borders for the Minister of Infrastructure and Water Management to overrule the land-use plan of local governments. These municipalities are thus not considered in this research. The local integration of these plans is done by the Dutch Infrastructure Managers ProRail. With the shift from the Tracéwet to the new Environment and Planning act in 2021, the aim is to integrally upgrade the surroundings of the project. This means that local governments can submit other projects near the 'main' project, which can be considered in that overarching project as well. As a result of the locally perceived positive developments, resistance towards the initial project might be reduced. More details on the processes of local integration can be found in the next paragraph, paragraph 1.2.3. on the Rail Sector actors.

Germany: Bundesländer

Germany is a federation that exists of 16 'states', that are called Bundesländer in German. The Bundesländer are partly sovereign states. These Bundesländer have their own Ministries of Transport that decide for the transport policy in that specific Bundesland. The Ministry of Transport of a Bundesland grants the concession for regional train traffic, mostly executed by Deutsche Bahn Regio. Regional traffic is traffic within 50 kilometers or 60 minutes (interview 14, 16). The regional train traffic is the largest claim on the rail infrastructure capacity in Germany. As a result, the federal Ministry has limited opportunities for long-distance or international train traffic, executed by Deutsche Bahn Fern Verkehr. The spatial integration of infrastructural measures is the responsibility of the Bundesland involved (interview 7)

Germany: Verkehrsverbunde & Landkreise

The German Bundesländer consist of different Verkehrsverbunde (public transport associations), that consist of different Landkreise. The Landkreise can be compared to the Dutch municipalities. These lower levels of government have relatively large power in public transport issues and take up a large part of the capacity (interview 1). The many stops that the current connection between Amsterdam and Berlin makes is due to the fragmentation/decentralization of power of these governmental layers (interview 9).

5.2.3 Rail sector – infrastructure managers & carriers

Rail projects across borders have several differences to overcome. These differences include in example different characteristics of the tracks, such as gauge width, voltage system or safety regulations. As a result, on the current direct connection from Amsterdam to Berlin, a change of locomotive is necessary at the border, because of the different characteristics of the tracks (interview 1). There are also differences in the way in which the rail sector is arranged per country.

In the European Union, the fourth railway package prescribes that any carrier can apply for capacity in European countries (European Parliament and the Council, 2016). The rail carriers that are described in this paragraph are the carriers that currently execute the connection from Amsterdam and Berlin. These carriers do not necessarily have to be the carriers that will execute this connection in the future, but that is very likely (interview 1).

The Netherlands – Infrastructure Managers: ProRail

In the Netherlands, the national Infrastructure Manager ProRail takes care of the construction, maintenance, management and safety of the national rail network. The capacity on the national network is divided by ProRail. With the construction, ProRail is the party that is involved in the local implementation of the plans, and then is closely connected to the local governments that are affected by the new infrastructure (interview 4, 18). ProRail exists since 2005, with the liberalization of the European rail market. ProRail thus was not involved with the construction of the HSL-Zuid.

ProRail are the owners of the entire Dutch rail network, except for the HSL-Zuid. On this particular piece of rail infrastructure, the maintenance and fault recovery are done by the consortium that constructed the HSL-Zuid as well: Infraspeed BV. ProRail thus was not involved in the design or construction of the HSL-Zuid. With the HSL-Oost, when there is chosen for a new stand-alone High-Speed Railway line, due to European regulations, this must be tendered again. Then, it is not certain whether ProRail will be involved in the construction of this new piece of infrastructure. However, when reducing travel time by implementing new infrastructure between Amsterdam and Berlin is created with measures to current infrastructure, then ProRail will be involved, as they are the owners of all current rail infrastructure (again with an exception for the HSL-Zuid).

With international rail services, the infrastructure managers involved agree on the time at which the train arrives at the border. That way, the national infrastructure managers can process the international train within the national timetable.

In the following years, ProRail will go through two important changes. The first is the change from a private limited liability company to independent governing body (in Dutch: zelfstandig bestuursorgaan). As a result of this shift, the Minister of Infrastructure and Water Management will be able to exercise direct control and justification than in its current form (interview 3, 9).

The second important shift in the following years for ProRail, is the implementation of the new Dutch Environment and Planning law (in Dutch: Omgevingswet). ProRail is responsible for the land acquisition, spatial integration and participation of local stakeholders when upgrading rail infrastructure that is their property (interview 18). In those processes, ProRail values proper environmental management and participation (interview 18). With the implementation of the Omgevingswet, this participation will also have a legal basis. Another consequence of the implementation of the Omgevingswet is that other projects in the proximity of the ‘main’ project can be included in the project decision as well, in order to create a higher degree of support from local stakeholders.

The Netherlands – carrier: Dutch Railways (NS)

The Dutch Railways is divided in different parts, being NS Reizigers (in English: passengers) and NS International. The Dutch Railways used to have a cargo department as well, but that department has been taken over by Deutsche Bahn. NS Reizigers is granted the concession for the Main Rail Network. NS international is responsible for cross-border rail services.

NS Reizigers is concerned with the national transport and is granted the concession for the main rail network by the Ministry of Infrastructure and Water Management until 2025. NS International is concerned with the international rail traffic. The connection between Amsterdam and Berlin is executed in a collaboration with Deutsche Bahn Fern Verkehr. The ambition for NS International is to double the total sold international train tickets.

Germany – Deutsche Bahn

The German railway company Deutsche Bahn is divided in several departments:

- DB Netze: the infrastructure managers in Germany
- DB Fernverkehr: for long-distance and international passengers
- DB Regio: for regional, short-distance traffic

These are the departments that are involved in this research, but Deutsche Bahn has many more roles, such as being an independent energy manager. Deutsche Bahn is also responsible for the distribution of tickets for the German rail network.

Germany - Infrastructure Managers – Deutsche Bahn Netze

In Germany, the rail infrastructure is managed by DB Netze. They are the owners of the tracks, and are the party involved in adding infrastructure to the existing German rail network.

Germany – carrier: Deutsche Bahn Fern Verkehr

DB Fernverkehr is the long-distance carrier in Germany. The long-distance train traffic is not granted a concession but is using open access in which a product is delivered when there is a market. DB Fernverkehr currently exploits the IC Berlin with the Dutch Railways. The Dutch and German use different voltage systems, which should be overcome. Currently, this is done using different locomotives. From 2024 onwards, the new equipment can operate on both voltages. This makes the equipment more expensive then when it should only be suitable for one voltage system.

With long-distance passenger rail services, DB Fern makes the distinction between an Intercity (IC) and Intercity-Express (ICE) trains. The ICE-trains have maximum speeds of 300 km/h, and will only stop in the most important cities on a corridor, in order to maintain the high speeds. The IC-train can travel the same line as the ICE, but makes more stops and thus knows a longer travel time. The maximum speeds of the IC-trains are 200 km/h. The current connection between Amsterdam and Berlin is an Intercity. The current connection between Amsterdam and Frankfurt (following the trajectory of the former HSL-Oost), however, is an Intercity-Express.

5.2.3.1 Civil Society

With interactive governance in which policy is set up within networks, as described by (Lange et al., 2013), governing is done through actors in the state, market and civil society. The civil society can thus also be seen as an actor in the process of policymaking. In this research, a Dutch perspective is applied to reducing travel time by implementing new infrastructure between Amsterdam and Berlin, and thus only the Dutch Civil Society involved is addressed in this paragraph.

In the Netherlands, the Upper and Lower houses form the Dutch parliament and are the representative assembly on the national level in Dutch politics. The House of Representatives (Tweede Kamer der Staten-Generaal) controls the government, and thus the plans of the Ministry of Infrastructure and Water Management. The formed plans are judged by the Senate (Eerste Kamer der Staten-Generaal). In the public transport specifically, the interests of travelers are represented by ROVER in the Netherlands and overarching in the European Union by the European Passengers Federation (EPF). The interests of the environment are accounted for by the Natuur & Milieu Federatie, in every province.

Other ways through which the civil society is engaged in reducing travel time by implementing new infrastructure between Amsterdam and Berlin is through the public debate. There are signs that this subject currently is popular in the public debate: petitions of Greenpeace and GroenLinks are backed by thousands of people. Most important notion that air-rail substitution is gaining importance in civil society is the fact that on all international train destinations, numbers of sold tickets have increased (also see Figure 19) (interview 1, 9, 15). For the connection of Amsterdam to Berlin this growth is autonomous: no changes were made to the product. Considering that people ‘vote with their feet’, the connection is gaining interest.

5.3 Alternative routes

Determining the strategy on the rail connection between Amsterdam and Berlin includes diverging routing options, and on these different routes a range of different measures that can be taken. One alternative route will be chosen as the preferred option to further develop. In this paragraph, the different routing options are explained, using a short history, the current situation, and national and international potential for the alternative. In this section, the alternative routing options are visually displayed with the use of maps, for which the legend is found in Figure 11.

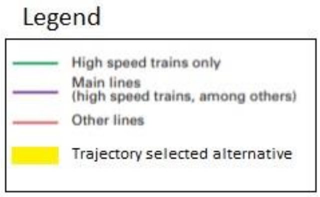

Figure 11: Legend as used on maps with alternatives

Current direct connection: Amsterdam – Hilversum – Amersfoort – Apeldoorn – Deventer – Almelo – Hengelo – German border (currently 6.20 hours total travel time) (Figure 12 Figure 13)

The exploitation of this direct connection between Amsterdam and Berlin started in 1991, when the train to Hannover was extended to Berlin. On the short term (before 2024), the quality of traveling on this line is improved with the arrival of new equipment. The tracks on the Dutch side of the border are rather old, which means that in order to reduce travel time considerably (e.g. to 4 hours as is the ambition of the Dutch Railways), the infrastructure should be changed drastically, with the accompanying costs (interview 2, 3).

Figure 12: Current direct connection in the Netherlands (Interrail, 2020)

In the Netherlands, this train has a regional function, and thus many stops are made on the route. The domestic function creates the right to exist for the line. However, this is no justification for the considerable costs that come with the infrastructural measures of reducing travel times towards 4 hours: on a national scale, the line does not have priority for improvements, as other lines are crammed and need improvements as well. Another result of the national function is the high number of stops, both in the Netherlands (6 stops) and Germany (10 stops). The high amount makes the development of the international train product paradoxical: one the one hand, the stops are needed for the line to exist, but on the other hand, it creates unnecessary extra travel time for passengers between Amsterdam and Berlin. The added value of this line in the air-rail substitution discussion can be questioned: for people to substitute their air movements with train movements, the travel time should be as attractive as possible.

On the German side of the border, the cost-benefit part is an obstacle as well. The economic activity in the hinterland of Niedersachsen, the German Bundesland on the other side of the border, is analyzed and proven to be to low (interview 15). As a result, no infrastructural investments will be done in that region from broadly Hannover to the Dutch-German border.

Thus, both in the Netherlands and Germany, the national interests in upgrading this line is limited. As a result, the possibilities to reduce international travel time also suffer from this lack of national importance, as the investments to upgrade this line will not be taken for the international benefits only.

Figure 13: Current direct connection overview (Interrail, 2020)

'Bundling' international connections: Amsterdam – Utrecht – Arnhem – German border (currently 6.05 hours total travel time) (Figure 14 & Figure 15)

This alternative uses the trajectory of the HSL-Oost as means in the plans that originate from the same time as the HSL-Zuid. The original plan was to upgrade this line by doubling the tracks, and the possibilities for increasing speeds on this corridor were investigated. The tracks were doubled between Amsterdam and Utrecht, and on the same trajectory the maximum speed was increased from 140 to 160 km/h.

Figure 14: 'On top' connection in the Netherlands (Interrail, 2020)

The autonomous growth of the current connection (i.e. growth without changes to the product) from the current direct connection of Amsterdam to Berlin shows, according to the Dutch Railways (interview 1), that the market towards Berlin is still developing. This means that in the future an additional connection from the Randstad towards Germany could be commercially viable. This autonomous growth makes an additional direct connection to Berlin of interest for the Dutch Railways. By creating a new direct connection to Berlin, the connection to the Ruhr area will become hourly instead of every other hour. Another possible positive side effect is the opening of a new market for the Dutch Railways: the Northern Ruhr area. In order to make this connection that currently requires a transfer in Duisburg or Düsseldorf a direct one, this transfer needs to be removed.

Besides the current international function, that might become larger in the future, this is an important domestic corridor in the Netherlands as well. This corridor connects important Dutch railway stations: the one of the capital city (Amsterdam), the biggest train station (Utrecht) and the train station with an important hinterland (Arnhem) (interview 1). In order to be able to cope with the national flow of passengers in 2040, an increase in capacity is required, and choosing this alternative solves that major domestic capacity shortage between these important cities as well. The further development of this line thus is of major interest on the Dutch side. The fact that solving a national issue with choosing this alternative as international connection makes this alternative easier to repay and therefore less risky than the of less national importance current trajectory. The current state of the infrastructure on this ‘on top’ connection towards Berlin also makes it easier (i.e. in terms of investments to make) to create travel time savings than on the current direct route. This makes that the ‘on top’ alternative is seen as the preferred alternative with regards to substituting air travel by rail travel.

Another advantage of the ‘on top’ alternative compared to the current direct connection is the number of stops. In the Netherlands, this connection will only stop twice: in Utrecht and Arnhem. However, this is still an obstacle for HSL trains to reach high speeds, especially on the short distances between the cities (Amsterdam-Utrecht broadly 35 km, Utrecht-Arnhem broadly 55 km). The further elaboration of the chosen alternative will include determining whether each city will keep its stop, or that for the sake of keeping the speed high, stops should be skipped.

Figure 15: 'On top' connection overview (Interrail, 2020)

In Germany, the corridor used by the Amsterdam-Berlin train is of national importance as well, as the line connects important economic regions: the industrial Ruhr area to the capital city Berlin. This is a more important connection than the connection of Berlin to the hinterland in Niedersachsen of the current direct connection. From the Dutch-German border towards the Ruhr area, the train would use the new ‘third track’ of the Betuweroute. From the Ruhr area towards Berlin, the line is already using new infrastructure for 250-280 km/h (from Wolfsburg to Berlin) and several other parts are upgraded for 200-230 km/h (Deutsche Bahn, 2018). The rest of the infrastructure is suitable for 160 km/h.

New international connection: Amsterdam – Zwolle – Hengelo – German border (Figure 16Figure 17)

Another alternative that is being considered is the creation of a new international connection. This trajectory would use the relatively new Hanzelijn, opened in 2012. This connection would pass through the Flevopolder, towards Zwolle, and then from Almelo onwards would use the same trajectory as the current direct connection. Advantage of using this line is that on the Hanzelijn between Lelystad and Zwolle, the maximum speed is 200 km/h, and the European railway safety system ERTMS, required for international European rail traffic. Disadvantage is the current state of the line: between Zwolle and Almelo the track is not electrified and there predominantly is only one track. Realizing this alternative as the preferred international connection to compete with air travel will come with great investments and risks. The alternative however is being considered as the infrastructural measures are important for improving the Dutch national rail network, but this alternative is not the most obvious one.

Figure 16: New international connection via Zwolle and Hengelo in the Netherlands (Interrail, 2020)

From the international perspective, due to the detour that is made, travel time savings are limited. From the German perspective, the same goes as for the current direct connection as these alternatives use the same trajectory in Germany. The investments in infrastructure in Niedersachsen will be limited.

Figure 17: New international connection overview (Interrail, 2020)

High-Speed Rail 'as the crow flies' or parallel from Amsterdam to Berlin with minimal stops (Figure 18)

This alternative would contain the implementation of a new 'stand-alone' High-Speed Railway line, apart from the current existing national network. This alternative would look like the HSL-Zuid, with a piece of new dedicated High-Speed Railway infrastructure between the cities with stops. For a High-Speed Train to reach the highest possible speeds and thus the lowest travel time, the number of stops should be limited. This implies that the national benefits for the line, besides the international connectivity, are limited, especially when compared to the first three alternatives. The plan for the HSL-Oost as intended in the same time as the HSL-Zuid did not contain a stand-alone High-Speed

Railway line, but one next to the trajectory of Amsterdam – Utrecht – Arnhem towards the Dutch-German border.

The implementation of a new High-Speed Railway line has a further reaching impact on the landscape than the alternatives within which a track is added to existing trajectories. Whereas with the first alternatives with there is built on the existing tracks, with more nuisance (such as noise) added to the existing nuisance. With the implementation of a new High-Speed Railway line, new nuisance is created. A new line will cut through the landscape in a place where that was not the case beforehand. Additional noise pollution is created, and people might perceive such a line as 'visual' nuisance as well. It can be questioned whether these widespread negative effects of such a new line outweigh the positive effects of travel time reduction and possible increased mobility for the big cities with a stop and possible positive environmental effects.

The implementation of such a new High-Speed Railway line will undoubtedly face resistance, regarding the negative experiences of the HSL-Zuid, as described in chapter 3. The Dutch Ministry of Transport therefore indicates that if a stand-alone line would be implemented again 'nothing would be learnt from the HSL-Zuid' (interview 9). The HSL-Zuid shows the considerable impact on the landscape that High-Speed Railway lines have. For the HSL-Zuid, in order to mitigate this visible impact, the Green Heart tunnel was built. Taking such far-reaching measures to mitigate negative side effects increases the risks of delays and exceeding the predetermined budgets.

The Dutch Ministry of Infrastructure takes this option into account with the calculations and considerations for the different alternatives, but it is not very likely that this is going to be the preferred alternative. The reason for this is the larger degree of complexity and thus risks on delays, extra costs and disappointing quality when compared to building on to existing lines.

Figure 18: High-Speed Railway line 'as the crow flies' overview (Interrail, 2020)

5.4 Synthesis Context Case Study

Concluding, there are several alternative routes, that can be changed in several ways, that can contribute to reducing travel time by implementing new infrastructure between Amsterdam and Berlin. Currently, there are two ways to travel from Amsterdam to Berlin. The first is using the IC Berlin via Hengelo that has 6 national stops. This line is old and has limited national importance. The second is by using the trajectory of the previous plans of the HSL-Oost and make a transfer in the Ruhr area. This trajectory has considerable national importance, and has more chances on reducing travel time by implementing new infrastructure in Germany as well. Improving this connection would also create a ‘bundling’ of important Dutch-German connections, with which an hourly connection to the Ruhr area can be created.

There are four alternative routes. Of these four routes, 2 use the line in Niedersachsen (see figure Figure 13 & Figure 17). Due to the limited national importance on the German side, this line will not receive funding in the future. In the Netherlands these lines are of lesser national importance as well. Besides, parts of these lines are old, or exist of single tracks, and thus need substantial investments in order to reach travel time savings.

The option of a new High-Speed Railway line that is tendered besides the existing Dutch rail network is not very likely. The Dutch Ministry of Transport has stated that ‘if a stand-alone line will be implemented again, nothing will be learnt from the HSL-Zuid’ (interview 9). Such measures will be very expensive for limited travel time savings. As can be read in paragraph 5.1.1, this was never the plan for the HSL-Oost in the time that the plans for the HSL-Zuid were developed as well.

The trajectory that previously went by as the HSL-Oost and currently as Traject Oost seems the most logical alternative to develop further in the Netherlands. The line has an important national function, and for that reason alone will have to be expanded to cope with the national passenger numbers in 2040 (interview 5). Additional argument to develop this line, is that the frequency of the connection to Frankfurt can be doubled, and a connection to the Northern Ruhr area can be created. This area currently is not connected to Amsterdam, and the Dutch Railways state that with this, a new market can be opened for them, creating new business opportunities (interview 1).

The important national function involved in every alternative is a complicating factor for reducing travel time by implementing new infrastructure on the international connection of Amsterdam and Berlin. A national benefit implies national stops, which increases international travel times. When a train must stop multiple times in the Netherlands, this means that there is limited distance to reach maximum speeds and optimally be able to use these speeds. The benefits for the national train product, however, is a necessary condition to justify investments on the international level (interview 1, 2, 9).

6. Ex durante evaluation: reoccurring or disappearing failure factors on the rail connection from Amsterdam to Berlin

In this chapter, the failure factors as derived from theory and the HSL-Zuid in chapter 3 are assessed to their possible future reoccurrence or disappearance. These factors in the past have caused delays, to cause budgets to be exceeded and quality to turn out disappointing with mega-projects. In this chapter, it is made clear which failure factors might occur again or disappear with reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin, possibly by reopening the plans of the HSL-Oost. In the previous chapter it is made clear that there are several alternatives in order to do so, of which the corridor of the previous plans of the HSL-Oost is preferred by the Dutch Ministry.

The data used in order to execute the ex durante evaluation is gathered using semi-structured interviews with actors involved in the process of reducing travel time by implementing new infrastructure between Amsterdam and Berlin and experts on Dutch-German rail connections and Dutch-German relations. The result of this chapter will be an ex durante (i.e. evaluation during the process) evaluation of the failure factors within the project of reducing travel time by implementing new infrastructure through rail between Amsterdam and Berlin, and the extent to which these factors might reoccur or disappear. The outcomes of this ex durante evaluation can serve as tool to make the policymaking of this project become adaptive to the current developments. As a result of making adaptations in the process according to the current appearance of failure factors, failure might be prevented in the future of the project. In the next chapter 7, conclusion and discussion, this overview is used to answer the main research question of this thesis, using the independent variable of institutional theory.

6.1 Analysis of failure factors HSL-Oost

In chapter 2, theory on mega-project management is presented. Mega-projects are managed in 4 phases: initiation, decision-making, construction and commissioning. Mega-projects can be analyzed at 3 levels: the technical, strategical and institutional level. In this research, the focus is on the institutional level, as improving the institutional level contributes to the improvement of the technical and strategical level as well (Morris & Geraldi, 2011). That is why the analysis is based on semi-structured interviews involved in improving the rail connection between Amsterdam and Berlin.

In chapter 3, the factors that have caused failure (delays, exceeding budgets, disappointing quality) in past mega-projects are uncovered using theory and the empirical case of the HSL-Zuid. These factors are divided in the phases that are uncovered in paragraph 2.1 (see Table 8 on the next page). In this next chapter, the failure factors of past project are assessed to the extent to which these might reoccur or disappear in the possible future mega-project of the HSL-Oost. This context of this possible project has been elucidated upon in chapter 5, the context of the case study. In the context chapter, the actors involved in this project are presented. Semi-structured interviews among these actors are conducted as data gathering for the analysis in the following chapter. For an overview of the interviewed actors, see Attachment 2. In the conceptual model shown in paragraph 4.3, this analysis chapter is the box on the second lowest box on the right. With the knowledge gained from this ex durante evaluation, institutional theory is used in chapter 7 to possibly explain the reoccurrence or disappearance of failure factors.

Initiation	Decision-making	Construction	Commissioning
Targeted tackling of the thoughtfully identified problem	Suitability of plans for political decision-making	Uniformity throughout phases	Testing of the equipment
Inappropriate objectives	Transparency & the role of Parliament	Slow pace of realization	Uncoupling management & operation
National coordination of parties	Political courage		
International coordination of parties	Disconnected from spatial context		
Forecasts: realistic estimation of timeframe			
Further elaboration of the plan			

Table 8: Theoretical and Empirical failure factors: frame of analysis as uncovered in chapter 3

6.1.1 Initiation

As is uncovered in paragraph 2.1.2., the initiation phase is defined as the phase in which the project is conceptualized and formed. There is decided whether there are alternatives, besides the foreseen project, that might solve the problem at hand. The objectives, scope and structure of the project are decided by the key stakeholder, after which the actors involved in collaboration should create a holistic proposal, containing a problem definition, solution, timeframe and a final recommended solution. Then, in the next phase, the political decision-making on the final recommended solution can take place. The variables that cause failure in this phase, as is uncovered in chapter 3, are shown in Table 9.

Variables Initiation
Targeted tackling of the thoughtfully identified problem (I)
Inappropriate objectives (II)
National coordination of parties (III)
International coordination of parties (IV)
Forecasts: realistic estimation of timeframe (V)
Further elaboration of the plan (VI)

Table 9: Past failure factors initiation phase (§3.2.1.)

I. Targeted tackling of the thoughtfully identified problem

With the HSL-Zuid, the final solution of implementing High-Speed Railway infrastructure preceded the problem analysis. The lack of discussion on the utility and necessity of the project resulted in a changing argumentation of the importance of the project. This caused opposition in politics and society.

The starting point of the implementation of infrastructure in order to reduce travel time on the rail connection between Amsterdam and Berlin is different than with the HSL-Zuid. Towards the east, the demand is more fragmented than in the time of the HSL-Zuid it was towards the south (interview 1).

The HSL-Zuid was from the starting point onwards supposed to be a connection to the European network of High-Speed Railway lines and should consist of High-Speed Railway infrastructure as well. For improving the rail connection between Amsterdam and Berlin, this is not the case. This means that there is room for debate on the trajectory on which measures might be taken in order to improve the connection towards the east. That is why in this research the term 'HSL-Oost' is not used, but 'improving the rail connection between Amsterdam and Berlin' is used instead. There are more routing options than the one of the HSL-Oost (see paragraph 5.3), and the measures taken can also be different than the then-proposed doubling of the tracks between Amsterdam and Arnhem and making these suitable for 200 km/h.

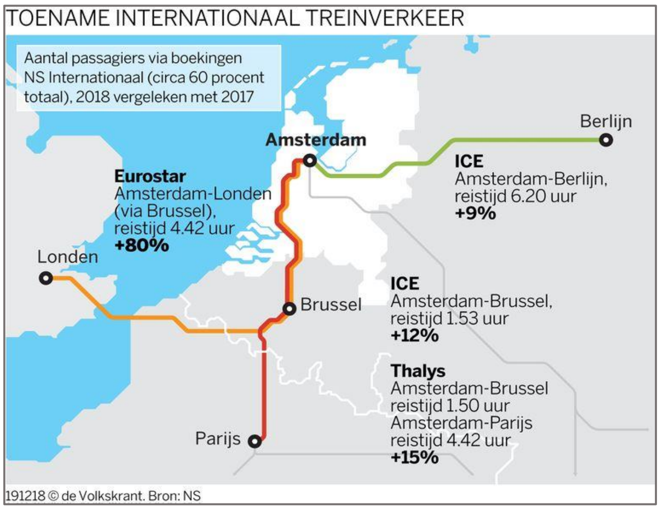

Figure 19: Growth International travel through rail(van den Eerenbeemt, 2019)

Problem analysis

The current line from Amsterdam to Berlin, and from Amsterdam to Arnhem that continues to the German border are saturated with national, international and regional train traffic. The limits of current capacity are reached. At the same time, the discussion on substituting short-distance flights has gained interest in Europe. On the connection between Amsterdam and Berlin, an autonomous growth in passenger numbers is observed (see Figure 19). This growth is autonomous as nothing has changed to the product in terms of costs, capacity, travel time, flexibility or reliability. Those factors create a modal shift on the micro perspective. This independent growth shows a latent demand for international rail services (interview 1, 2, 8). The combination of the capacity problems on a regional and national level and the gained interest in (further) developing international rail connections in order to substitute airplane trips, will in the future require an increase in supply, by taking infrastructural measures. It should be noted that 'soft' measures are conditional to the success of the infrastructural measures that are taken in order to promote a shift from air to rail transport on medium distances (see Box 2, interview 2).

The measures that are taken should contribute to solving capacity problems perceived on the regional, national and international level (interview 2, 7).

Soft measures

In order to promote the substitution from air transport to (High-Speed) rail transport, it is stressed by the passenger federations that this cannot solely be achieved with implementing 'hard' measures. A lot can be gained with 'soft' measures such as comfort, international passenger rights and ticketing (interview 2, 3, 8).

<u>Comfort:</u> on the current line, old trains are currently being used. These trains in example have no wireless internet, which could improve travel time as the hours on the train can be used as 'working' hours. The new equipment that will be used from 2024 onwards will be of high comfort standards and have wireless internet access onboard.

<u>International passenger rights</u>: With international train travel it is unclear where to get refund in case of delays or missing a transfer

<u>Ticketing:</u> these can only be booked shortly (3 months) prior travel date, there is no central place (such as it is with plane tickets) to easily find and buy tickets.

Box 2: 'Soft' measures

Tackling the problem

Different alternative routes are considered to improve the connection from Amsterdam towards the east and with Germany are considered. On these different alternative routes, different measures can be taken. An inventory of regionally experienced bottlenecks are gathered in the process of generating the plans for Toekomstbeeld OV 2040. Then, there is looked at which of the route's measures can be taken that the regional, national and international level all can profit from. There is looked for the investments on which 'your euro can pay off most' (interview 15).

Experienced characteristic of the current Dutch Ministry of Infrastructure and Water Management is that they want to score 'rather today than tomorrow' (interview 1), and approach this by picking the 'low-hanging fruit' (interview 6). The Ministry describes its own approach as adaptive (interview 9). In this way, results can be achieved quickly with limited resources, and thus by taking limited risks on failure. On the short term (i.e. before 2024) travel time savings are reached through new equipment that will be used on the current connection from Amsterdam to Berlin. As a result, a small reduction of travel time can be realized. With additional small infrastructural measures that are deemed to be reasonable by the Ministry (interview 9), these travel time savings will be a maximum of 40 minutes (interview 1, 3, 9, 16).

On the long term, however, more investments will be needed to provide additional capacity that will be needed to accommodate the foreseen demand for regional, national and international rail services for 2040 (interview 5). For improving the connection between Amsterdam and Berlin, international coordination is sought between the Dutch ministry of Infrastructure and Water Management and the German Federal Ministry of Transport and Digital Infrastructure. On an international level, it is agreed to research the possibilities within the national rail network, after which there is looked at a possible collective alternative that benefits the international product, but solves national problems on both sides as well. This creates support for the international plans on the national and regional level as well.

On the Dutch side of the border, the possibilities on the national rail network are investigated within the development of a 'national public transport network', that is formed in the plans of Toekomstbeeld OV 2040 (see section 5.1.3). In these plans, the locally experienced bottlenecks experienced by local governments are inventoried, and considered by the national government in consultation with public transport carriers and the Dutch Infrastructure Managers from ProRail (see Figure 20). Then, the input of local governments is taken into account with the wishes and concerns for the development of the national network and international connections. A solution that benefits all levels, regional, national and international, has the highest probability of being realized.

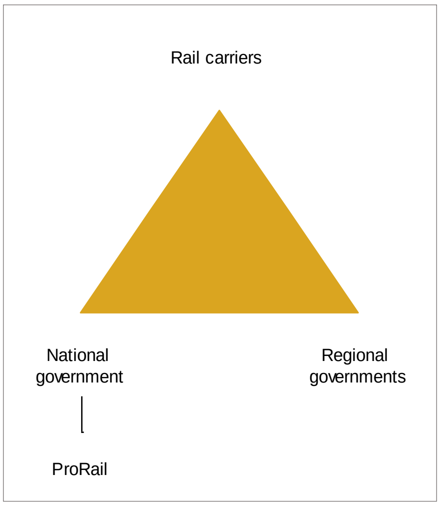

Figure 20: The 'golden triangle' for setting up the plans for Toekomstbeeld OV 2040 (Venne & van Wijmen, 2019)

The combination of tackling national and international problems justifies the investments on the international connections, but also creates a paradoxal situation for the international train: national benefits imply more stops, which will not be the optimal situation for the international train, is this increases travel time for the international train.

Finding targeted tackling of thoughtfully identified problem

This failure factor is not expected to reoccur with the HSL-Oost, as the problem is analyzed more carefully, and the eventual outcome is carefully considered. The benefits of the solution for the international train product, however, can be considered to be sub-optimal when the measures taken should also benefit regional and national services.

II. Inappropriate objectives

With the HSL-Zuid, the objective included a financial revenue of 1.8 billion (Guilders). For passenger volumes, no objective was set. The Parliamentary Inquiry Committee judged that the government should have let transport objectives outweigh the financial outcomes (Tweede Kamer der Staten Generaal, 2015).

The objective of the international working group is to reduce travel time between Amsterdam and Berlin. The Dutch Ministry of Infrastructure mentions that it has many ambitions, of which the wish to reduce travel time between Amsterdam and Berlin is only one, and not of the highest priority (interview 9). The need to divide the resources of the Ministry between the separate projects and ambitions fosters the necessary debate on the utility and necessity on investments in the connection between Amsterdam and Berlin. The utility and necessity of investments on the connection between Amsterdam and Berlin are elevated by the need to invest in the national network as well: if the investments on the international connection can serve the national ambitions as well, a multiplier effect can be observed in solving multiple problems with one solution. There definitely is a drive to realize the ambitions of the government, on both sides of the border (interview 9).

Finding inappropriate objectives

This failure factor is not expected to reoccur with reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin. The objective is broad: reduce travel time. However, in this case that means that also small measures can be taken and still live up to this objective. As a result, the achievements in travel time on the international product might not be as high as they could have been. The risks on failure, however, is considerably smaller with smaller infrastructural measures then when compared to the implementation of a High-Speed Railway line.

III. National coordination of parties

Because the solution of implementing a High-Speed Railway line preceded the problem analysis, there was a lack of political, societal and professional debate. This caused resistance and a lack of support of the plans, resulting in the opposition pushing through adjustments in a later stage of the project (see factor Transparency & Role of Parliament).

The national coordination of parties involved in reducing travel time by implementing new infrastructure between Amsterdam and Berlin takes place within the framework of Toekomstbeeld OV 2040 (interview 2, 7, 9). Within that framework, there is operated within a 'golden triangle' (Figure 20). This approach has proven to be successful of creating plans in the past (Venne & van Wijmen, 2019). Local governments, that de facto could be overruled in their plans by the current Tracéwet[12], can make their wishes and concerns clear, after which the national government can take these into account with setting up the new plans. The consultation that takes place within this triangle contributes to the political, societal and professional debate on the measures to be taken, that was lacking with the HSL-Zuid.

As a result of the implementation of the Omgevingswet, the direct environment of the project might serve from the developments, as an integral approach is involved within this new Environment and Spatial Planning Act (see Box 3). The policy thus can count on more support from lower levels, as this is made more bottom-up than with the HSL-Zuid, and thus might face less resistance from lower governments, as solutions to their local bottlenecks might be included in the plans too.

> Omgevingswet
>
> *As a result of the implementation of the Omgevingswet, projects are enriched by upgrading the whole region of the project. This means that local projects in the vicinity of the national project can be executed as part of the plan as well (interview 18). Consequently, the region that otherwise would not have profited from the national project now can experience benefits as well. This might create more support on the local level for projects for which a 'not in my backyard' attitude could be experienced.*

Box 3: Consequences implementation of the Omgevingswet

Political debate

The fact that the 'Traject Oost' is included in the MIRT program (see paragraph 5.1.2) makes that measures to improve connections towards the east are already put on the agenda, and are already approved as a priority by the Parliament. Also, on the local level, a higher level of support is expected, due to their bottlenecks being involved and the integral approach of upgrading the environment of the project as well (interview 18). The local benefits then might contribute to the acceptance in national politics.

Societal debate

The societal debate on the importance of international train connections as substitute for short to medium distance flights is growing (interview 1, 3, 4). The autonomous growth of the passenger volumes of the past year shows a growing importance of international rail connections in society (interview 1, 2, 8).

Professional debate

Because the Dutch infrastructure managers of ProRail and the Dutch Railways are involved in the policymaking of Toekomstbeeld OV 2040, but also are involved in the international working group of reducing travel time by implementing new infrastructure between Amsterdam and Berlin. These parties represent the concerns, priorities and possibilities within the rail sector. With the HSL-Zuid, no party from the rail sector was involved in making the plans for the infrastructure, which resulted in failure.

Finding National Coordination of parties

Due to how Toekomstbeeld OV 2040 is set up, in the golden triangle (Figure 20), the political, societal and professional debate on the utility and necessity of the infrastructural measures has taken place more than with the HSL-Zuid. As a result, the actors involved have contributed to the plans, and a higher supporting base is created. Due to this more bottom-up approach that is applied than with the HSL-Zuid which has a more top-down approach, this factor is not expected to reoccur in the same way

[12] Involved in the in 2021 expected Omgevingswet. For more information on the Tracéwet see (Gierveld, 2016)

with reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin as the HSL-Zuid.

IV. International coordination of parties

With the HSL-Zuid, the process of getting the involved countries on one line was bumpy. When the plans were approved on a national level, the international coordination had to be sought with Belgium. The disturbed relationship between the Ministers of Transport involved put the process in a deadlock between 1994 and 1996. Eventually, this could be overcome with the arrival of new ministers, that initiated shared studies and a financial compensation that should be granted to Belgium. Based on the independent shared studies, the project eventually could proceed and be realized.

The international coordination of the parties involved in reducing travel time by implementing new infrastructure between Amsterdam and Berlin is laid down in an international working group. In this group, from the Dutch side, the Ministry of Infrastructure and Water Management, the Dutch Railways and the Dutch Infrastructure Managers of ProRail are involved. From the German side, the Federal Ministry of Transport and Digital Infrastructure and the German Infrastructure Managers of DB Netze are involved (interview 9, 15). DB Fern, the commissioning party on German long-distance rail travel, are explicitly not involved. This is because of the 'open access' form of exploiting, the German Ministry and this commissioning party are not as attached as the Dutch Railways and the Dutch Ministry are due to the concession granted on the Dutch side (interview 15).

In the working group it is agreed that first, the possibilities for infrastructural measures on each side of the border should be researched by the ministries themselves. Then, with the nationally preferred solution(s), an internationally preferred alternative is sought, that fits in the national transport plans. Then, this agreed plan is worked out on the individual levels, towards lower levels of government in both countries independently.

It is stated by the Ministry that the Secretaries of State involved, share the ambition of improving the connection between Amsterdam and Berlin, and the relationship between them is very good (interview 9). The Dutch Ministry however, noticed that even though the ambition is shared, the Dutch Ministry often has to 'drag' in order to reach results (interview 9). This can be caused due to the fact that the idea of a project is different between the Netherlands and Germany: whereas in the Netherlands a project is based more on process agreements, in Germany a project is based on the contents (interview 13, 15). In order to be considered as a project in Germany, there has to be 'money, political will and people need to be deployed' (interview 13). Another difference between projects in the Netherlands and Germany is the means of financing. When a project is involved in the MIRT in the Netherlands (see section 5.1.2), the financing is also covered. When a project is involved in the Bundesverkehrswegeplan in Germany, this does not involve the way of financing. Each project in Germany should look for their own way of financing (interview 16) [13].

In Germany hierarchical structures within companies and governmental institutions are very important. That is why the Dutch Ministry cannot do business with the Bundesland at the border, Nordrhein-Westfalen. The countries involved do not only differ in the conceptions of what a project is, but also the rail sectors of the countries differ considerably. It is stated by an actor from the European

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[13] For more information, see Maßnahmensetzvorbereitungsgesetz by (Bundesministerium für Verkehr und digitale Infrastruktur, 2020)

Passengers Federation that such differences make cross-border projects twice as expensive as national projects (interview 8). The differences involve:

- **Technical differences:** differences in voltages and security requirements.
- **Strategical differences:** the performances of the national rail carriers differ considerably. DB Fernverkehr, responsible for long-distance and international traffic in Germany, has poor performances on the national level (interview 8, 12) due to great claim done on the capacity by the regional services (see section 5.2.3.). In the Netherlands, the performance of the Dutch Railways on the national level is better, and thus a shift of the focus towards international rail travel can be permitted. The Deutsche Bahn thus does not have a similar priority for improving international connections (interview 3), as their first priority is getting the national performances to an acceptable level.
- **Institutional differences:** these involve the different relationship between the Ministries of transport and the concessions, and the different perceptions of what is a project. Important notion to take is that in Germany, with the spatial integration of plans in the Bundesländer, participation can take place until late in the process, and thus adjustments to the plans can be done until late in the process as well. This has proven to delay the process of the Betuweroute considerably (interview 7, 16). The late participation will be eliminated with the German Maßnahmensetzvorbereitungsgesetz (interview 16)[14].

Finding international coordination of parties

Even though the relation between the State Secretaries involved are seen as very good compared to the HSL-Zuid and there are shared ambitions, this failure factor is expected to **possibly reoccur** with reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin. Technical, strategical and institutional differences between countries involved that should be overcome, which causes uncertainties that cannot eliminate failure.

V. Forecasts: realistic estimation of timeframe

As a result of tendering the construction and commissioning of the line, optimistic forecasts were shown by the parties that eventually were granted the tender. This is a known problem with tenders, that candidates use optimistic forecasts in order to win the tender. Also, the risks of building the line were not properly assessed, resulting in problems due to the soft soil (see the failure factor disconnected from spatial context).

As described in section 5.3 on alternative routes, a stand-alone High-Speed Railway line is not likely to be chosen as final recommended solution, due to the interwovenness with the national network and the positive effects that the investments should have on the national and regional level as well (interview 1, 2, 3, 9). As a result, an upgrade of current infrastructure will be most likely. An upgrade implies the improvement of existing infrastructure or the building of additional tracks (interview 3). ProRail then are involved as the owner of the current infrastructure, and the project does not have to be granted through a tender as would happen with a High-Speed Railway line apart from the existing Dutch Rail network. ProRail has years of expertise on building and improving rail infrastructure, and thus less failure is expected than with the inexperienced party involved in the HSL-Zuid.

Also, with upgrading existing infrastructure as compared to implementing completely new infrastructure on a new place, the local circumstances and what happens when a train passes over are

[14] Also taken care of in Maßnahmensetzvorbereitungsgesetz

known on the existing tracks, more than with a new line being built. However, the insight in the risks from the external environment for different alternatives are often not known in the first phases, when the choice for an alternative is made. In the first phase of the project there is looked what is possible from a perspective of the infrastructure and tracks, and not on the external environment. As a result, choices on alternatives are made without an underlying Environmental Impact Assessment (in Dutch: MER) (interview 18). The local circumstances thus are often not known when choosing an alternative, which makes that unpleasant surprises (e.g. with the circumstances of the soil) might still occur.

Finding Forecasts: estimation of timeframe

The optimist forecasts are eliminated due to the likelihood of an upgrade being the preferred alternative, and the existence of ProRail as independent Infrastructure Manager (conditional of the alternative not being a High-Speed Railway line). Also, with existing infrastructure the risks of surprising local conditions are relatively low compared to implementing new infrastructure. However, the external environment is often in its entirety not taken into account in the first phases when a choice is made on the final recommended solution, due to a focus on the possibilities on the infrastructure are, and not what possibilities in the direct environment of the project are.

VI. Further elaboration of the plan

The aim of the Dutch government was to be connected to the European High-Speed Railway network. This aim implied that the infrastructure that was going to be implemented would be High-Speed Railway infrastructure. The construction of infrastructure that allows speeds of 300 km/h was never done before. Also, there was chosen to implement a completely new security system, without an underlying system of proven technology. The choice for Public Private Partnership also complicated the coordination with the HSL-Zuid (see factor uniformity throughout phases).

The further elaboration of the plans will depend on the alternative that is chosen to improve the connection between Amsterdam and Berlin. It is however stated by the Dutch Ministry of Infrastructure and Water Management that the lessons learned of the HSL-Zuid are interwoven in the 'working processes' of the Ministry (interview 9). As a result, the contracting that complicated the construction of the HSL-Zuid is not in the prospect with this project. Also, when the alternative of an upgrade of current infrastructure is chosen, such contracting will not be necessary due to the position of ProRail as owner of the tracks. ProRail then will construct the measures as these are to their own tracks. Other problems that occurred with the HSL-Zuid, such problems with the security system ERTMS, are currently also not seen as a problem, as ERTMS is implemented more on the national level (interview 2, 8). The Ministry also expresses that when a stand-alone High-Speed Railway line would be implemented again, 'nothing would be learnt from the HSL-Zuid'. It can thus be assumed that the most far-reaching alternative of the High-Speed Railway 'as the crow flies' as described on page 73 is not likely to be chosen as final preferred solution. This limits the probability of problems with technical and contractual complexity that occurred with the HSL-Zuid to occur with reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin.

Finding Further elaboration of the plan

This factor is not expected to reoccur with reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin, due to the lessons that are learnt and applied of the HSL-Zuid.

Findings initiation

Besides *international coordination of parties* and *forecasts: realistic estimation of timeframe* all the other failure factors are expected to disappear with reducing the travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin. The fragmented demand towards to east, compared to the south, is less straightforward and more fragmented. As a result, there can be chosen from several alternative routes to develop and use as the preferred route to reduce travel time between Amsterdam and Berlin. The iterative process in which the Dutch preferred alternative is chosen is fed by the local governments, rail transport carrier Dutch Railways and the Dutch Infrastructure Managers of ProRail in the creation of the plans of Toekomstbeeld OV 2040. This golden triangle creates a supporting base for the final recommended solution, as national and regional capacity problems are to be incorporated in the plans as well. The national and regional function of the infrastructural measures justify the investments, but also make that the international train product is not used optimally. The many other ambitions that are involved in Toekomstbeeld OV 2040 make that investments should be thoroughly be considered, in order to do the best investments. This creates the utility and necessity for the measures that was lacking with the HSL-Zuid. This also makes that the Dutch Ministry will achieve results that are easily reached, and thus involve minimal risks.

The failure factors that are expected to reoccur are international coordination of parties and the forecasts: realistic estimation of parties. The forecasts of railprojects are not always entirely taken into account, because the spatial impact of the measures that will be taken is often not known. As a result, unexpected risks can occur in the external environment of the project, which could be foreseen when an Environmental Impact Assessment would underlie the choice for a final recommendation.

The international coordination of parties is created by technical, strategical and institutional differences between the countries involved, that should be overcome during the process.

Failure factors initiation phase	**Reoccurrence (+) or disappearance (-)**
Targeted tackling of the thoughtfully identified problem	-
Inappropriate objectives	-
National coordination of parties	-
International coordination of parties	+
Forecasts: realistic estimation of timeframe	+
Further elaboration of the plan	-

Table 10: Ex durante evaluation past failure factors in initiation phase improving rail connection Amsterdam-Berlin

6.1.2 Decision-making

As is uncovered in paragraph 2.1.2., in this phase the formal decision-making on the final recommended solution takes place. The approval of the project depends on the legitimacy, efficiency & effectiveness and the political feasibility and social acceptability of the project. When the projects lacks at these point, it is discontinued and adjustments should be made in order to reiterate through this process. When the project is approved in political decision-making, the spatial integration at lower governmental levels has to take place, after which construction can be prepared and executed in the next phase. The variables that cause failure in this phase, as is uncovered in chapter 3, are shown in Table 11.

Variables Decision-making
Suitability of plans for political decision-making (VII)
Transparency & the role of Parliament (VIII)
Political courage (IX)
Disconnected from spatial context (X)

Table 11: Past failure factors decision-making phase (§3.2.2.)

As mentioned in paragraph 2.1.2, this is the phase where the (political) decision-making on the final recommended solution that is the result of the initiation phase takes place. In this phase, the final recommended solution can either be approved, discontinued or be sent back to make adjustments. In order for the project to be approved, it should be legitimate, efficient, effective, politically feasible and socially acceptable. The phase consists of political decision-making and the spatial integration at the lower governmental levels.

VII. Suitability of plans for political decision-making

With the HSL-Zuid, the first Core Planning Decision (PKB) was withdrawn, due to limited support as result of insufficient substantiation. The plans had to be constructed in a new core decision. This led to a longer lead time of the decision-making phase.

The improvement of the rail connections to Germany is involved in the Dutch MIRT program[15]. In the process of coming to measures that are taken within this program, there is a fixed structure. If there is a plan within the MIRT projects, this is reported to Parliament, which can judge whether the plans are justifiable or not (interview 9). The plans that are set up in Toekomstbeeld OV 2040 are arranged in the same way as the phases of the MIRT process[16] (interview 9). Besides, an alternative that will consist of an upgrade of current infrastructure will require other, simpler, political decision-making than the decision to build the HSL-Zuid as stand-alone High-Speed Railway line.

Finding Suitability of plans for political decision-making

This factor is **not** expected to reoccur with reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin

VIII. Transparency & the role of Parliament

With the HSL-Zuid, this factor appeared as a marginalized role for the Parliament. The Parliament was at some points in the process misinformed. They were presented with accomplished facts, while there was still room for debate and to make adjustments.

[15] For more detailed information see MIRT Overzicht 2020 by Ministerie van Infrastructuur en Waterstaat (2020)

The plans that are involved in MIRT are set up transparently. These plans are updated every year and publicly accessible[16]. The steps that are made towards realization are clear and determined beforehand. Transparency to lower governments is achieved through the golden triangle in which the wishes and concerns from local governments are taken into account as well (interview 9).

Finding Transparency & the role of Parliament

This factor is **not** expected to reoccur with reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin

IX. Political Courage

With the HSL-Zuid this factor has proven to cause failure due to the lack of transparency and limited role of the Parliament in the first stages of the project. The opposition had limited voice in the decision for High-Speed Railway infrastructure. Then, when the project was approved, the opposition could only push through agreements, that would complicate the plans (e.g. by the implementation of the Green Heart tunnel).

An upgrade of infrastructure that is likely to become the preferred alternative will require other decision-making than the implementation of a complete new stand-alone High-Speed Railway line (interview 9). The plans that are made in Toekomstbeeld OV 2040 are transparently set up and widely supported due to the participation of lower governments and parties from the rail sector. As a result of this transparency and broader supporting base, intervening of political opposition will be more limited than with the HSL-Zuid, due to more transparency and involvement in the formation of the plans.

Finding Political Courage

This factor is **not** expected to reoccur with reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin, due to more participation by actors in the first stages and the creation of a bigger supporting base due to the interwovenness with national and regional perceived problems, which creates less need for political opposition.

X. Disconnected from spatial context

With the HSL-Zuid, this failure factor is apparent in the sinking of the infrastructure in the soft soil. The risks of the soft soil were not properly taken into account, resulting in underperformance (i.e. delays due to malfunctioning of trains). This was partially caused by the decisions made on a high governmental level, after which local circumstances were not known sufficiently in order to know the risks.

The extent to which this failure factor reoccurs depends on the alternative that will be chosen. When there is chosen for a new line, apart from the existing networks, the risks of underestimating the soil can be bigger than when current infrastructure is upgraded, or an additional track is added to current tracks. When there is existing infrastructure, it is known what happens with the soil when trains are placed upon that soil. As a result, the risks can be assessed more realistically.

The spatial integration of upgrades to existing rail infrastructure (with exception of the HSL-Zuid) is done by ProRail, the Dutch Infrastructure Managers. They are designated with the contacts with regional stakeholders for rail projects. They carry out the elaboration of the plan, in terms of spatial planning and legal affairs. From the Infrastructure Managers' internal perspective, the spatial context is often considered when the process is going on for a considerable time. This means that often decisions on alternatives are made without an underlying Environmental Assessment Report (MER). This means the decisions are taken without understanding of the spatial implications of the project (interview 18). This is caused by the focus often being on what is possible on the *tracks*, without looking at the implications for the *external environment*.

Finding disconnected from spatial context

This factor **might** reoccur with reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin. In the first phases of the project, there is a limited view on the spatial implications of different alternatives. This creates uncertainties about the risks involved in the external environment of the chosen alternative, which might contain circumstances that create failure.

Findings decision-making

The Dutch preferred trajectory of reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin is involved in the Dutch Multi-Year Programme for Infrastructure, Spatial Planning and Transport (MIRT) as Traject-Oost. The plans projects that are involved in MIRT are created in a transparent way, with predefined phases. The decisions that are taken on the projects are reported to Parliament. Parliament can decide before starting the project whether or not to approve the plans, which was not the case with the HSL-Zuid.

Besides the projects being in preparation and approved by Parliament for years, an upgrade of current infrastructure will create less resistance in politics than a stand-alone High-Speed Railway line. Especially when the measures also serve national and regional causes, considerably less resistance is expected to occur than with the HSL-Zuid. An upgrade to current infrastructure also consists of less complicated decision-making.

Failure factor that is expected to occur within this phase is the decision-making being disconnected from the spatial context: it happens often with rail projects that alternatives in the initiation phase are chosen, eliminating other alternatives, without a spatial basis of an Environmental Assessment Report (MER) underlying the considerations for choosing an alternative.

Failure factors decision-making phase	**Reoccurrence (+) or disappearance (-)**
Suitability of plans for political decision-making	-
Transparency & the role of Parliament	-
Political courage	-
Disconnected from spatial context	+

Table 12: Ex durante evaluation past failure factors in decision-making phase improving rail connection Amsterdam-Berlin

6.1.3 Construction

As is uncovered in paragraph 2.1.2., in this phase the preparation of the construction and the physical construction of the project take place. When the project is built, formal completion to the owner of the project takes place, after which the commissioning phase can commence. The variables that cause failure in this phase, as is uncovered in chapter 3, are shown in Table 13.

Variables Construction
Uniformity throughout phases (XI)
Slow pace of realization (XII)

Table 13: Past failure factors construction phase (§3.2.3.)

XI. Uniformity throughout phases

With the HSL-Zuid, the choice of a stand-alone line apart from the rest of the rail network implied that the construction had to be tendered. Then, a Public Private Partnership (PPP) was chosen in the form of a Design-Build-Finance-Maintain (DBFM) contract. As a result, the commissioning party's wishes were not involved in making the plans for the tracks. This resulted in trains being ordered to late, after these could not be tested on the designated infrastructure (see failure factor testing of infrastructure).

It is very likely that in order to reduce travel time on the rail connection between Amsterdam and Berlin, an existing line will be upgraded. When there is chosen for an upgrade of current infrastructure instead of implementing a High-Speed Railway line apart from the network (i.e. the HSL-Zuid), this will be constructed by ProRail, because they are the owners of the tracks. This means that the construction does not have to be tendered. Because of the interwovenness with the national network, the new infrastructure will probably be similar to of the same as the infrastructure on the existing network. As a result, the specifications of the infrastructure will be known earlier in the process, as there is experience with this kind of infrastructure. Also, because the Dutch Railways are involved in the international working group, they will likely be involved in the commissioning. The Dutch Railways and the Dutch Infrastructure Managers have experience in working together, and thus the communication problems as with the HSL-Zuid are not expected to occur.

Finding Uniformity throughout phases

This factor is **not** expected to reoccur with reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin, due to the prominent roles in the likely case of an upgrade of the experienced parties ProRail and the Dutch Railways.

XII. Slow pace of realization

The slow pace of realization of the HSL-Zuid was caused by the technical & contractual complexity of the project. A High-Speed Railway line had never before been constructed in the Netherlands, and this now had to be done by a party that normally is not involved in constructing rail infrastructure at all.

The slow pace of realization of the HSL-Zuid was partially caused by the choice for High-Speed Railway infrastructure and the choice for a Public-Private Partnership. Both of these project characteristics are not about to happen (interview 9). As a result, the communication between parties involved in the construction and commissioning is expected to face less difficulties. ProRail and the Dutch Railways are the parties that are involved in the international working group and thus likely to be involved in the construction and commissioning. These parties have lots of experience with working together, and thus less friction is expected than with the HSL-Zuid. Also, due to the implementation of the HSL-Zuid, there is experience and thus more expertise than before the implementation of the HSL-Zuid on constructing and commissioning a High-Speed Railway line.

Finding slow pace of realization

This factor is **not** expected to reoccur with reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin

Findings Construction

The factors in the construction phase are both expected to disappear with reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin (Table 14). The causes of the disappearance lay in the possibility of choosing for the best suitable alternative in the initiation phase. When there is chosen for an upgrade of current infrastructure, and not a High-Speed Railway line apart from the existing Dutch rail network, the line does not have to be tendered. Upgrading existing infrastructure will always be managed by the Dutch Infrastructure Managers of ProRail, because ProRail is the owner of the entire (with exception of the HSL-Zuid) Dutch Rail network. ProRail has large experience with building rail infrastructure, whereas the party responsible for construction of the HSL-Zuid had no experience with building rail infrastructure. The communication is also expected to run more smoothly, due to the existing collaboration between ProRail and the Dutch Railways, whom are also involved in the international working group and thus likely to be the carrier involved on the rail connection between Amsterdam and Berlin.

Failure factors construction phase	**Reoccurrence (+) or disappearance (-)**
Uniformity throughout phases	-
Slow pace of realization	-

Table 14: Ex durante evaluation past failure factors in construction phase improving rail connection Amsterdam-Berlin

6.1.4 Commissioning

As is uncovered in paragraph 2.1.2., in this phase the formal owner gets access to the product that is a result of the project. With rail-infrastructure, this requires testing of the equipment of the infrastructure, after which the infrastructure can be taken into usage for what it initially was set up for. The variables that cause failure in this phase, as is uncovered in chapter 3, are shown in Table 15.

Variables Commissioning
Testing of the equipment (XV)
Uncoupling management & operation (XIII)

Table 15: Past failure factors commissioning phase (§3.2.4.)

XIII. Testing of the equipment

With the HSL-Zuid, problems occurred with the delivery of the equipment. There were uncertainties on the characteristics of the new safety system ERTMS, which demands certain specifics on the infrastructure and the trains. This caused that the trains were ordered late in the process, due to dependencies of the commissioning party (Dutch Railways & Royal Dutch Airlines) to the constructing party (consortium Infraspeed). During the time that the trains were not delivered yet, normal trains were used. As a result, when the trains were delivered, these could not be tested on the HSL-Zuid, as this was already taken into commissioning.

The extent to which this factor might cause failure with the connection from Amsterdam to Berlin depends on the alternative that is chosen. A new stand-alone High-Speed Railway is considered as one of the alternatives on this route but is the most far-reaching alternative. The Ministry states that 'when a stand-alone line is implemented again, nothing would be learnt from the HSL-Zuid' (interview 9). With new projects, the lessons learnt of the HSL-Zuid, as provided in the parliamentary inquiries on the decision-making and the equipment, are recaptured (interview 9). These involve the preference for proven technology, and when using innovative technologies, a full back float as back-up plan. This implies that, with reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin and other future projects, the experiences of the HSL-Zuid are interwoven in the processes of the Ministry and the lessons learnt are applied.

Finding Testing of the equipment

This factor is **not** expected to reoccur with reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin, due to the possibility of applying lessons learnt of a High-Speed Railway project in a Dutch context, which was not possible in the time of the HSL-Zuid.

XIV. Uncoupling management & operation

Due to the liberalisation in the Railway market, the Dutch railways were not involved in the construction of the HSL-Zuid. The tasks of the infrastructure part of Dutch Railways are currently under the independent authority of the Dutch Infrastructure Managers ProRail. ProRail owns the entire Dutch rail network, except for the HSL-Zuid. However, when an outage occurs on the HSL-Zuid, ProRail is the party responsible to troubleshoot. However, to be able to reach the train with a problem, ProRail needs to ask permission every time this happens to access the HSL-Zuid. Also, when trying to improve the underperformances by relocating voltage locks, this involves a renegotiation of the contract. This situation will be maintained until the end of the contract in 2035.

The extent to which this failure factor might reoccur with reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin depends on the parties involved in the construction and commissioning of the line. It can be assumed that this will consist of an upgrade of current infrastructure (interview 3, 9), and that the implementation of a stand-alone High-Speed Railway line is not likely to become the preferred alternative. As a consequence of choosing for an upgrade instead of a stand-alone High-Speed Railway line, ProRail will be the party involved with the construction, as they are the owner of all current rail infrastructure in the Netherlands, except the HSL-Zuid (interview 3). The fact that ProRail will be involved as the owner of the upgraded infrastructure prevents issues of ProRail having to ask for permission to enter the HSL-Zuid in case of stranding trains, because they manage the traffic on their own infrastructure and thus can access the infrastructure more easily.

Finding Uncoupling management & operation

This factor is **not** expected to reoccur with reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin, due the likelihood of the preferred alternative being an upgrade of current infrastructure and to the existence of ProRail as infrastructure manager and owner of the current infrastructure.

Findings Commissioning

Both the failure factors are expected to disappear with reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin (Table 16). Again, the chosen alternative affects the extent to which failure occurs in this phase: choosing an upgrade instead of a new stand-alone High-Speed Railway line will reduce the risks considerably, due to the involvement of ProRail in upgrading infrastructure. Also, the fact that the HSL-Zuid exists makes that the technology is less innovative, because there is already knowledge on the implications of speeds of trains of 300 or 200 km/h in a Dutch context.

Failure factors commissioning phase	**Reoccurrence (+) or disappearance (-)**
Testing of the equipment	-
Uncoupling management & operation	-

Table 16: Ex durante evaluation past failure factors in commissioning phase improving rail connection Amsterdam-Berlin

6.2 Ex durante Evaluation past failure in future of rail connection Amsterdam-Berlin

Compared to the HSL-Zuid, the HSL-Oost can be seen as a less complex mega-project. Taking into account the 4 aspects that make a project a mega-project, with the HSL-Oost the chances are there to make the project less complicated than the HSL-Zuid by choosing a simpler alternative than the implementation of the HSL-Zuid.

- **Spatial/technical configuration complexity:** when there is not chosen for a stand-alone High-Speed Railway line, ProRail will be responsible for the construction of the infrastructural measures. This means that a party with expertise on building tracks will be managing the construction phase.

- **Maturity of involved technologies:** with new rail projects, the lessons learnt from the HSL-Zuid are taken into account. This involves the preference for proven technology. The fact that the HSL-Zuid is implemented and operates with 300 km/h infrastructure would also make these technologies less innovative, as these are already used for more than 10 years.
- **Scale of the project's regional and political impact:** the impact of an upgrade of current infrastructure would be considerably smaller than when a new line would cut through the landscape.
- **Cross-institutional complexity of 'global mega-projects':** this aspect exists both with the HSL-Zuid and the HSL-Oost.

The causes of the lower complexity of the future project, is that there can be learnt from the failure of the HSL-Zuid. The lessons learnt are interwoven in the processes in the Dutch Ministry of Infrastructure and Water Management. Also, the liberalization of the rail sector has matured since the implementation of the HSL-Zuid, resulting in the development of the Dutch Infrastructure Manager ProRail, which currently is the owner of the Dutch rail network, excluding the HSL-Zuid.

Also, the starting point from further developing the rail connection between Amsterdam and Berlin is different: towards the east, the demand is less straightforward, and the measures that are taken should benefit the national and regional train services as well. With the HSL-Zuid, the demand was very straightforward (connecting Amsterdam and Rotterdam to the European network of High-Speed Railway lines) and the main objective was international mobility. The fact that the national and regional services must benefit from the investments as well is needed to justify the investments, but also causes the international product not to be developed optimally

Result of the analysis of possible reoccurring past failure in the future project of the HSL-Oost are that 3 of the 13 failure factors might reoccur: *international collaboration of parties, Forecasts: realistic estimation of timeframe, and Decision-making disconnected from spatial context* (see Table 17)*.* The disappearance of the 10 remaining failure factors is caused by the application of the lessons learnt of the HSL-Zuid and the development of the Dutch rail sector.

The failure factor of international collaboration of parties was expected to reoccur, because a cross-border aspect is known to cause such complexity that this characteristic makes a project a mega-project. An international aspect makes the project more complicated on every level: technical, strategical and institutional. With Dutch – German rail projects, the complications are as follows:

- Technical: overcoming differences in voltage systems & safety requirements
- Strategical: the priorities and ambitions with developing international product. In Germany, there are national concerns for the German rail network, which has a priority before developing international connections.
- Institutional: differences in the relationship between the ministry and the rail carrier, and different extents to which power lies at lower governmental levels.

The differences that occur between the countries create uncertainties and should be overcome.

Initiation		Decision-making		Construction		Commissioning	
Targeted tackling of the thoughtfully identified problem	-	Suitability of plans for political decision-making	-	Uniformity throughout phases	-	Testing of the equipment	-
Inappropriate objectives	-	Transparency & the role of Parliament	-	Slow pace of realization	-	Uncoupling management & operation	-
National coordination of parties	-	Political courage	-				
International coordination of parties	x	Disconnected from spatial context	x				
Forecasts: realistic estimation of timeframe	x						
Further elaboration of the plan	-						

Table 17: Result ex durante evaluation: reoccurring (x) and disappearing (-) failure factors improving rail connection between Amsterdam and Berlin

The other reoccurring failure factors concern the national level and the spatial basis in deciding on the final recommended solution. With rail projects, there is often looked at the possibilities of the infrastructure, and not to the possibilities in the external environment of that infrastructure. As a result, alternatives are weighed without insights in the spatial implications of those different alternatives. The different alternatives could mean different risks in this external environment. These risks are not taken into account in the important first phase of the project, which can be a source of failure in the forms of delays, exceeded budgets or disappointing quality in later stages of the project.

7. Conclusion & Discussion: are we going back to the future in failure in cross-border mega-projects?

This thesis is concluded in this final chapter. First, a recapitulation of the previous chapter summarizes the insights gained from those chapters. Then, the main research question is answered using theory and empirical results from the previous chapters. Then, this thesis is concluded with an epilogue, in which the theoretical and societal implications are addressed.

7.1 Introduction to conclusion: recapitulation of past chapters

In this research, the reoccurrence or disappearance of failure in past mega-projects is assessed to a future mega-project. Mega-projects have built up a negative image, due to frequent delays, exceeded budgets and disappointing quality (Biesenthal et al., 2018; Flyvbjerg, 2011; Tijdelijke Commissie Infrastructuurprojecten, 2004). As a result, the implementation of mega-projects can be avoided, preventing not only the negative, but also the positive effects from mega-projects being realized. Implementing mega-projects can be used to implement infrastructure, which changes transport supply and might create a modal shift from conventional to more sustainable modes of transport (Banister, 2008; Rodrigue, 2016). A modal shift from conventional to sustainable transport can help policymakers help combat climate change and reach the goals as set in the Paris Climate Agreement.

Mega-projects can be analyzed on 3 levels: the technical strategical and institutional level. In this research, an institutional lens is applied, because improving the institutional level contributes to improving the technical and strategical level of the project as well (Flyvbjerg et al., 2009; Miller & Lessard, 2008; Morris & Geraldi, 2011). Improving the understanding of the institutional level of mega-projects thus contributes most to the possibilities of preventing failure in mega-projects.

Over the past decades, the institutional level of mega-projects has become more complex due to the shift from government to governance (Crespo & Cabral, 2016), and the increasing international collaboration within these projects (Kardes et al., 2013). As a result, various actors and policy-fields are attached to mega-projects, making the institutional arrangements needed to reach a window of opportunity harder to reach (Buitelaar et al., 2007).

In order to measure the extent to which past failure might re-occur with future projects, a frame of analysis of failure factors within the project-management phases is set up, using theory and empirically experienced failure factors that are derived from theory and the HSL-Zuid. These factors are assessed using an ex durante evaluation to the possible future project of on the ongoing project of reducing travel time by implementing new infrastructure on the rail connection between Amsterdam and Berlin. Result of the ex durante analysis of possible reoccurring past failure in this future project of is that 3 of the 13 failure factors might reoccur: the factors *international collaboration of parties, forecasts: realistic estimation of timeframe, and decision-making disconnected from spatial context* might reoccur. The other 10 factors are expected to disappear.

The disappearance of the 10 remaining failure factors is caused by the application of the lessons learnt of the former project, that is the HSL-Zuid. These are interwoven in the processes in the Dutch Ministry of Infrastructure and Water Management. Other explanation for the disappearing failure factors is rooted in the development and involvement of the Dutch Infrastructure Managers (ProRail).

7.2 Resolving the research question: explanation why past failure factors might reoccur or disappear with future mega-projects

The research question that should lead to an explanation of the reoccurring and disappearing failure factors is presented in chapter 1, and reads:

> "Why are the same failure factors expected to reoccur or disappear between past and future cross-border infrastructural mega-projects?"

10 of the 13 failure factors from theory and the HSL-Zuid are not foreseen to reoccur with reducing travel time by implementing new infrastructure between Amsterdam and Berlin, and 3 failure factors are expected to possibly reoccur. These 3 reoccurring failure factors could cause failure in the form of delays, exceeded budgets and/or disappointing quality in that future project (Biesenthal et al., 2018; Flyvbjerg, 2011; Tijdelijke Commissie Infrastructuurprojecten, 2004).

Explaining disappearing factors

The disappearing failure factors can be explained by the fact that institutions are deeply historically sedimented (Scott, 2008). Institutions can learn from their past projects, that might have known failure as well. As a result, past failure can more easily be prevented in future projects when the causes of this past failure are known and anticipated upon.

Explaining reoccurring factors

The *International coordination of parties* in cross-border mega-projects was expected to reoccur, as the *more diverse set of participants* was one of the points described by Scott & Levitt (2017) that challenge cross-border mega-projects institutionally. This research shows that an international aspect complicates a project on all levels described by (Flyvbjerg et al., 2009; Miller & Lessard, 2008; Morris & Geraldi, 2011).

- **Technical level:** overcoming differences in technical characteristics (in this research on rail infrastructure e.g. the voltage system of tracks)
- **Strategical level:** the different national concerns of the countries involved.
- **Institutional leve**l: the different ways in which the actors involved work.

In previous chapters, it is stated that understanding the institutional framing, underpinnings and logics of mega-projects **can** provide the key in the successful delivery of mega-projects and that understanding the institutional level might improve the performance on the technical and institutional level as well (Biesenthal et al., 2018; Morris & Geraldi, 2011). The emphasis is on the word **can,** because with international projects this is not necessarily always the case. In this research, the technical and strategical difficulties continue to apply, even when the institutional context is uncovered.

The difficulties on the institutional level cannot easily be resolved with international mega-projects. The reason for this can be found in the different national frameworks actors move within, which form the pillars of institutions that are described as institutional theory by Scott (2013) and Scott & Levitt (2017). The distinctive national frameworks from which the countries operate differ considerably concerning the three pillars of institutions. No integral planning can take place, and thus the differences in frameworks between the countries involved should in any way be overcome. The differences in the 3 frameworks of institutions uncovered in this research are:

- **Regulative frameworks:** laws of both countries, the relation between national and local and regional entities, corporate hierarchies.

In the policymaking of reducing travel time with infrastructural measures between Amsterdam and Berlin, the national differences in regulative frameworks concern different laws in both countries, different relationships from the national ministries towards the provinces and Länder, and different ways in which the rail sector are organized, which imply different terms on which measures can be taken. Also, the German hierarchical structures make that the Dutch national government cannot do business with the Bundesland Nordrhein-Westfalen, which would prevent the risk on multi-level governance problems.

- **Normative frameworks:** professional standards, norms and values.

The differences in this framework are less apparent than in the others, but the differences in safety standards between the countries involved is a difference uncovered in this research in the standards that apply in both countries.

- **Cultural-cognitive frameworks:** beliefs, schemas and frames, economic and religious ideologies, differing ethnicities and languages.

The most obvious cultural-cognitive difference between actors in the Netherlands and Germany is language. The cultural-cognitive frameworks of institutions, however, go beyond the obvious and include the beliefs, schemas and frames in which actors are situated, and involves the shared definition of a local setting of an institution (Scott, 2013).

With cross-border projects, the differences in cultural-cognitive frameworks are impossible to overcome, because the countries are situated in their own national definitions. The regulative controls and normative prescriptions that institutions are involved with, are involved by the cultural systems, because these are institutionally constituted entities (Scott, 2010). The cultural differences thus create differences in all 3 pillars of institutions, which can create dilemmas, tensions, misunderstandings, conflicts and confusion between institutions involved(Scott, 2010), and create a risk on failure that cannot be eliminated with international projects.

The explanation of the reoccurrence of the failure factors *disconnected from spatial context* and *forecasts realistic estimation of timeframe* can be explained by using the varying degrees of local embeddedness that is seen as a factor that complicates cross-border mega-projects by Scott & Levitt (2017). Line infrastructure is spatially dispersed (WRR, 1994), and thus many governmental levels are intersected by such a line. As a result, it is impossible to involve the current and future spatial situation of lower governmental levels when choosing an alternative on the international level.

Concluding, 2 of the 4 complicating factors discovered by Scott & Levitt (2017) that make a regular project into a mega-project can be prevented by taking past failure in account when setting up new projects. *Splitting up the project into sub-projects* and *using innovative technology* then can be chosen to be eliminated early in the process when the risks of such decisions are considered too high. The impact on surroundings and amount of different national frameworks involved >1, however, cannot be eliminated with cross-border line-infrastructure mega-projects, due to the spatially dispersed and international character of such projects. Risks on failure are thus inherent to cross-border line-infrastructure mega-projects.

7.3 Epilogue

One way in which past failures are prevented and through which is becomes clear that there is learnt from the past, is the creation of a national support base for the international plans. This is done through choosing the alternative that the regional and national level can benefit from as well.

The national concerns that are interwoven in the investments on international mega-projects, justify these investments. However, as a result of the national benefits the international measures should have, the international travel time is not optimally improved. This means less travel time reduction for the international trips, and thus a reduced competitive position compared to the aircraft, and thus a less optimal situation for a modal shift from the aircraft to the High-Speed train (Rodrigue, 2016). Luckily, the modal shift does not only depend on travel time, but also on changes in costs, capacity and flexibility and reliability of a transport mode. Besides, the Sustainable Mobility approach by Banister (2008) also involves to reduce the need of travel, reduce trip length and to create greater efficiency in the transport sector. These measures, however, often imply a reduction of mobility in order to reduce emissions, which the substitution of air travel by High-Speed Rail travel does not.

A change when comparing the HSL-Oost to the HSL-Zuid, is that many alternatives are set up, with input from the regional governments and rail sector, due to the shift from government to governance (Crespo & Cabral, 2016). More parties than just the state pull the strings, and the role of the state is to coordinate the priorities and interests. To maintain the national supporting base, several alternatives are created, after which the most beneficial option for all parties involved can be chosen. The fact that rail infrastructure is spatially dispersed makes that it is not possible to research the spatial implications on lower governmental levels of each alternative. The large scale on which this would then have to take place makes this a highly time-consuming task.

The role of spatial planners has transformed into being a node in this institutional network of collective action (Crespo & Cabral, 2016). Now, the spatial dimension often is involved later in the process, when choices on alternatives are already committed to on an international level, without the spatial implications being thoroughly researched beforehand. As a result, the spatial risks of choosing an alternative are not clear when choosing an alternative, which can lead to unpleasant surprises in the surroundings of the foreseen project. Spatial planning processes thus should be given a more prominent role in earlier phases of mega-project management. In the early phases of mega-projects, the roots of failure are planted (Eweje et al., 2012). Attracting spatial plans early on in determining the alternatives that can be chosen from on an international level can prevent that in later stages one will be faced with surprises in the surroundings of the project.

As this research applies a more generic approach on the actors involved in cross-border infrastructural mega-projects, a more specific approach on the role of the spatial planner in mega-projects is proposed as a subject for future research. Recommendation for future research then is on how the spatial perspective can be involved in the initiation process of international mega-projects and leave the national supporting base intact. In other words: how can both the creation of many alternatives remain intact to maintain the supporting base and the spatial perspective be applied and interwoven to these alternatives.

To conclude: the good news is that we are not entirely going back to the future in terms of failure, because the lessons learnt from failure are applied, and with international project failure inherently is part of the process. The bad news is that the future might hold other causes of failure that we cannot foresee what these will look like in practice yet. The challenge thus is to foresee future challenges, and to anticipate on the future challenges as soon as possible, in example by giving a more prominent role to the spatial planner in early stages of mega-projects. In order to prevent failure in future projects, the focus should shift from looking *back to the future* to looking forward into that which is to come.

References

Algemene Rekenkamer. (2014). *Hogesnelheidslijn-Zuid: een rapportage in beeld*. 39.

AT Osborne & Royal HaskoningDHV. (2018). *Quick Scan Verbetering treinverbinding Amsterdam-Berlijn Quick Scan*. Baarn.

Banister, D. (2008). The sustainable mobility paradigm. *Transport Policy*, *15*(2), 73–80. https://doi.org/10.1016/j.tranpol.2007.10.005

Barbier, E. B., López, R. E., & Hochard, J. P. (2016). Debt, Poverty and Resource Management in a Rural Smallholder Economy. https://doi.org/10.1007/s10640-015-9890-4

Biesenthal, C., Clegg, S., Mahalingam, A., & Sankaran, S. (2018). Applying institutional theories to managing megaprojects. *International Journal of Project Management*, *36*(1), 43–54. https://doi.org/10.1016/j.ijproman.2017.06.006

Brookes, N. J., & Locatelli, G. (2015). Power plants as megaprojects: Using empirics to shape policy, planning, and construction management. *Utilities Policy*, *36*, 57–66. https://doi.org/10.1016/j.jup.2015.09.005

Bryman, A. (2016). *Social Research Methods* (Fifth edit). London: Oxford University Press.

Buitelaar, E., Lagendijk, A., & Jacobs, W. (2007). A theory of institutional change: Illustrated by Dutch city-provinces and Dutch land policy. *Environment and Planning A*, *39*(4), 891–908. https://doi.org/10.1068/a38191

Buitelaar, E., Sorel, N., & Opdam, S. (2010). *Ex-durante evaluatie Wet ruimtelijke ordening Eerste resultaten*.

Bundesminister für Verkehr der Bundesrepublik Deutschland. (1992). *Bekanntmachung der Vereinbarung zwischen dem Bundesminister für Vekehr der Bundesrepublik Deutschland und dem Minister für Verkehr und öffentliche Arbeiten des Königreichs der Niederlande über die Verbesserung des deutsch-niederländischen Schienengüter- u*. Warnemünde, Germany.

Bundesministerium für Verkehr und digitale Infrastruktur. (2020). BMVI - Wichtige umweltfreundliche Verkehrsprojekte werden beschleunigt. Retrieved June 28, 2020, from https://www.bmvi.de/SharedDocs/DE/Artikel/K/beschleunigung-umweltfreundliche-verkehrsprojekte.html

Cauvern, M., Geitz, W.-D., & Tjalma, J. (2018). *Externe analyse HSL-Zuid*. Wiesbaden.

Chapman, L. (2007). Transport and climate change: a review. *Journal of Transport Geography*, *15*(5), 354–367. https://doi.org/10.1016/j.jtrangeo.2006.11.008

Crespo, J. L., & Cabral, J. (2016). The institutional dimension to urban governance and territorial management in the lisbon metropolitan area. *Urban Governance in Southern Europe*, *45*(197), 27–50.

De Bruijn, H., Heuvelhof, E., & Veld, R. (2010). Process management: Why project management fails in complex decision making processes. In *Process Management: Why Project Management Fails in Complex Decision Making Processes*. https://doi.org/10.1007/978-3-642-13941-3

de Roo, G. (2012). Spatial planning, complexity and a world "out of equilibrium": Outline of a non-linear approach to planning. In *Complexity and Planning: Systems, Assemblages and Simulations* (pp. 141–175). https://doi.org/10.4324/9781315573199-13

De Staatssecretaris van Infrastructuur en Waterstaat. (2018). Spoor: vervoer- en beheerplan. Brief van de Staatssecretaris van Infrastructuur en Waterstaat. *Tweede Kamer Der Staten-Generaal*, *29 984*(783), 1–12.

de Vries, J., Harbers, A., & Verwest, F. (2007). *Grensoverschrijdende Projecten in Nederland en Vlaanderen. Leren van de HSL-Zuid, Schelde en Ijzeren Rijn*. NAi Uitgevers.

Deutsche Bahn. (2018). *ICE-Netz 2018*.

EEA. (2018). Greenhouse gas emissions from transport in Europe — European Environment Agency. Retrieved October 25, 2019, from European Environmental Agency (EEA) website: https://www.eea.europa.eu/data-and-maps/indicators/transport-emissions-of-greenhouse-gases/transport-emissions-of-greenhouse-gases-11

Engwall, M. (2003). No project is an island: Linking projects to history and context. *Research Policy*, *32*(5), 789–808. https://doi.org/10.1016/S0048-7333(02)00088-4

Etheridge, D. M., Steele, L. P., Langenfelds, R. L., Francey, R. J., Barnola, J. M., & Morgan, V. I. (1996). Natural and anthropogenic changes in atmospheric CO2 over the last 1000 years from air in Antarctic ice and firn. *Journal of Geophysical Research Atmospheres*, *101*(D2), 4115–4128. https://doi.org/10.1029/95JD03410

European Commission. (2017). *Delivering an effective and interoperable European Rail Traffic Management System (ERTMS) – the way ahead*.

European Court of Auditors. (2018). *A European high-speed railnetwork: not a reality but an ineffective patchwork*. *287*(19).

European Parliament and the Council. (2016). *Regulation (EU) 2016/796 of the European Parliament and of the Council of 11 May 2016 on the European Union Agency for Railways and repealing Regulation (EC)*.

Eweje, J., Turner, R., & Müller, R. (2012). *Maximizing strategic value from megaprojects: The influence of information-feed on decision-making by the project manager*. https://doi.org/10.1016/j.ijproman.2012.01.004

Flyvbjerg, B. (2011). Over Budget, Over Time, Over and Over Again: Managing Major Projects. In *The Oxford Handbook of Project Management*. https://doi.org/10.1093/oxfordhb/9780199563142.003.0014

Flyvbjerg, B. (2014). What you should know about megaprojects and why: An overview. *Project Management Journal*, *45*(2), 6–19. https://doi.org/10.1002/pmj.21409

Flyvbjerg, B., Garbuio, M., & Lovallo, D. (2009). Deception in large infrastructure projects: Two models for explaining and preventing executive disaster. *California Management Review*, Vol. 51. https://doi.org/10.2307/41166485

Frick, K. T. (2008). The cost of the technological sublime: Daring ingenuity and the new San Francisco-Oakland Bay Bridge. In *Decision-Making on Mega-Projects: Cost-Benefit Analysis, Planning and Innovation* (pp. 239–262). https://doi.org/10.4337/9781848440173.00020

Gellert, P. K., & Lynch, B. D. (2003). Mega-projects as displacements*. *International Social Science Journal*, *55*(175), 15–25. https://doi.org/10.1111/1468-2451.5501002

Gierveld, H. (2016). *Tracéwet Tekst & Commentaar*. Utrecht.

Government of the Netherlands. (2017). Revision of Environment and Planning Laws. Retrieved May 14, 2020, from https://www.government.nl/topics/spatial-planning-and-infrastructure/revision-of-environment-planning-laws

Kardes, I., Ozturk, A., Cavusgil, S. T., & Cavusgil, E. (2013). Managing global megaprojects: Complexity and risk management. *International Business Review*, *22*(6), 905–917. https://doi.org/10.1016/j.ibusrev.2013.01.003

Lange, P., Driessen, P. P. J., Sauer, A., Bornemann, B., & Burger, P. (2013). Governing Towards Sustainability-Conceptualizing Modes of Governance. *Journal of Environmental Policy and Planning*, *15*(3), 403–425. https://doi.org/10.1080/1523908X.2013.769414

Lessard, D., Sakhrani, V., & Miller, R. (2014). House of Project Complexity—understanding complexity in large infrastructure projects. *Engineering Project Organization Journal*, *4*(4), 170–192. https://doi.org/10.1080/21573727.2014.907151

Miller, R., & Lessard, D. R. (2008). Evolving strategy: Risk management and the shaping of mega-projects. In H. Priemus, B. Flyvbjerg, & B. van Wee (Eds.), *Decision-Making on Mega-Projects: Cost-Benefit Analysis, Planning and Innovation* (pp. 145–172). https://doi.org/10.4337/9781848440173.00015

Ministerie van Infrastructuur en Waterstaat. (2019). *Contouren Toekomstbeeld OV 2040*. 30.

Ministerie van Infrastructuur en Waterstaat. (2020). *MIRT Overzicht 2020*.

Morris, P. W. G., & Geraldi, J. (2011). Managing the institutional context for projects. *Project Management Journal*, *42*(6), 20–32. https://doi.org/10.1002/pmj.20271

Omega Centre. (2009). *Netherlands - HSL-Zuid*. Centre for Mega Projects in Transport and Development.

Parsons, T. (1951). *The social system*. Psychology Press.

Parsons, T. (1960). *Structure and process in modern societies*. Free Press.

Perry, J., & Kingdon, J. W. (1985). Agendas, Alternatives, and Public Policies. In *Journal of Policy Analysis and Management* (Vol. 4, p. 621). https://doi.org/10.2307/3323801

Pierre, J. (1999). Models of urban governance: The institutional dimension of urban politics. *Urban Affairs Review*, *34*(3), 372–396. https://doi.org/10.1177/10780879922183988

Priemus, H., Bosch-Rekveldt, M., & Giezen, M. (2013). Dealing with the complexity, uncertainties and risk of mega-projects: Redundancy, resilience and adaptivity. In *International Handbook on Mega-Projects* (pp. 83–110). https://doi.org/10.4337/9781781002308.00011

Priemus, H., Flyvbjerg, B., & Van Wee, B. (2008). Decision-making on mega-projects: Cost-benefit analysis, planning and innovation. In *Decision-Making on Mega-Projects: Cost-Benefit Analysis, Planning and Innovation*. https://doi.org/10.4337/9781848440173

Priemus, H., & van Wee, B. (2014). Decision-Making on Mega-Projects. In *International Handbook on Mega-Projects* (pp. 9–10). https://doi.org/10.4337/9781781002308.00007

ProRail. (2020). Programma hoogfrequent spoorvervoer. Retrieved May 1, 2020, from https://www.prorail.nl/programma-hoogfrequent-spoorvervoer

Reay, D., Sabine, C., Smith, P., & Hymus, G. (2007). Climate change 2007: Spring-time for sinks. In *Nature* (Vol. 446). https://doi.org/10.1038/446727a

Richmond, J. (2005). Book Review: Megaprojects and Risk. *Planning Theory*, *4*(1), 115–119. https://doi.org/10.1177/147309520500400107

Rodrigue, J. P. (2016). The geography of transport systems. In *The Geography of Transport Systems*. https://doi.org/10.4324/9781315618159

Roland, G. (2004). Understanding institutional change: Fast-moving and slow-moving institutions. *Studies in Comparative International Develpment*, *38*(4), 109–131.

Scott, W. R. (2008). Approaching adulthood: The maturing of institutional theory. *Theory and Society*, *37*(5), 427–442. https://doi.org/10.1007/s11186-008-9067-z

Scott, W. R. (2010). Reflections: The past and future of research on institutions and institutional change. *Journal of Change Management*, *10*(1), 5–21. https://doi.org/10.1080/14697010903549408

Scott, W. R. (2013). Institutions and organizations: ideas, interests and identities. In *SAGE Publications Inc* (Vol. 15). https://doi.org/10.1016/s0263-2373(97)89895-7

Scott, W. R., & Levitt, R. E. (2017). Institutional Challenges and Solutions for Global Megaprojects. *The Oxford Handbook of Megaproject Management*, *1*(April 2018), 1–25. https://doi.org/10.1093/oxfordhb/9780198732242.013.4

Sims, R., & Schaeffer, R. (IPCC). (2014). *Transport*. Mitigation of Climate Change.

Smith, R. J., & Bryant, R. G. (1975). Metal substitutions in carbonic anhydrase: A halide ion probe study. In *Biochemical and Biophysical Research Communications* (Vol. 66). https://doi.org/10.1016/0006-291X(75)90498-2

Sorensen, A. (2017). New Institutionalism and Planning Theory. In *The Routledge Handbook of Planning Theory*. London, New York.

Steunenberg, B. (2018). Adaptieve beleidsontwikkeling: zoeken naar nieuwe vormen van beleidsanalyse voor de digitale overheid. https://doi.org/10.5553/bo/221335502018000001001

Tijdelijke Commissie Infrastructuurprojecten. (2004). *Reconstructie HSL-Zuid: De besluitvorming uitvergroot*.

Turner, R. (1993). The handbook of project based management. In *International Journal of Project Management* (Vol. 11). https://doi.org/10.1016/0263-7863(93)90051-n

Tweede Kamer der Staten Generaal. (2015). *Parlementair onderzoek Fyra*. ’s Gravenhage.

van Brussel, S. (2018). *The Art of Governing of in the Complex Mobility Transition*.

van den Eerenbeemt, M. (2019). ‘Ongekende’ groei van internationale treinreizen: gaat de trein het vliegtuig inhalen? Retrieved June 28, 2020, from https://www.volkskrant.nl/nieuws-achtergrond/ongekende-groei-van-internationale-treinreizen-gaat-de-trein-het-vliegtuig-inhalen~b2454733/

van Doorne, E., & Cordeweners, T. (2018). *Adaptief Bestuur. Essays over adaptiviteit en openbaar bestuur*.

van Gelder, H., & Rijsenbrij, B. (2010). *HSL-Zuid - Lessen Geleerd*.

van Ham, H., & Baggen, J. (2015). *Herwaardering HSL-Oost*.

Venne, M., & van Wijmen, P. (2019). *Netwerkuitwerking Lange Termijn Toekomstbeeld OV*.

Vinet, L., & Zhedanov, A. (2011). A “missing” family of classical orthogonal polynomials. *Journal of Physics A: Mathematical and Theoretical*, *44*(8), 32. https://doi.org/10.1088/1751-8113/44/8/085201

Walliman, N. (2011). Social Research Methods. In *Social Research Methods*. https://doi.org/10.4135/9781849209939

Wehling, T. O., Lichtenstein, A. I., & Katsnelson, M. I. (2008). First-principles studies of water adsorption on graphene: The role of the substrate. In *Applied Physics Letters* (Vol. 93). https://doi.org/10.1063/1.3033202

Westland, J. (2007). *The project management life cycle: a complete step-by-step methodology for initiating, planning, executing & closing a project successfully*.

Woodside, A. G., & Wilson, E. J. (2003). Case study research methods for theory building. *Journal of Business and Industrial Marketing*, *18*(6–7), 493–508. https://doi.org/10.1108/08858620310492374

WRR. (1994). Besluiten over grote projecten. In *Besluiten over grote projecten*. https://doi.org/10.26530/oapen_439512

WRR. (2003). Naar nieuwe wegen in milieubeleid. In *Naar nieuwe wegen in milieubeleid*. https://doi.org/10.26530/oapen_439779

Attachments

Attachment 1: Public-Private Partnership with the HSL-Zuid

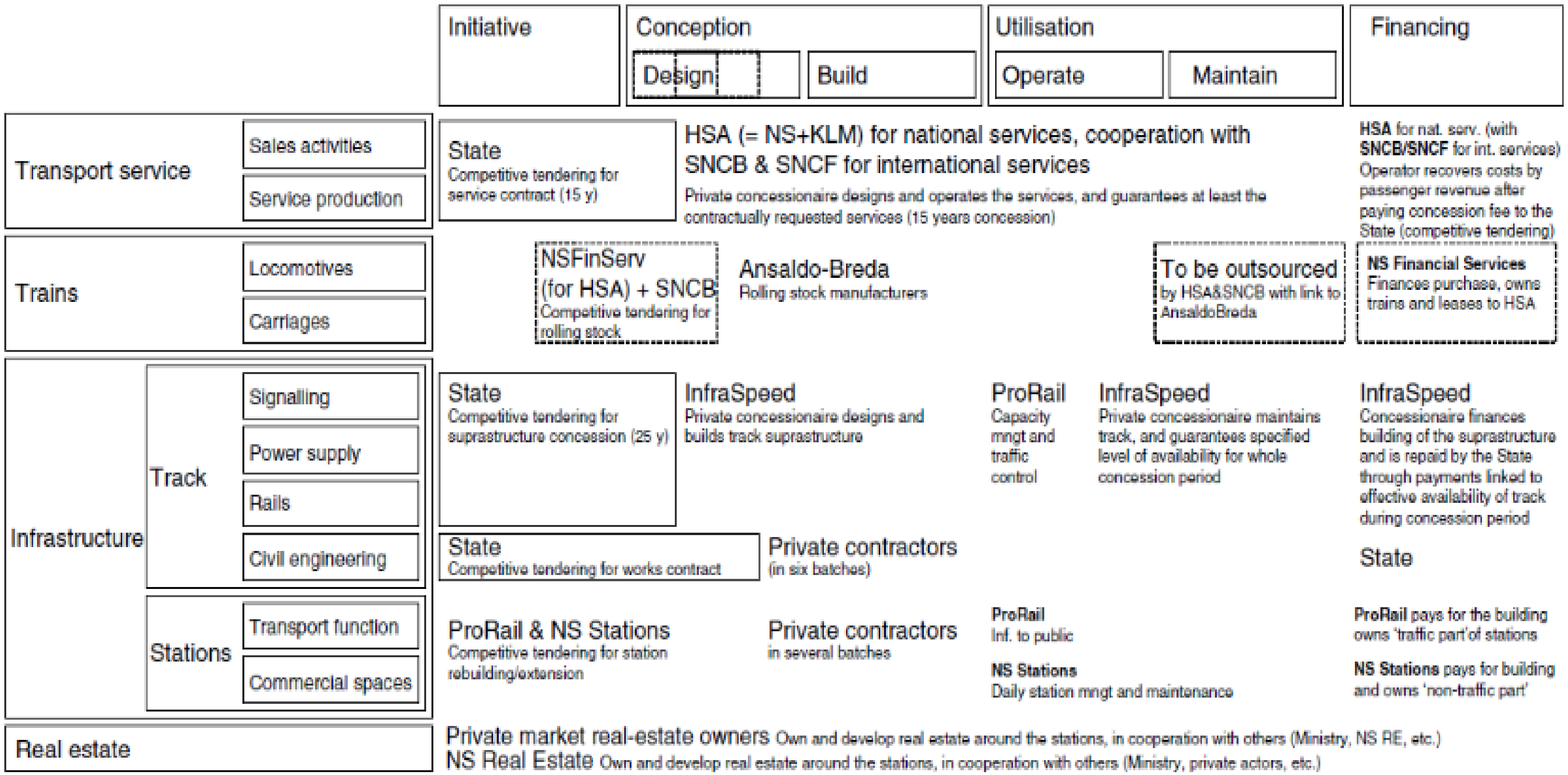

Figure 21: Contracting HSL-Zuid (Priemus et al., 2008, pp. 276)

Attachment 2: List of interviewees

Interview no.	Location / medium	Date	Respondent
1.	Utrecht	29-10-2019	Former Dutch Railways (NS)
2.	Amersfoort	30-10-2019	ROVER – Dutch passenger federation
3.	Utrecht	30-10-2019	Dutch Infrastructure Managers (ProRail)
4.	Amsterdam	30-10-2019	Municipality of Amsterdam
5.	Utrecht	04-11-2019	Province Utrecht
6.	Phone call	04-11-2019	Natuur & Milieufederatie Noord-Holland
7.	Arnhem	06-11-2019	Province Gelderland
8.	Amersfoort	07-11-2019	European Passengers Federation
9.	The Hague	08-11-2019	Ministry of Infrastructure & Water Management
10.	Amsterdam	08-11-2019	Municipality of Amsterdam
11.	Zwolle	11-11-2019	Province Overijssel
12.	Amersfoort	12-11-2019	Royal HaskoningDHV (expert)
13.	Groningen	13-11-2019	Province Groningen (expert)
14.	Haarlemmermeer	14-11-2019	Former project direction HSL-Zuid (expert)
15.	Utrecht	26-11-2019	Dutch Railways (NS)
16.	The Hague	18-11-2019	Meines Holla & Partners (expert)
17.	Informal conversation *No transcript available*	02-12-2019	Municipality Utrecht
18.	Utrecht	10-12-2019	Dutch Infrastructure Managers (ProRail)

Table 18: Overview of respondents semi-structured interviews

Attachment 3: Topic lists interviews

Actors

- Introduction interviewer/interviewee
- Extent to which failure factors occur with HSL-Oost
    - Initiation
        - Targeted tackling of the thoughtfully identified problem
        - Inappropriate objectives
        - National coordination of parties
        - International coordination of parties
        - Forecasts: realistic estimation of timeframe
        - Further elaboration of the plan
    - Decision-making
        - Suitability of plans for political decision-making
        - Transparency & the role of Parliament
        - Political courage
        - Disconnected from spatial context
    - Construction
        - Uniformity throughout phases
        - Slow pace of realization
    - Commissioning
        - Testing of the equipment
        - Uncoupling management & operation
- Possible explanation of reoccurrence and disappearance failure factors
- Additions by interviewee

Experts

- Introduction interviewer/interviewee
- Shortly discuss occurrence failure factors initiation, decision-making, construction and commissioning
- Explanation of reoccurrence and disappearance
    - Differences HSL-Zuid and Amsterdam-Berlin (HSL-Oost)
    - Difficulties Dutch-German projects
- Additions by interviewee

Attachment 4: Transcriptions interviews

This file can be found in an additional document.