



**Bridging the Dutch Infrastructure Gap**  
On the involvement of pension funds in Dutch  
mobility infrastructure projects

Tim Beerens  
MSc Thesis



# Bridging the Dutch Infrastructure Gap

On the involvement of pension funds in Dutch mobility infrastructure projects

By

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## Preface

My thesis-journey started in February 2018, after just coming back from a semester doing part of my master in Melbourne, Australia. I have to admit, when you have just been on the other side of the world for over half a year, there are things you would rather do than embarking on what is supposed to be your biggest challenge to date. Nevertheless, because I knew that I could only get both feet back on the ground by just starting, I pulled myself together.

I was lucky to stumble right on the company that would eventually guide me towards fulfilling the task that was ahead of me. Although the process to actually being able to start was a long one, in the end, deciding to do this thesis in cooperation with AT Osborne was the best decision I could have made. Apart from this, I was lucky that a greatly interesting topic, which suited my interests, was just waiting there to be picked up by someone. The topic combined my interest in finance and engineering with my desire to do something that could have an actual impact on people's lives. Moreover, the topic made me able to focus on the use of theories and apply these to the problem at hand. Although applying these theories on topics they hadn't been applied before might have been the most challenging part of the thesis, it has also been the most interesting. In the end, I am happy that I didn't shy away from this challenge.

I was also lucky that working on this topic required me to interview people with a wide variety of backgrounds. I have been able to talk to pension funds, project managers, municipalities, an investment agency, as well as to multiple advisors. Doing this also made realise that, on topics like this, every single person has its own (mostly diverging) perspective and opinion. Although combining a wide variety of different views and making sense out of this was challenging, it was also one of the most interesting parts of the process. I would like to express my gratitude to the people that took their time to supply me with these diverging views and opinions during the interviews I conducted.

Now, after seven months of hard work, the occasional setback, and the usual complaining; yet, also seven months that I found profoundly interesting and challenging, this is it. Although it was a tough process, it was also one that I felt actually made me reach new heights. Personally, I know that this is largely due to the people that guided me through this process. For this, I would like to thank the people at AT Osborne and, in particular, both my supervisors, Frits Verhees and Thomas van Leengoed, for always being available to provide me with advice. Moreover, my thanks go out to Leon Hombergen, who was always ready to provide me with new insights and energy. A huge thanks goes out to Aad Correljé, who had to withstand me storming in his office multiple times over the course of this thesis with my head full of thoughts. Additionally, I would like to thank Marcel Hertogh for guiding me in the right direction after every meeting.

Finally, I am well aware of the fact that the most important factor in this work was the support I received from the people around me. Luckily, they made sure that I never had troubles in finding distractions and positivity during setbacks. For this, I would like to give a special thanks to my friends and family. In particular to Sonja, for always being there to encourage me during this thesis; and to both my parents, for supporting me throughout my entire studies.

*Tim Beerens  
Delft, November 2018*

## Summary

### *Problem statement and research question*

Induced by prospects and horror stories of future congestion and air pollution in Dutch cities, government officials and CEO's of transport companies called at the start of 2018 for an implementation of light rail connections in the Netherlands. Although many agree on the applicability of these plans, they also agree on the fact that actual implementation will be hard to accomplish. Light rail projects are hugely costly endeavours, while governmental budgets remain tight; on a national, as well as on a regional level. Additionally, while the new parliament in the Netherlands reserved an additional €2 billion for infrastructure investments, none of this will go to the proposed light rail investments. As a consequence, no money is reserved until at least 2030. The largest barrier for the implementation of light rail seems to be the funding of these projects.

Upon closer inspection, the aforementioned problem seemed not to be limited to merely the Netherlands, nor merely to light rail. All around the world the same problem is addressed: an apparent infrastructure gap; a gap between investment requirements of infrastructure and the public funds available. McKinsey calculated that the annual investment needs in the world until 2030 amount to about US\$3.3 trillion per year; this sum triples when UN sustainable development goals need to be met. This problem becomes even more apparent when looking at the world's infrastructure investment rates over the past years. Especially in Europe, investment rates have declined rapidly, most notably in roads and telecom infrastructure. In developed economies like the Netherlands, this especially puts a constraint on the prospective economic growth.

When the aforementioned government officials and CEO's made the call for light rail, they also made a proposition on how to solve this problem: they pointed towards Dutch pension funds. This proposition seemed to make sense: the Netherlands has, relative to its GDP, worldwide the most pension fund assets. Furthermore, pension funds are always looking for new investments and the long-term aspect and potentially low correlation of infrastructure make them particularly attractive. Interestingly, this proposition strokes with studies about the infrastructure gap, who all point to institutional investors as part of the solution. In particular, they mention two key focus points: one the one hand, the availability of finance and the willingness of institutional investors to invest in infrastructure; on the other hand, the availability of projects for these investors to invest in.

The objective of this research was to study this problem by analysing the pension funds in the Netherlands. By considering both their current barriers of investment, as well as their opportunities by looking at light rail projects, both sides of the aforementioned infrastructure gap spectrum are considered. In order to do this, the following research question was composed:

*What barriers and opportunities can be distinguished for pension fund investment in Dutch mobility infrastructure projects?*

### *Research approach*

The study has been divided into two main parts: determining the barriers of investment and looking at the investment opportunities. To analyse these parts, a theoretical framework has been put together. The supposed market failure in capital supply has been studied by using Transaction Cost Economics (TCE). Because TCE is merely focused on transactions between private parties, it has been supplemented by the Transaction Cost Regulation (TCR) theory. The first sub-question focused on how these theories can aid in explaining the aforementioned problem. The second sub-question used the first part of this framework to analyse the transaction of investing in infrastructure projects. Subsequently, the third sub-question focused on the specific characteristics of pension funds compared to the average investor. These results have then been combined to answer the question of what barriers exist for pension funds to invest in infrastructure. The second part of the research looked at the actual opportunities of investors. This has been done by applying TCR to light rail projects, with the goal of explaining what possible difficulties exist in initiating and developing these projects. The insights gained from both parts of the research are, subsequently, synthesized to provide a final conclusion on the factors influencing the infrastructure gap in the Netherlands, as well as to provide recommendations on where solutions can be found.

### *Barriers of investment*

The barriers of investment have been mapped out by applying the transaction cost theories to the problem. The core argument of TCE claims that there should be an alignment of attributes and governance structure

of a transaction; in case of high specific investments and transaction uncertainty, the interests of the actors should be highly aligned to mitigate chances of opportunism (i.e., a hierarchical governance structure). When there is no alignment, the transaction is characterized by large risks and transaction costs, which can ensure that actors will not engage in the transaction.

To determine the barriers of investment, the aforementioned theoretical framework has been applied on the transaction of investing in infrastructure projects (from the investors' side). It has been shown that, in typical infrastructure projects, the interests of the various actors are highly aligned (hierarchical structure). However, especially the interaction between investor and public actor is mostly arranged in a market-like structure, thereby increasing the hazards of (political) opportunism. Moreover, when looking at the transactional attributes, one can find that there are large uncertainties and transaction specific investments involved for the investors. To lower the chances of opportunism, investors must make large transaction costs, while considerable risks can still remain. These factors can lead to the investors requiring higher returns on their investments, or lead to them not investing at all. Consequently, two focal points for the remainder of the research have been distinguished: on the one hand, there is the willingness of investors to take the aforementioned risks and transaction costs; on the other hand, there is the ability and willingness of governments to supply the required return.

To look at the willingness of investors to invest, the specific characteristics of pension funds have been analysed. From this analysis, it became clear that pension funds in the Netherlands are driven by a liability driven investment strategy. This means that their investments are guided by the liabilities they possess. In the case of pension funds, the main consequence is that they are more risk-averse than the average investor, while focussing on long-term, stable cash-flows, with a large capital value. The conclusion that one can draw is that there are some inherent barriers for pension funds to be involved in greenfield projects in the Netherlands.

Together with the analysis of the transaction, a framework was now available that showed the main criteria that pension funds employ to determine whether or not to invest in an infrastructure project (from a theoretical perspective). The purpose of the third sub-question was to verify this framework by interviewing the pension funds themselves. The most valuable insight gained in these interviews is the profound willingness with these investors to invest more in infrastructure, but the competition in the supply of capital that hampers it. Furthermore, from the interviews it became clear that the initiation of new projects by governments might be one of the biggest causes of the infrastructure gap. Yet, when shifting the attention to this other side of the problem, it had to be taken into account that the required return depends on the factors derived from the theoretical analysis. More specifically, capital is always available, as long as enough return is given. This return partly determines the ability to initiate new projects on the governments side.

### *Opportunities for investment*

Keeping this in mind, the attention shifted to the other side of the infrastructure gap spectrum, by looking at the factors that hamper the initiation of investment opportunities. It was already mentioned that the infrastructure gap in the Netherlands shows itself in the problems with light rail. To determine whether part of the problem might have to do with the initiation and characteristics of projects, as well as whether pension funds can have a role in the development of these projects, light rail in the Netherlands was analysed. This analysis was done by looking at characteristics and complexities of light rail in general, as well as by studying two cases, from a TCR perspective.

TCR essentially says that the investment level in a country depends on the government's ability to mitigate the chances of governmental and third-party opportunism. This has been applied in the research by looking at how these forms of opportunism play out when looking at light rail projects in the Netherlands. It was found that, due to the decentralised institutional environment in the Netherlands, these forms of opportunism particularly show themselves in different governmental institutions and third-parties contesting each other in decision-making, eventually slowing down or halting new projects from being initiated. Looking at light rail, one can conclude that there are some inherent complexities in initiation and development that make them highly susceptible to these forms of opportunism and, therefore, hard to realise. Three key factors have been distinguished which are the eventual determinants for this: the amount of public budget used, the impact on third-parties, and the amount of public parties involved. Together, these key factors explain for a major part the difficulties in realising light rail and providing investors with investment opportunities.

### Synthesis and solution development

The aforementioned analyses were, subsequently, synthesized to describe the infrastructure gap in the Netherlands. This is shown in Figure 1.

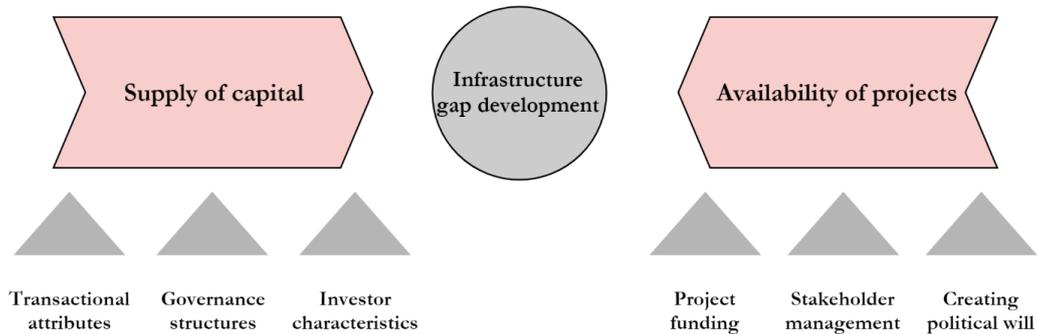


Figure 1: Analysis of the infrastructure gap

The analysis shows the two parts of the problem which formed the backbone of the study. From the supply of capital side, it became clear that the three factors determine the required return for the investors. A high required return due to the inherent characteristics of the transaction is one of the reasons why it can be hard to realise new projects. However, from this analysis it also became clear that, due to a wide availability of capital, this is not the biggest problem. A considerable part of the problem seems to be related to the initiation and subsequent realisation of a sufficient pipeline of infrastructure projects, i.e., investment opportunities. Budget constrained governments struggle to supply the necessary funding for projects, especially when multiple public parties are involved. Due to political fragmentation and opposition by third parties, this problem becomes even more apparent. Eventually, new projects are not initiated by public parties on a large enough basis to provide pension funds with sufficient investment opportunities.

Although the analysis has been performed by considering the infrastructure gap from two sides, one cannot deny that all factors are interconnected in a way. Whether funding can be arranged for projects also depends on the cost of capital for the project. Furthermore, whether investors are willing to supply capital for a project also depends on whether stakeholders and different public bodies are aligned on the plans. Eventually, all factors together contribute to a solution for the infrastructure gap. This is shown in Figure 2.

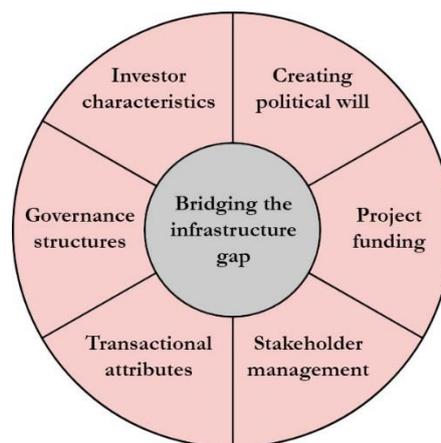


Figure 2: Factors influencing the infrastructure gap

The six key factors shown in the analysis have been used to suggest areas where solutions can be found. As the analysis focused on pension funds and light rail, the solutions are also in principle applicable to these two focal points. However, the proposed solution areas also serve as suggestions to where solutions can be found to more infrastructure development in general, and thereby to aid in closing the infrastructure gap. Opportunities can be exploited both by looking at pension funds themselves, as well as by increasing the supply of projects. When looking at pension funds, they can be more involved in the initiation and development of projects. Pension funds in the Netherlands are already among the top of the world when it

comes to investing in greenfield projects; thinking about moving up even higher in the chain is worth the effort. On the other hand, a streamlining of project initiation and development by governments has a big chance of creating more opportunities. Developing national recommendations and looking at programs of projects can be used to align public parties and stakeholders and to adequately divide tight public budgets. Moreover, innovative models for financing and funding have to be considered to lower the overall costs of projects, to increase revenues earned, and to decrease the risks for investors. A combination of the aforementioned factors could aid in allowing investors to invest more in Dutch infrastructure, as well as in closing the infrastructure gap.

### *Conclusion*

In the end, the most important barrier identified in this research is the availability of infrastructure projects (investment opportunities) with an appropriate risk-adjusted return. This is proven by the fact that pension funds are looking for good investment opportunities in infrastructure, but cannot find them. Additionally, pension funds are not the ones to initiate projects, because of their inherent risk-averse investment strategy. This means that they are dependent on other (public) parties to do it for them. Because of the large sums of capital that pension funds possess and the competition in the supply of capital that is currently soaring, projects cannot be initiated on a large enough basis to increase their (relative) allocations to infrastructure.

This is caused by two factors. On the one hand, pension funds are required to make sufficient returns on projects because of the inherent uncertainties, transaction costs and chances of opportunism. This, in turn, makes it difficult for governments to provide funding. On the other hand, political complexities make it hard to initiate projects on a large enough basis. Due to the fragmented institutional environment in the Netherlands, decisions about infrastructure projects are profoundly hard to make. Especially in projects like the light rail, where decisions have to be made by multiple public actors, impacting numerous stakeholders, and using tight public budgets from various public parties, decision-making is too slow to generate enough projects to close the infrastructure gap.

Concludingly, the most important message from this research is the following. Although pension funds can have a stake in closing the infrastructure gap and implementing light rail, they will not be the ones to solve the problem. Pension funds are, in the end, always dependent on politics to be able to invest more in infrastructure. In the end, solving the infrastructure gap boils down to creating political will. More specifically, when there is actual profound willingness with all (public) actors to develop new (light rail) projects, inevitably some ways will be found to do this. In this case, problems such as funding, financing, stakeholder management, and mostly decision-making will undoubtedly be overcome. In this respect, the impact of what Spiller described as governmental and third-party opportunism is crucial. The many public bodies, their corresponding ways of decision-making, and the large interest and influence of third-parties are big threats to creating this political will. It is just hard to develop a sufficient pipeline of infrastructure projects in the Netherlands when the interests of all these actors have to be aligned.

Yet, both sides of the infrastructure gap are still looking to solve this problem. More infrastructure needs to be built, while pension funds are chasing investment opportunities. Moreover, the fact that pension funds are currently willing to take more risks and transaction costs for a lower return than in other economic times, provides opportunities. It is important for the involved parties to be aware of the situation and missed opportunities. Parties are recommended to make use of the suggested solution areas to look for more elaborate solutions that, in the end, can benefit all.

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# 1. Introduction

This chapter will provide an introduction to the research and forms the basis for the report. The introduction starts with the problem statement, which explains the factors that triggered the research. This is followed by a review of the literature with the aim of exploring the current state of the research regarding the topic.

## 1.1. Problem statement

The Dutch government is up to an important task regarding its infrastructure. Damages deriving from congestion on Dutch roads already amount to about €3.7 billion a year (Kennisinstituut voor Mobiliteitsbeleid, 2017) and with ever-increasing population numbers (especially in the heavily urbanised area the Randstad) problems seem to be growing exponentially. Additionally, in an increasing manner the climate is becoming an issue. Apart from CO<sup>2</sup>-emissions, the large amount of cars deteriorates air quality in city centres (NRC, 2018). These issues require long-term solutions that reduce the number of cars and reduce pollution.

In an article in the Dutch newspaper NRC, multiple government officials and CEO's of transport companies propose a solution to this problem (NRC, 2018). In this article, they debate the necessity of an improvement of light rail connections in the Netherlands. Light rail is a way of public transport by rails with the possibility to extend into city centres, while also integrating with regular traffic (van der Bijl, Baartman, & van Witsen, 2010). Light rail can thus function as a train between cities, but also as metro and tram inside major city cores. In theory, this can provide the solution to the aforementioned problems. The best example of why this would work is the RandstadRail between Rotterdam, The Hague and Zoetermeer. On this track, the light rail has been successfully implemented, tripling the number of travellers over a 10-year period (Duursma & Verlaan, 2018).

An eminent problem that requires a solution, support by government officials and transport companies, and a successful project already implemented are indicators that the implementation of light rail connections might be the new big infrastructure program in the Netherlands. There is, however, one major problem that might jeopardize these plans: funding. The implementation of light rail is costly (only for The Hague and Rotterdam already an estimated €2.5 billion is needed) and although the new parliament assigned an additional €2 billion for infrastructure investments, none of this money will go to the proposed light rail investments (Duursma & Verlaan, 2018; Verlaan, 2018). This means new sources of funding have to be found, and everyone is looking at the private sector.

The notion of calling for investment from the private sector is not some kind of revolutionary idea. Ever since the start of the new millennium, researchers and government officials have been calling for more investment from the private sector. They all address the same problem as is the case with the light rail: an apparent infrastructure gap; a gap between investment requirements of infrastructure and the public funds available (e.g.: Mckinsey Global Institute, 2016; OECD, 2015a; Uppenberg, Strauss, & Wagenvoort, 2011). This gap has especially become apparent after the recent financial crisis, when reform of capital requirements for banks and institutional investors and an increased market uncertainty lowered the availability of capital for infrastructure investments (OECD, 2014b). A study by Mckinsey in 2016 estimated that the infrastructure gap from 2016 to 2030 amounts globally to about US\$3.3 trillion a year. If UN sustainability goals want to be met, this sum triples (Mckinsey, 2016).

To fill this gap, many are looking at institutional investors. In the article by the NRC (2018), the officials specifically point at pension funds and the European Investment Bank (EIB). It seems that, in the Netherlands, especially pension funds might be the solution to the problem. The Netherlands has, relative to its GDP, worldwide the most pension fund assets: 193.8%. The total pension fund assets amount to almost \$1600 billion (Willis Tower Watson, 2018). Furthermore, pension funds are always looking for new investments and the long-term aspect and potentially low correlation of infrastructure make them particularly attractive (Inderst, 2009). This means that, especially in the Netherlands, pension funds seem to have huge potential to solve the 'infrastructure gap problem'. Whether this is actually the case, will be explored in this research.

## 1.2. Literature review

The literature review is aimed at the problem introduced in the previous section. To shed more light on the problems, the infrastructure gap and pension fund investment in infrastructure are looked at in more detail. This is followed by an exploration of light rail in the Netherlands and a consideration of the current state-of-the-art in private investment in infrastructure. The literature review is finished with a conclusion on the identified problems.

### 1.2.1. The infrastructure gap

The infrastructure gap is named by many sources over the course of the last couple of years (e.g.: BCG, 2013; Mckinsey Global Institute, 2016; PWC, 2017; Wyman, 2017). It is defined as the gap between the world's infrastructure needs and the governments' ability to fund the development of new infrastructure. Mckinsey calculated that the investment needs in the world annually until 2030 amount to about \$3.3 trillion per year. This sum triples when UN sustainable development goals want to be met (Mckinsey, 2016).

The infrastructure gap has different implications for developing and developed economies. Where in developing economies there is a large need for new infrastructure; in the developed world, a huge challenge exists to maintain existing infrastructure (Dobbs et al., 2013). Furthermore, there are diverging justifications for why more infrastructure investment is required. While in some countries, more infrastructure is clearly needed because of the state of the existing infrastructure, which causes problems such as traffic jams, blackouts and tainted water supplies; in more developed countries, the main problem is that underinvestment in infrastructure constrains economic growth (PWC, 2017). The reason for this is that long-term economic performance depends for a large part on sufficient and reliable infrastructure (European Commission, 2018).

This problem becomes even more apparent when looking at the world's infrastructure investment rates over the past years. Especially in Europe, investment rates have declined rapidly, most notably in transport and telecom infrastructure (Mckinsey, 2016). This is best explained by a decrease in public spending due to the financial crisis of 2008, shown in Figure 3. Although stimulus spending increased shortly after the financial crisis in 2009, governments cut down on spending in times of economic prosperity, because of budget constraints of former economic times. This pro-cyclical investment strategy hampers economic growth (Wyman, 2017). A 2017 investment report by the EIB showed that current investment levels in infrastructure are 20% below pre-crisis levels, while being most pronounced in the transport sector (EIB, 2017).

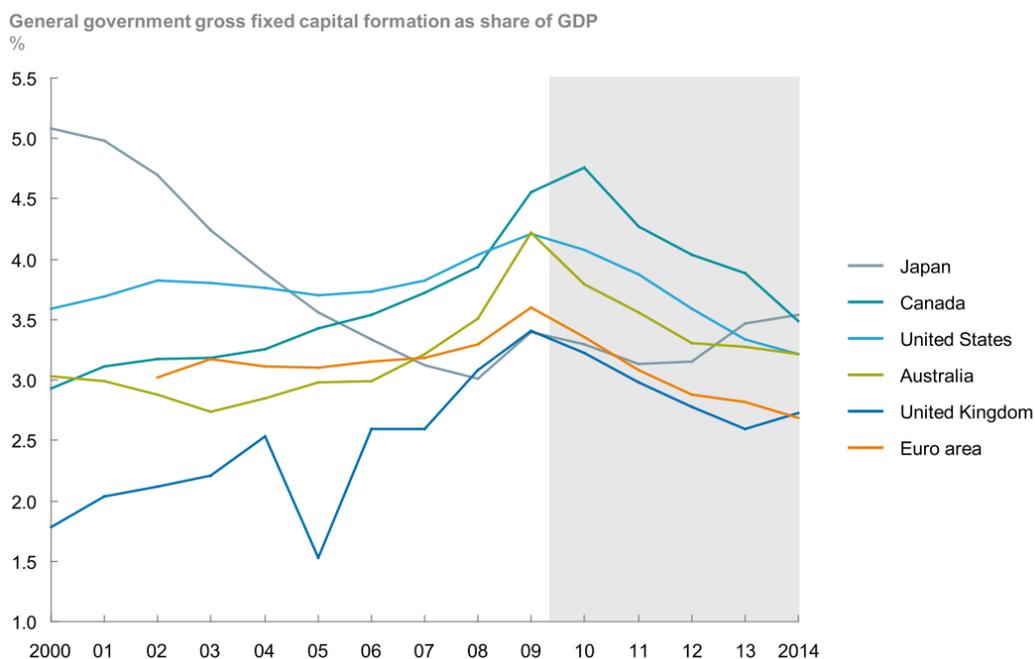


Figure 3: Infrastructure investment as % of GDP 2000-2014 (Mckinsey, 2016)

When comparing infrastructure gaps of countries, a considerable difference can be observed. Most notably, countries that employ private capital in large sums, have a more positive balance in this respect. In countries like France and Australia, where privatisation is employed in big numbers, the infrastructure gap is not present (a positive balance of 0.1% and 1.2% of GDP respectively). While in other western countries like the US, UK and Germany, large gaps exist (0.7%, 0.4% and 0.4% of GDP respectively) (Mckinsey, 2016; PWC, 2017) As such, countries might be able to learn from each other in their quest for solutions to the problem.

To solve the infrastructure gap, the studies point to the private sector and, more specifically, to institutional investors. They particularly mention the large amount of assets these investors possess and the inability with these investors to achieve their target allocations to infrastructure (Mckinsey, 2016). In this respect, there seems to be a failing market. Mckinsey (2016, p. 17) mentions: “Despite large infrastructure needs and investors chasing opportunities, the market fails to clear”. To solve this problem, they mention two key focus points: one the one hand, the availability of finance and the willingness of institutional investors to invest in infrastructure; on the other hand, the availability of projects for these investors to invest in (Figure 4).



Figure 4: Focus points on how to secure financing from institutional investors (Adapted from Mckinsey, 2016).

**1.2.2. Pension fund investment in infrastructure**

The research about pension fund investment in infrastructure really began about a decade ago, when investment in infrastructure by pension funds started to pick up. Inderst (2009) mentions that the burst of the dot-com bubble in the early 2000s and the subsequent recession is responsible for this. As a consequence of this recession, pension funds started to experience funding and solvency problems, which led to a reconsideration of the strategies pertaining to asset allocation. Apart from the dot-com bubble burst, a couple of other developments are named that explain the shift to alternative asset classes. The most important one in this respect is the 2008 financial crisis. As a consequence of this financial crisis, pension funds started looking for a more diversified portfolio of assets, including investments with a lower volatility. Lastly, an increase in Socially Responsible Investing (SRI) meant more interest in ethical and social infrastructure projects (Della Croce, 2011).

The question that one has to ask is why pension funds would invest in infrastructure in the first place. The OECD (2014b) mentions that alternative assets (e.g. infrastructure) are less liquid, are more difficult to exchange, and possess longer time horizons than publicly traded stocks and bonds. They mention that these characteristics are attractive to pension funds, because they assist with a liability driven investment strategy. What this essentially means is that the characteristics of infrastructure investments should match the characteristics of pension funds’ liabilities. Another reason that is mentioned is that infrastructure assets could provide protection against the sensitivity of pension funds to inflation. Della Croce (2011) adds to this by mentioning the improved diversification of portfolios, due to the often predictable and stable cash flows of infrastructure investments. Lastly, many papers mention the added value that infrastructure can provide to a more sustainable investment strategy; something that is becoming increasingly important (Della Croce, 2011; Inderst, 2009; OECD, 2014b).

The shift of pension funds to more alternative asset classes also meant that research started to focus more on the involvement of pension funds in infrastructure. Most research is focused on why pension funds are as of yet not invested as much in infrastructure. Inderst (2009) mentions, among others: novelty, lack of knowledge and experience, shortage of data, lack of transparency, regulatory, political and social risks, and conflict of interest issues. He also mentions that regulatory constraints might be an issue, but then continues by mentioning there are no such regulations in the Netherlands. Della Croce (2011) divides the barriers of investment into three main categories: the investment opportunities, the capability of the investor and the conditions for investment.

Seeing as the barriers have been mapped out quite clearly and the benefits seem to be there, one may ask if there has been research on how to actually get these investors more into infrastructure. The OECD published a set of 17 principles to promote private sector investment in infrastructure (OECD, 2007). These principles can be divided into five categories: the public-private decision, improving the institutional environment, goals, strategies and capacities, improving public-private cooperation, and encouraging responsible business. Della Croce (2011) proposes policy actions based on the three groups of investment barriers mentioned earlier. He mentions the following main ones (Della Croce, 2011, pp 21-23):

1. The investment opportunities: as one of the main barriers for investment is the limited number and incidental nature of the investment opportunities, governments should promote long-term investment by creating an ongoing supply of investment opportunities.
2. The investor capability: In some countries, pension funds might not have the specific capabilities to invest more in alternative assets. Government should promote their development by establishing appropriate regulatory, supervisory and tax frameworks.
3. The conditions for investment: because infrastructure is a relatively new asset class it lacks reliable data that can predict the risks involved. International institutions should play an active role in producing this data, improving the investment environment.

He then continues to propose more detailed policy actions that government should be put into place to promote private sector investment in infrastructure.

The question is if infrastructure investment by pension funds actually picked up after these policy actions were proposed. A study by Willis Towers Watson estimated in 2008 that in total about 0.28% (US\$ 45.8bn) of the pension fund assets was in unlisted infrastructure (i.e., not in infrastructure companies listed on the stock exchange) (Willis Towers Watson, 2008). Although Inderst (2009) mentions that, at that time, it had already grown for 3 years from almost zero (outside of Australia). In 2017, the same study was executed and it was found that the number had grown significantly, to US\$ 125.7bn (Willis Towers Watson, 2017). In the same study, it is mentioned that in 2016 a number of records were set in the unlisted infrastructure investment by pension funds. The study also mentions that the interest of pension funds in infrastructure is steadily increasing but that “structurally almost all institutions are either not yet invested in infrastructure or are below their target allocation” (Willis Towers Watson, 2017, p.9). This implies that there are still a lot of missed opportunities.

Looking specifically at the Netherlands, as mentioned before, Dutch pension funds have a total amount of about US\$ 1600bn pension fund assets (Willis Towers Watson, 2017). The biggest pension fund is ABP, with total pension assets of about €452 bn in 2017 (ABP, 2017b). ABP has about 2,7% of their total assets invested in infrastructure (APG, 2017b). This does, however, not mean that this is invested in the Netherlands. As a matter of fact, Dutch pension funds invest most of their capital abroad (NOS, 2017). When looking at infrastructure, Dutch pension funds invest 16.1% in the Netherlands, with the remaining 83,9% in the rest of the world (NLII, 2017). What is worth mentioning in this respect is that there is incentive with these pension funds to invest in the Netherlands. In the 2016-2018 strategic statement of APG (the fund manager of ABP), it is stated that they want to focus on investing in the Netherlands to encourage economic growth, as long as the investments meet the requirements of return, risk, cost, and sustainable and responsible investment (APG, 2016). Furthermore, Arcadis (2016), in their Global Infrastructure Investment Index, ranks the Netherlands 10<sup>th</sup> in the world in terms of favourable conditions to invest in infrastructure. All this considered means that there are still plenty of possibilities for more investment in infrastructure in the Netherlands.

### 1.2.3. Light rail in the Netherlands

The case that has been chosen is the development of light rail in the Netherlands. An introduction was already given, but this requires some more explanation. Van der Bijl et al. (2010) provide the following definition: “*Light rail is a rail bound form of public transport that is utilized on the scale of metropolitan area and urban environment. Contrary to train and metro, light rail is by definition suitable to integrate up to a certain level in public areas and, if desired, to be blended in regular road traffic*” (Van der Bijl et al., 2010, p. 19). This means that the strength of light rail is that it can operate on the same track as intercity trains, but can also pass through a busy shopping street in the middle of the city (De Weger, 2013). The advantage of this is that commuters can travel quickly from the suburbs to city cores. Other arguments in favour include the fact that it is a good alternative for the car, it attracts investments along its track, and it stimulates the economy (De Weger, 2013).

Light rail has been proven to work in a wide variety of examples across the world (De Weger, 2013). As mentioned before, the best example in the Netherlands is the RandstadRail between Rotterdam, The Hague, and Zoetermeer (Duursma & Verlaan, 2018). To boost implementation, platform Do LightRail developed a vision for 2040, where the light rail will be implemented in the ten biggest metropolitan areas in the Netherlands (De Weger, 2013). Apart from this, there seems to be plenty of support from governments and public transport companies (as proven by the article in the NRC (2018)). Yet, the past has shown that developing light rail projects is a tough task. Only in recent years, multiple light rail initiatives in the Netherlands have stranded. Examples include the RijnGouweLijn between Gouda and Alphen and the Regiotram in Groningen (Van Oort, Van der Bijl, & Roeske, 2014). All together there seems to be an agreement about the applicability and advantages of light rail in urban areas, yet actual implementation keeps lagging behind. In the Netherlands, this seems to be the embodiment of the infrastructure gap, making it suitable as a case to study.

#### **1.2.4. State-of-the-art**

Various different financing models for infrastructure projects have been developed that involve private investors. These models have either been trying to improve the performance of the models or make the model more attractive for investors. The aforementioned Australian and Canadian models provide a first example for this. These two models have proven in the past to attract more pension funds to infrastructure (Inderst & Della Croce, 2013). Inderst (2017) mentions various other financial models that are being developed in the UK. For example, the PFI is being updated to “The new Private Finance 2”, after the PFI was criticised for various reasons. Furthermore, the National Audit Office (2015) mentions numerous new trends in infrastructure financing that change the risk allocation in contracts that might support private financing.

Della Croce & Gatti (2014) wrote a paper about international trends in financing infrastructure. They start in this paper by mentioning the infrastructure gap and how this can be filled by institutional investors. They then start describing the trends in infrastructure financing divided by debt and equity. On the debt side, they mention various new models, including the Partnership/Co-investment model, the Securitisation model and the Debt fund model, which provide institutional investors a wider range of investment options. On the equity side, they mainly talk about new initiatives aimed at making it easier for institutional investors to provide equity in infrastructure projects. Among others, they mention building in-house expertise and governments providing assistance in setting up infrastructure funds (Della Croce & Gatti, 2014).

Hodge & Greve (2016) add some important insights into this topic. One of the things they mention is that there are “as many different ways of structuring infrastructure project arrangements as there are writing legal contracts” (Hodge & Greve, 2016, p.6). They add to this by mentioning that the financing structure of a PPP is essential for project selection and understanding how successful it is judged to be. They conclude by forming the proposition that infrastructure projects and the many ways it can be financed make sure that it is hard to judge performance of PPP’s outside of a country and individual project context. This means that performance of PPP’s very much depends on country, project and financial model used (Hodge & Greve, 2016, p.6). This has implications for research specifically focused on a certain country and (infrastructure) sector.

#### **1.2.5. Conclusion**

To provide the research with focus, the literature study has looked at the problem posed in the introduction in more detail. A couple of conclusions can be drawn from this. First of all, as mentioned in the introduction, there exists a substantial gap between infrastructure investment requirements and the funds available. There especially seems to be a decrease in transport infrastructure spending in EU countries. In the Netherlands, this might reflect itself in the funding problems of the light rail. Moreover, there seems to be an agreement over the possibilities that institutional investors have to contribute to a solution to this problem. Especially, pension funds in the Netherlands possess large sums of capital, also relative to their GDP. These facts have been the reason for a more detailed literature study on pension funds investment in transport infrastructure.

About pension fund investment in infrastructure a couple of things can be concluded. First of all, pension fund investment in infrastructure grew from near zero (outside Australia) a decade ago, to an actual separate investment class with potential. This is partly the result of research that has been conducted on the barriers for pension fund investment in infrastructure and what policy actions are needed to promote it. Although infrastructure investment by pension funds has improved significantly over the last decade, there

seem to be more possibilities, especially in the Netherlands. Partly Dutch pension funds could invest more of their money in the Netherlands and, because the literature study also reveals that there are many advantages for infrastructure investments compared to other asset classes, partly they could invest more of their money in infrastructure.

Apart from this, light rail seems to be an especially interesting case to study, because of the connections with the infrastructure gap and pension funds. Mainly, while there seems to be an agreement on the benefits that light rail can provide, the actual development lags behind. In the case of light rail, this is primarily attributed to funding problems. Moreover, the commonality between the infrastructure gap is also that institutional investors (in this case pension funds) are named as one of the solutions. This all points to the fact that light rail lends itself perfectly to study pension funds and the infrastructure gap.

Concerning the financial structures that are used, there are some developments. Especially some new trends in infrastructure finance emerge, including research on new financial structures for infrastructure finance (Della Croce & Gatti, 2014; National Audit Office, 2015). The applicability of these new models in infrastructure projects in the Netherlands and how these can attract pension funds is something worth researching. The conclusions of the literature study are used in the next chapter to devise the research objective.

## 2. Research design

This chapter depicts the research design related to the problem stated in the first chapter. It starts with the theoretical framework, which shows what theories are used to tackle the problem. After this, the research objective and research questions are presented, followed by the methodology of research.

### 2.1. Theoretical framework

As has been mentioned before, while infrastructure seems a good fit for pension funds, the investments seem to lag behind. The aforementioned infrastructure gap depicts a certain kind of market failure. To explain this market failure, a theoretical framework is used. This theoretical framework consists of two transaction costs theories, that essentially explain why actors engage into transactions with each other. Furthermore, it can also explain why different transactions do not occur, because of the characteristics that these transactions possess. Because investment in infrastructure by investors is also a certain kind of transaction, it might explain the aforementioned market failure. The two theories will be explored briefly.

Firstly, the *transaction cost economics* (TCE) theory developed by Williamson (1979) has been used. In principle, this theory describes how transaction costs make sure that organisations exist, as they are the reason that products are better made in-house, than bought on the market (Williamson, 1998b). It is built on two key behavioural assumptions: bounded rationality and opportunism. Bounded rationality means that actors make decisions with limited time, capacity and information; while opportunism is about exploiting others with regard to self-interest (Williamson, 1985).

TCE invokes the discriminating alignment hypothesis, which implies that attributes of transactions are aligned with certain governance structures (Williamson, 1998b). Williamson (1979) characterizes transactions on the basis of three critical dimensions: uncertainty, the frequency with which the transactions recur, and the degree to which transaction-specific investments are incurred (Williamson, 1979, p. 239). These three attributes determine which governance structure for the transaction will be chosen: market, hierarchy or a hybrid form. This especially has implications for the type of contracting that the different actors use. The theory might explain why pension funds are willing to take certain risks with certain forms of contract and financial structures.

Although Williamson's theory can provide important insights, it is based exclusively on private actors, which means that it doesn't necessarily hold in an environment with public actors. Spiller (2013) adds to the theory by incorporating public actors in his theory of *transaction cost regulation* (TCR), which is a study of the governance features between governments and investors. Spiller (2013) mentions that certain characteristics of governments make the transactions between the actors inherently different. The theory is build-up of two pillars: TCE and positive political theory. Positive political theory adds to the TCE theory by looking at political dynamics inherent to public actors, which can add to the difficulties of a transaction (Spiller, 2013).

Bergara, Henisz, & Spiller (1998) mention in their paper how utility investments are particularly prone to this form of opportunism. They defined utility investments as having three fundamental features: their products are consumed widely, they exhibit economies of scale and scope, and they are characterized by specific investment that are sunk costs (Bergara et al, 1998, p. 203). This makes this theory applicable to mobility projects. Spiller (2013) characterizes two specific hazards in public/private interactions: governmental opportunism and third-party opportunism. Governmental opportunism pertains to the changing of rules in favour of the public party via governmental powers; third-party opportunism means that third-parties (who by definition have an interest in the project because of the use of public funds) behave opportunistically. Spiller (2013) mentions that different countries are in different levels prone to these forms of opportunism depending on their institutional environment. He mentions that for third-party opportunism to thrive, it requires some form of political contestability and fragmentation. Governmental opportunism, however, thrives in a country with a centralized institutional environment. The core argument of Spiller (2013) is that the investment level in a country depends on the countries' ability to mitigate these chances of opportunism by means of regulation.

Together, TCE and TCR can explain a couple of things about pension fund investment in infrastructure. Firstly, TCE can explain how certain project characteristics should lead to different forms of governance. This might explain that, for pension funds, different forms of governance are desired in certain situations. If the governance form used in infrastructure projects doesn't match the transactional attributes from the

perspective of the pension funds, this might be an important barrier of investment. Secondly, the TCR theory can add to this by incorporating the specific opportunistic hazards related to public-private interactions. The research focuses on the applicability of the theory in the Netherlands, and whether the theory can contribute to the explanation of a lack of investment. Although the literature mentioned in section 1.2 already covered some ground in terms of investment in infrastructure, these theories provided the research with a valuable new perspective.

## 2.2. Research question, objectives and framework

In this section, the research is demarcated by providing the research objective and research questions. Firstly, the research objective will be formulated, which serves as a foundation for the formulation of the main and sub-questions. The section will be concluded with a description of the research framework.

### 2.2.1. Research objective

The research objective is devised from the conclusions of the literature study, from which a couple of main points can be distinguished. Firstly, around the world there seems to be an agreement on the infrastructure gap. This means that, although there is substantial need and opportunity for new infrastructure, actual infrastructure development continues to lag behind. Although data on the Netherlands lacks, the problem seems to be showing itself in the supposed problems with the implementation of light rail. The problem is exactly the same: although public opinion seems to agree on the advantages and business case of the light rail (e.g.: Duursma & Verlaan, 2018; NRC, 2018), actual realisation seems not to be happening anytime soon. One of the main reasons that was mentioned for this was budget constraints by the public parties (Duursma & Verlaan, 2018; Verlaan, 2018), which seems to be in line with the claims made about the infrastructure gap. Another commonality that one can draw between this problem and the infrastructure gap in the literature is the call for investment by institutional investors. In the specific case of light rail in the Netherlands, many are looking at pension funds. This viewpoint makes sense: the Netherlands is the country with the most pension capital relative to its GDP. Moreover, there seems to be plenty of room with these pension funds to increase their investment in infrastructure projects. As Watson et al. (2017) stated in their study: “structurally almost all institutions are either not yet invested in infrastructure or are below their target allocation” (Watson et al., 2017, p.9).

Concludingly, for the aforementioned problem, two focal points can be distinguished, which were also mentioned in the literature study. On the one hand, there is question of the willingness of investors to invest in infrastructure; on the other hand, there is the availability of investment opportunities. To research this problem in the Netherlands, the study will focus on the investors’ side by looking at the willingness of pension funds to invest in infrastructure. Subsequently, to also consider the supply of investable projects for these pension funds, a closer look will be taken at the light rail case. Together, these provide the research with an analogy on the infrastructure gap in the Netherlands.

The objective of the research is to contribute to the current knowledge of the infrastructure gap in the Netherlands by looking at the willingness of pension funds to invest in infrastructure as well as by looking at their investment opportunities. These findings can aid in the development of the light rail, as well as provide knowledge about the existence, causes, and possible solutions of the infrastructure gap in the Netherlands.

### 2.2.2. Research questions

The research objective has been translated into a research question, which required some more demarcation. The research has been particularly focused on mobility infrastructure projects in the Netherlands. The reason for this is, as mentioned in the paper by Hodge & Greve (2016), that infrastructure projects are very heterogeneous. This means that different problems arise for different kinds of infrastructure projects. To come to some sort of conclusion on the problem regarding the light rail in the Netherlands, it was chosen to focus the research on mobility infrastructure projects in the Netherlands; i.e., road and rail infrastructure.

Because of the nature of the research objective, the research has focused on investment by pension funds. The reason for this is, as mentioned, that especially in the Netherlands pension funds control large sums of assets. Furthermore, pension fund assets seem to be particularly suitable for infrastructure investments due to their long-term nature. Concludingly, the following research question was composed:

*What barriers and opportunities can be distinguished for pension fund investment in Dutch mobility infrastructure projects?*

It was already mentioned that there are two sides to the infrastructure gap problem: supply of capital and availability of projects. By looking at the barriers, as well as the opportunities for pension funds, the main question tackles this problem in both ways. Firstly, by looking at the barriers of investment, one can look at the infrastructure gap problem from an investor's perspective. Apart from this, by looking at the investment opportunities for these pension funds, the availability of projects is considered as well.

To aid in answering the main question and give steering to the research, sub-questions were formulated. The first question is focused on the theoretical framework and what this framework can teach us about investment in infrastructure in general. The focus of the second sub-question is on the analysis of the transaction by looking at what governance structures and transactional attributes are currently in use that involve investors in infrastructure projects. This is followed by a description of the specific characteristics that characterize pension funds, which differentiate them from other types of investors. The answers to the aforementioned questions are then combined to formulate a conclusion on which main barriers exist for pension funds to invest in infrastructure. The last sub-question considers the opportunities by looking specifically at light rail, and in what way the availability of investment opportunities forms part of the problem. This led to the following sub-questions:

1. *How can the theoretical framework be used to analyse investment in infrastructure?*
2. *What governance structures and transactional attributes characterize the transaction of investing in infrastructure?*
3. *What are the specific characteristics of pension funds compared to other investors that influence the decision to invest in an infrastructure project?*
4. *What conclusion can be formulated about the barriers of investment in infrastructure by pension funds?*
5. *What opportunities do investors have in light rail projects?*

### 2.2.3. Research framework

To answer the research question, a research framework was set up. The research framework consists of the following parts: research objective, research object and research perspective/theoretical framework. The research objective, which is stated in the first paragraph, is to contribute to the knowledge of the infrastructure gap by looking at the involvement of pension funds in infrastructure. Therefore, the research object is the current policy of involving pension funds in infrastructure in the Netherlands. The theoretical framework consists of the theories mentioned in paragraph 2.1. The theoretical framework provides a theoretical basis on the topic and will be supplemented by an analysis of pension funds and their investment characteristics. Together, these form an initial conclusion, which is supplemented with the analysis of the case-study. After these recommendations can be given. The research framework is schematically shown in Figure 5.

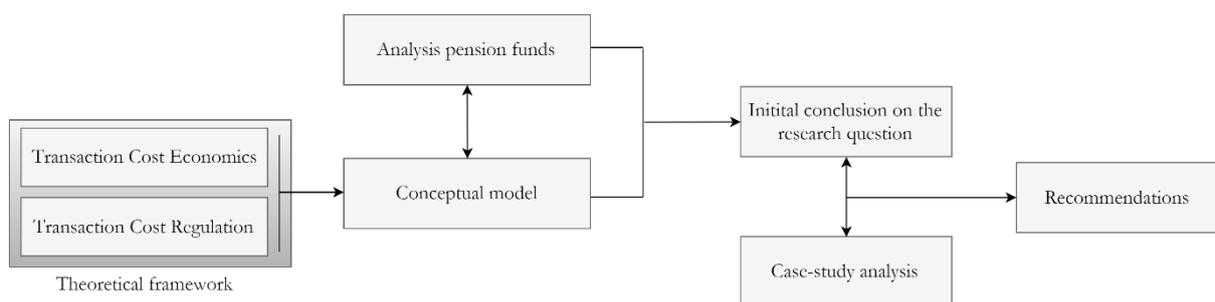


Figure 5: Research framework

## 2.3. Research methodology

This section describes the research methodology. The research methodology consists of the approach used in the research, as well as the methods of information gathering and analysis.

### 2.3.1. Research Approach

#### *Type of research*

Because of the nature of the problem, the research is practice-oriented. This means that the research serves a practical purpose: providing knowledge and information to change an existing situation (Verschuren & Doorewaard, 2013). The type of research can be specified in more detail by using the intervention cycle, which determines which type of research will be done. The part of the intervention cycle where this research focuses on is the *Diagnosis*, which means identifying the background and the causes of a problem. The reason for this is that the problem was quite clear and acknowledged in the literature (there is an infrastructure gap), only the real reason behind this seems something to question.

The different types of research in the intervention cycle can be specified in more detail. Verschuren & Doorewaard (2013) describe three types of diagnostic research: background analysis, opinion research and gap analysis. The background analysis is used when there are more causes to a problem and there is no certainty as to which of the causes actually causes the problem. The gap analysis is used when there is a gap between the desired and the current situation. Therefore, the research is a combination of a *background-* (because it is not certain what is the actual reason why pension funds don't invest more in infrastructure) and a *gap analysis* (because there is a gap between current and desired investments).

#### *Research approach*

The research was divided into two main parts: the forming of a conclusion on the barriers for pension fund investment in infrastructure, and the application of this conclusion on the light rail. Firstly, the theoretical framework was reviewed to develop a theoretical view, which describes the transaction of investing in infrastructure. The theoretical view was then applied to the actual transaction, to determine the attributes of the transaction that influence the decision by investors to invest in infrastructure projects from a theoretical perspective. Subsequently, the distinctive characteristics that distinguish pension funds from other investors were determined via a literature study. Together, these formed a framework that describes the characteristics of infrastructure projects that influence the investment decision by pension funds. Whether this actually told the full story was subsequently checked by performing interviews with the pension funds themselves. The results of this were combined with the findings from the literature study to develop a perspective on the problem from the investors side.

The second part of the research focused on the light rail project. The goal of this was to use the results of the first phase to consider the possible added value of the pension funds in these projects. Moreover, by looking at the light rail project, a perspective could be developed on the problems from the side of the supply of projects and the demand of investors' capital. The light rail project was looked at in general, as well as by studying specific cases. Firstly, the general characteristics and complexities of typical light rail projects in the Netherlands were studied. Subsequently, case studies were done on different projects to see what the main issues were in these particular examples. This was done by a combination of interviews and a document analysis. Finally, a conclusion was drawn on the general complexities and problems that exist when developing light rail projects in the Netherlands.

After this was finished, a conclusion could be drawn on the main question and the presented problems. Firstly, a conclusion could be drawn on the barriers of investment in infrastructure of pension funds, by both looking at the willingness of pension funds to invest as well as at their investment opportunities (considering light rail). Subsequently, this conclusion could be generalised to propose one of the issues of the infrastructure gap in the Netherlands, by making the analogy to pension funds and the light rail project. Lastly, using this problem analysis, some solution areas could be proposed where involved actors could look for when developing solutions to the issue. These solutions have been checked by means of an expert meeting.

There were two main challenges of the research: gaining knowledge about investment strategies of pension funds, and gaining knowledge about the cases. To gain knowledge about investment strategies there was chosen for a *qualitative in-depth analysis*. The reason for this is that it was presumed that there were a large number of factors that influence the investment decisions of pension funds, which meant a more in-depth

analysis of different investors was required. When reasons are complex and interconnected, a quantitative analysis (and therefore a survey) is hard to perform (Bryman, 2012). The method of qualitative data collection was by performing interviews with people responsible for infrastructure investments at pension funds. The case-studies were analysed in a similar fashion. Firstly, documents about the cases were studied. After this, people responsible for decision-making and people with relevance to the projects were interviewed. This data was linked to the findings of the first part of the research. The research model is schematically visualised in Figure 6.

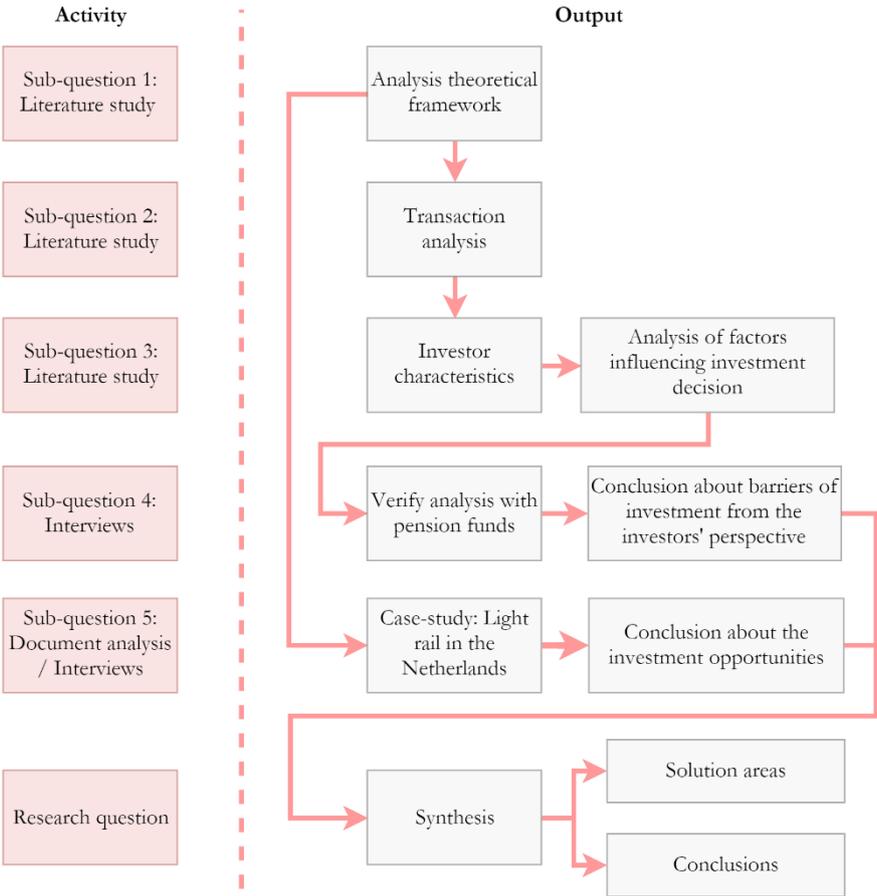


Figure 6: Research model

**2.3.2. Information Gathering**

To gather the knowledge described in the research model, literature studies were conducted. Firstly, the theoretical framework was studied to form a first idea of the barriers for pension fund investment in infrastructure. Subsequently, a literature study has been performed on the current governance structures used to involve pension funds in infrastructure projects, as well as on investment strategies by pension funds. Together these literature studies formed a first hypothesis of the barriers for pension funds to invest in infrastructure and form an input for the interviews in the next phase.

There were two stages of the research that required interviews: the analysis of pension funds investment strategies and the case-study. For the analysis of the pension funds, people responsible for infrastructure investments at different pension funds in the Netherlands have been interviewed. The method of strategic sampling was as follows. Because the five biggest pension funds own more than half of the total pension fund assets in the Netherlands, the focus was on these ones. The five biggest pension funds in the Netherlands have their capital managed by three fund managers, namely APG, PGGM and MN. To test the hypothesis, these fund managers were interviewed.

In the case-study phase, light rail has been analysed in general, as well as by studying two specific cases. The cases have been chosen in such a way, that their characteristics differ as much as possible. Subsequently, people involved in the respective projects were interviewed to gain more knowledge about the particular cases. These interviews were executed to get more information on the specific risks and

particularities of the project and to get a better view on the problems related to the initiation and realisation of the project. All the interviews were executed in a *semi-structured, face-to-face* manner. What is meant by semi-structured is that questions were asked on certain topics, with the possibility of deviating from these topics. The topics were derived from the literature study.

When performing interviews, one has to be aware of the limitations and make sure that they are considered in the results. Yin (2003, p.84) names a couple of weaknesses of interviews in case study research, namely: a bias due to badly constructed questions, response bias, inaccuracies due to poor recall, and interviewees giving desired answers. These weaknesses were taken into account when constructing the interviews and interpreting results. This was done by checking the questions that were asked with experts and by validating results with literature.

### **2.3.3. Data analysis & Interpretation of results**

The data analysis was particularly important after the interviews with the pension funds. In this phase, the different interviews had to be analysed and compared to find the similarities. In order to do this, the interviews were first transcribed. These transcriptions formed the basis for the analysis. To compare the different interviews, statements of the interviews were grouped together on the basis of their topics. From each topic, a conclusion was then formed on the basis of the combined statements. The conclusions were then used to combine the results from the literature study with the interviews.

For the analysis of the case-studies, the cases were initially analysed separately. The cases were described, after which interviews have been performed. For each case, conclusions were then drawn on the basis of pre-identified factors. These factors include topics like complexities, contractual structures, and success factors. These conclusions were subsequently combined and compared with earlier studied literature about light rail projects, as well as with the theoretical framework. Finally, a conclusion was drawn about the main problems that exist when developing light rail projects and what opportunities pension funds have regarding these projects.

The aforementioned results were then used to form conclusions on the main question. This was done as follows. First, the willingness of pension funds to invest in infrastructure projects (from the 1<sup>st</sup> phase) and the difficulties in developing light rail projects and bringing them to the market (from the 2<sup>nd</sup> phase) have been used to determine what the main barriers are for pension funds to invest in these projects. Subsequently, an analogy is made to the infrastructure gap to provide this problem with suggestions on what the main issues are. Lastly, recommendations are given on what role pension funds can play in the implementation of light rail, as well as in general infrastructure development in the Netherlands.

### 3. Theoretical framework

This chapter goes into more detail in the theories that are used in this research. The theoretical framework consists of the transaction costs economics and transaction costs regulation theories introduced in chapter 2. This chapter will start with the common foundation of both theories, the new institutional economics field. After this, both theories are explained in more detail. Subsequently, there will be an exploration of the use of the theories in construction, followed by conclusions and the development of a conceptual model for the research. After each section, there will be a short summary to provide the reader with a brief explanation on how the theories are used in the research.

#### 3.1. New institutional economics

“When transactions are significant, institutions matter” (North, 1991, p. 6). Transaction cost economics is part of the broader field of New Institutional Economics (NIE), particularly of the study of governance in this field (Williamson, 1998a). To explain the concept of TCE, this section will first focus on NIE and the place of transaction cost economics in this field of study.

##### 3.1.1. NIE defined

The term new institutional economics (NIE) was first mentioned by Williamson (1975), while he described how a new field of study in economics has developed. In its essence, NIE studies why institutions exist and what purpose they serve by combining various fields of study, including economics, law, organization theory, political science, sociology, and anthropology (Klein, 1999). What distinguishes NIE from older economic theories is that it sees the institution as being susceptible to analysis (Williamson, 1998a), while older neoclassical economic theories treated the firm as a ‘black box’. This black box perspective means that the firm was merely seen as a production unit that transforms inputs into outputs (Klein, 1999). Although this view does explain processes in a perfect market, it falls short to explain the real world, where practices like vertical integration, long-term commercial contracting, and joint-ventures can readily be observed (Klein, 1999). NIE tries to explain these processes by opening the ‘black box’ and incorporating an institutional analysis.

NIE has its roots in two seminal papers by Ronald Coase: *The Nature of the Firm* (1937) and *The Problem of Social Cost* (1960) (Williamson, 1998b). In his 1937 paper, Coase discusses why firms actually exist, as neoclassical economics tells us that economies ‘work themselves’, which means that supply and demand are regulated automatically. In the 1960 paper, he talks about the problem of externalities, essentially explaining that, with zero transaction costs, the law has no purpose (Coase, 1960, 1988). The reason why the aforementioned papers by Coase were at the cradle of the NIE is because one can distinguish the two defining elements of NIE in the two papers. The first paper is concerned with the ‘rules of the game’ (i.e. the institutional environment), while the second paper is about the ‘play of the game’ (i.e. the institutional arrangement) (Williamson, 1998b).

##### 3.1.2. The four-layer model

The economics of institutions comprises of several levels of social analysis, summarized in Williamson’s four-layer model (Figure 7) (Williamson, 1998b). In this figure, levels two and three correspond to the aforementioned elements of NIE. According to Williamson (1998), the different levels of analysis impose constraints on each other, shown by the solid arrows in the figure (Williamson (1998) does acknowledge that in fact all levels impose certain constraints on all the levels below). Furthermore, the distinct levels of analysis maintain different frequencies over which they change. The first level is the level of social embeddedness, consisting of informal institutions, which only change over the course of several centuries. These informal institutions include customs, traditions, social norms, and religions. Although North (1991) poses that this level has a ‘pervasive influence’ on the long-run character of an economy, this level is left out of most economic analyses (North, 1991, p. 111; Williamson, 1998b). The fourth level is the level of social analysis, which evolves continuously. This level is described by the aforementioned neoclassical economic theories, in which the firm is seen as a ‘production unit’. In this production unit, price and output are determined by resource allocation and employment. More recently, agency theory has been used to contribute to the understanding of the processes occurring in this level of analysis (Williamson, 1998b). Agency theory holds the premise that a misalignment of interests might occur in a firm as a consequence of a separation of ownership and control (i.e., between managers and shareholders). This misalignment of

interests has a consequence for the incorporation of resources in a firm (Klein, 1999). Williamson (1998) mentions that, in this level, it is mainly about getting the ‘marginal conditions’ right, continuously responding to changing market conditions (Williamson, 1998b, p. 29).

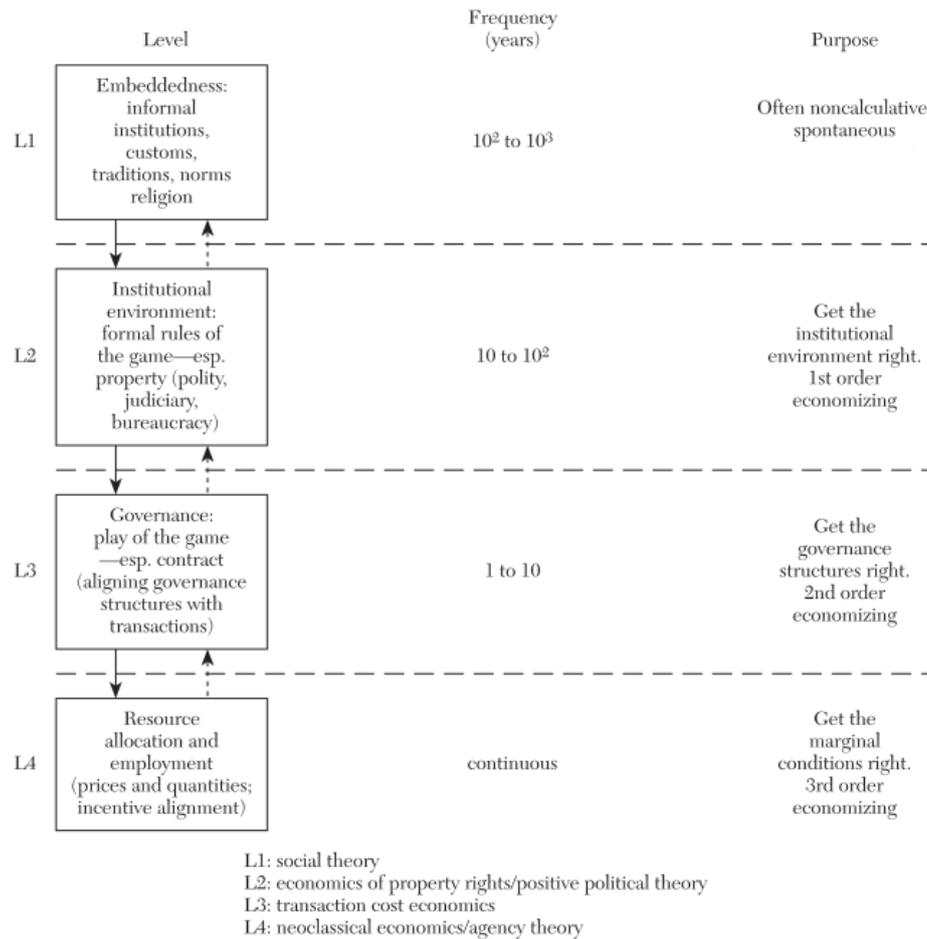


Figure 7: Levels of institutional analysis (Williamson, 1998b)

The main topics of interest for NIE are the levels two and three, corresponding to the aforementioned ‘rules of the game’ (level 2) and ‘play of the game’ (level 3). Level 2 can be referred to as the institutional environment: while level 1 deals with the informal constraints, level 2 contains the formal rules of the game (Williamson, 1998b). Davis & North (1971) define the institutional environment as “the set of fundamental political, social, and legal ground rules that establishes the basis for production, exchange, and distribution” (L. Davis & North, 1971, p. 6). Additionally, Klein (1999) mentions that it forms the “framework in which human actions take place” (Klein, 1999, p. 3). Lastly, Williamson (1998) mentions that the institutional environment is a consequence of politics, and that it forms the boundaries of economic activity. Getting the institutional environment right is specifically important for economic productivity of an economy; Williamson (1998) calls this exercise “first-order economizing” (Williamson, 1998b, p. 27). The problem, as he mentions, is that a change in this level only occurs over the course of decades, while only large scale events incidentally open a window of opportunity for an immediate change (Williamson, 1998b). Important fields of study contained in this level of analysis are positive political theory and economics of property rights (Klein, 1999).

The last level contained in the four-layer model is the level of governance, i.e., the institutional arrangement. Davis & North (1971) define an institutional arrangement as “an arrangement between economic units that govern the ways in which these units can cooperate and/or compete” (L. Davis & North, 1971, p. 7). This level focuses specifically on the agreements that actors make with each other that govern their way of interacting (Klein, 1999). What this also entails, is that it describes which modes of organizations might be chosen depending on the situation. Williamson (1998) calls this ‘second-order

economizing<sup>2</sup>: applying the appropriate governance structure (Williamson, 1998b, p. 29). This level of analysis is where transaction cost economics operates.

*The NIE shows which levels of social analysis influence decision-making by actors. This research will be focused on level three, using the transaction cost approach, with a due regard for the influences of level two. The transaction cost approach will be used to study how the transactions between investors and infrastructure projects influence their appetite for investments. It can be used to study how the governance structure used influences this relationship. Although this level can provide a valuable view on the relationships, it is acknowledged that the institutional environment for investing can be a major influence. Therefore, the influences of this level are taken into account as well. The next sections will explain the transaction cost theories and how these theories can be applied in this research.*

### **3.2. Transaction Cost Economics**

To explain the concept of TCE, one has to start at its roots. As mentioned before, Coase (1937, 1960) has laid the groundwork for the study of positive transaction costs (Williamson, 2010). In his 1937 paper, Coase notes that, according to neoclassical economics, firms have no reason for existence, because neoclassical economics tells us that economies work themselves by incorporating the mechanisms of supply and demand (Coase, 1937). Keeping this in mind, one might ask the question whether firms have to exist at all. Additionally, Coase is in this paper the first one to propose that market and firm structures are actually two opposing forms of structuring economic activity (Coase, 1937; Williamson, 2010). Although not explicitly mentioning the term, Coase lays in this paper the groundwork for the study of transaction costs (Williamson, 2010). In his second seminal paper, Coase (1960) talks about the problem of externalities in economics. Coase explains how, in a world with zero ‘cost of market transaction’, people would just bargain until an efficient allocation of resources is obtained and the externalities are internalized. This essentially makes the court decisions on this matter useless (Coase, 1960). Coase acknowledges in this paper that the assumptions of zero transaction costs does not hold: “[Market transactions] are often extremely costly, sufficiently costly at any rate to prevent many transactions that would be carried out in a world in which the pricing system worked without cost.” (Coase, 1960, p. 15). Both papers describe how the assumption of zero transaction costs does not correspond with real world observations. Although the papers went unnoticed for a few decades, it marked the start of thinking about the impact of positive transaction costs (Coase, 1988; Williamson, 2010). Arrow (1969) builds on the proposition by mentioning that vertical integration of firms shows that positive transaction costs exist (Arrow, 1969, p. 48). Williamson (1975) revived the theory by describing how the choice is made between market and hierarchy (Coase, 1988). Williamson acknowledges that transaction costs are at the centre of analysis in this decision (Williamson, 1975).

Transaction cost economics can be described as a private ordering approach. This means that actors try to align their governance structures to the specific attributes of transactions. The transaction cost approach takes transactions as the central unit of analysis, while subsequently studying how governance structures can be aligned to these transactions (Nielsen, 2009; Williamson, 1981). This section will explain TCE by first describing the different components that make up the theory, after which will be explained how these components collectively form the message that Williamson tries to convey.

#### **3.2.1. Transactions and their attributes**

A transaction can be defined as occurring “when a good or service is transferred across a technologically separable interface. One stage of activity terminates and another one begins” (Williamson, 1981, p. 552). The transaction costs are therefore the cost involved in these kinds of transactions; they are friction for an economic system (Williamson, 1985). Arrow (1969) explains it differently, by defining transaction costs as “all those costs incurred in operating an economic system” (Arrow, 1969, p. 69). The cost incurred in a transaction can be broadly separated in ex ante transaction costs and ex post transaction costs. Ex ante transaction costs include the costs incurred before the transaction takes place. One can distinguish the costs of bargaining, drafting up a contract, negotiating and safeguarding an agreement (Nielsen, 2009; Williamson, 1985). Ex post transaction costs are the costs incurred in making sure that the agreement takes place according to the agreed specifications, i.e., those costs incurred after the transaction takes place. After the transaction takes place, one can distinguish the costs of enforcing and policing an agreement, and costs incurred due to misalignment of the different actors (Nielsen, 2009). There are three critical determinants of transaction costs: (1) asset specificity, (2) uncertainty involved in the transaction, and (3) the frequency with which the transaction recurs (Williamson, 1996).

The degree of asset specificity of a transaction determines whether an asset can be applied in other transactions or not, without losing much of their productive value (Williamson, 1996). Asset specificity is closely linked to the concept of sunk costs, as sunk costs occur when one makes an investment in a certain asset that cannot be recovered. Investments can range in their specificity from very generic to highly specific investments that can only be deployed in one transaction (Nielsen, 2009). Asset specificity can also evolve during the employment of an asset (Nielsen, 2009; Williamson, 1996). The reason that asset specificity plays such an important role in the transaction cost economics theory is that when one has to make a highly specific investment, one relies on the counterparty to honour their agreement. Williamson (1996) has specified six types of asset specificity: (1) site specificity, where several assets can economize on each other by being located close to each other; (2) physical asset specificity, where investments are made in specialized physical components; (3) human asset specificity, which occurs when particular skills have to be learned for a transaction; (4) dedicated assets, when investments are made for one particular customer; (5) brand name capital, an investment in reputation, and (6) temporal specificity, which especially occurs when timely responsiveness by human capital is required on-site (Williamson, 1996, pp. 59–60).

Uncertainty pertains to unexpected disturbances that might arise in the execution of transactions. These disturbances can arise from multiple different causes, but transaction cost economics mainly focuses on behavioural uncertainty (Nielsen, 2009). This uncertainty is attributable to opportunism of the different actors involved in the transaction (Williamson, 1996). The main sources that one can distinguish in this kind of uncertainty are “strategic nondisclosure, disguise or distortion of information” (Williamson, 1985, p. 60). Although Williamson (1985) only mentions behavioural uncertainty, other authors also mention environmental uncertainty (Rindfleisch & Heide, 1997). This environmental uncertainty is the consequence of circumstances of an exchange that cannot be specified beforehand.

The last attribute that is used to define a transaction is the frequency with which the transaction occurs. The frequency is important because investments in transaction-specific assets are more easily recoverable when large volumes of transactions are involved (Williamson, 1985). Three classes of frequency can be distinguished to define transactions: one-time, occasional and recurrent (Williamson, 1985). Apart from the reasoning mentioned before, frequency can also be relevant due to learning effects (Nielsen, 2009). Although Williamson (1985) calls this dimension relevant for the study of transaction costs, it plays a relatively minor role in the theory (Rindfleisch & Heide, 1997).

### **3.2.2. Bounded rationality and opportunism**

Transaction cost economics is built on two behavioural assumptions about human nature: bounded rationality and opportunism (Williamson, 1985). These two assumptions form the cornerstones on which the transaction cost theory is built.

Bounded rationality mainly pertains to human behaviour that is “intendedly rational but only limitedly so” (Simon, 1959, p. xxiv). What this means is essentially that humans behave in a way that might be expected of them, but with limited capacity to receive and process information (Williamson, 1996). Transaction cost economics maintains that both sides of the definition (the fact that humans are intendedly rational, but also limitedly so) have to be taken into account. The fact that these two things are taken into account means that contracts can never be entirely complete (Williamson, 1985). Transaction cost economics combines the notion of bounded rationality with the idea that actors in a transaction act in their self-interest. This self-interest seeking assumption is called opportunism (Williamson, 1996). Opportunism can include forms of lying, stealing and cheating, but is more about subtle forms of acting in self-interest. Williamson (1996) calls it “the incomplete or distorted disclosure of information, especially to calculated efforts to mislead, distort, disguise, obfuscate, or otherwise confuse” (Williamson, 1996, p. 48). These acts are responsible for an information asymmetry that complicates transactions and provides for an increasing uncertainty. It is not required for actors to constantly behave opportunistically; the very threat of opportunism makes sure that actors protect themselves. This protection includes the drawing up and enforcement of expensive contracts (Nielsen, 2009).

Because the concept of bounded rationality tells us that contracts can never be entirely complete, and opportunism tells us that actors act in their self-interest, one can conclude that this entails a problem (Nielsen, 2009). Transaction cost economics studies this problem by focussing on the governance of incomplete contracts.

### 3.2.3. Governance structures

As mentioned before, in the four-layer model described in section 3.1, transaction cost economics operates on the level of governance. Combining this with the previous conclusion defines transaction cost economics. Keeping in mind that all contracts are unavoidable incomplete due to bounded rationality and opportunism, how are these contracts best governed? This question is central in transaction cost economics.

Governance structures can be defined as “the organizational constructions that coordinate the transactions between the parties to incomplete contracts” (Nielsen, 2009, p. 28). The governance structures are the way of making sure that order is achieved in a world with bounded rationality and opportunism. One can distinguish three main types of governance: market, hierarchy and a hybrid structure. There are, however, many varieties that can be distinguished among these forms, including joint-ventures, strategic alliances, networks, regulation, etc. (Nielsen, 2009, p. 29). The different forms of governance are characterized according to four main attributes: (1) incentive intensity, (2) administrative controls, (3) adaptation, and (4) contract law (Williamson, 1998b). These different attributes will be explained and, accordingly, the generic governance structures will be characterized according to these attributes.

Incentive intensity can be defined as the degree to which a change in effort by an actor has an effect on the compensation this actor receives (Williamson, 1996). In a governance structure with a high incentive intensity, actors can be expected to put a lot of effort in, because it has effect on the compensation they receive. For example, in a market structure, actors can be expected to work hard to make sure that their products are either sold at a higher price or there are sold more of them. Therefore, market structures are characterized by high-powered incentives (Nielsen, 2009). In a hierarchical structure, this incentive intensity is lower. When an employee in a hierarchical organization is paid a monthly salary, irrespective of how hard this person works, there is no immediate effect of a change in his work on his salary. One can say that working harder for this person does not change his reward on the short-term. Therefore, hierarchical structures are characterized by low-powered incentives (Williamson, 1996).

The amount of administrative control describes the mechanisms that an actor can impose on another actor in a transaction. These mechanisms include monitoring, auditing, dispute settlement, and penalties (Nielsen, 2009; Williamson, 2000). The type of governance structure determines the amount of administrative control an actor can exert on another actor. In a market, there is virtually no administrative control, while in a hierarchical structure, the administrative control is at its maximum.

The third attribute that characterizes governance structures is adaptation. According to Williamson (1991), there are two types of adaptation. He calls them autonomous adaptation and cooperative adaptation. Autonomous adaptation pertains to the neoclassical economics idea where consumers and producers respond independently to prices changes. This form of adaptation is possible in a market, and not in a hierarchy. The problem is that some events that require adaptation also require a coordinated response. The matter in which this coordinated response can be facilitated in a governance structure is called cooperative adaptation. Williamson (1991) especially mentions that parties in a bilateral dependency need to be aware that incomplete contracts require gap filling and sometimes get out of alignment. This requires a coordinated response, which is more difficult in a market than in a hierarchical situation.

The last attribute of governance structures that needs to be clarified is the contract law. Contracts emerge as a means to organize the transactions and coordinate the actors involved. Essentially, any form of contract is made to facilitate exchange (Macneil, 1974). Williamson (1979) initially classified three types of contracts relevant for the study of organisations (derived from MacNeil, 1979): classical, neoclassical and traditional. Williamson later advanced his theory by describing that hierarchical structures are most supported by forbearance law (Williamson, 1991). These different types will be explained below.

Of the three types of contract mentioned, classical contracts are the most complete and detailed. Although bounded rationality tells us that contracts can never be complete, this type of contract comes the closest (Nielsen, 2009). Classical contract law describes contracts that, in great detail, define the terms and conditions under which the exchange takes place. Because the contracts are standardized, the actors are not dependent on each other and the identity of the actors involved is irrelevant. This type of contract is most supportive to the autonomous market form of organization (Williamson, 1996). Neoclassical contracts are characterized by a greater degree of flexibility and a longer duration (Nielsen, 2009). These type of contracts are necessary for long-term contracts with a high degree of uncertainty and when transaction specific investments have created dependency between the different actors (Williamson, 1985). These circumstances require a contract that has the ability to adapt to disturbances over the course of the contract. Furthermore, third-party involvement in neoclassical contracts occurs to observe performance and settle disputes through arbitration (Nielsen, 2009). These type of contracts are most supported by hybrid modes of governance

(Williamson, 1996). The last type of contract that can be distinguished is forbearance law. Forbearance contracts are characterized by an even greater flexibility and a longer duration than neoclassical contracts. These types of contracts are applied in hierarchies, which means that disputes are resolved internally. (Niesten, 2009; Williamson, 1996). Table 1 provides an overview of the different governance structures and their attributes.

Table 1: Governance structures and their attributes (Niesten, 2009)

	Market	Hybrids	Hierarchy
<b>Incentive intensity</b>	High	Medium	Low
<b>Administrative control</b>	Low	Medium	High
<b>Autonomous adaptation</b>	High	Medium	Low
<b>Cooperative adaption</b>	Low	Medium	High
<b>Contract law regime</b>	Classical	Neoclassical	Forbearance

### 3.2.4. The discriminating alignment hypothesis

As has been mentioned before, transaction cost economics tries to align the governance structures with the transactional attributes. This alignment is called the discriminating alignment hypothesis. This hypothesis combines the attributes of the transactions with the performance of the governance structures. The hypothesis goes as follows: “transactions, which differ in their attributes, are aligned with governance structures, which differ in their cost and competence, so as to effect a discriminating - mainly a transaction cost- economizing – result” (Williamson, 1996, p. 12). A schematic representation is shown in Figure 8.

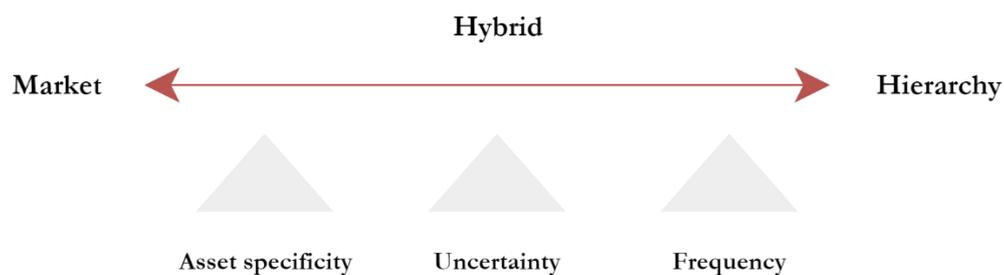


Figure 8: Alignment of governance structures to transaction attributes

When a transaction is characterized with a high asset specificity and uncertainty, the governance structure best suited is hierarchy. The reason for this is that a high asset specificity creates dependencies between the parties, including a loss of value when the contract is prematurely terminated. In a hierarchy, this risk is not there, because the investments are made in-house. When there is no asset specificity involved, the governance structure best suited is market (Niesten, 2009). Market forms of governance are also most suitable when the transactions are of a recurring nature, because actors can rely on their experience with other contracting parties. Hybrid forms include trilateral governance structures and bilateral governance structures. Trilateral governance occurs when the contracting parties are assisted by a third party (for example a court), while bilateral governance is a governance structure specialized to the transactions of the actors (Niesten, 2009). These types of governance are most suitable with an average degree of asset specificity and uncertainty (Niesten, 2009).

*Transaction cost theory states that investment in specific assets, combined with demand uncertainty makes actors prefer a more hierarchical structure, or makes them not investing in the asset at all. This framework can be used in the research by making the analogy to investors and infrastructure projects. Whether the investor will engage in the transaction (that is, invest) will depend on the uncertainty and specific investments related to the transaction and the governance structure that characterizes this transaction. This misalignment of governance structure and transactional attributes and the influence it has on the decision for investors to invest in infrastructure projects is central. The next section will look at the specific characteristics that differentiate public-private transactions with purely private transactions.*

### 3.3. Transaction Cost Regulation

Although the transaction cost economics theory provides valuable insights, it is primarily directed towards private-private interactions. This undermines the applicability of the theory when a public party is involved. A public party has different rights and can make use of different forms of interventions. This makes public-private interactions susceptible to more hazards than purely private-private interactions (Spiller, 2008). Furthermore, public contracting tends to be characterized by formalized, standardized, bureaucratic, rigid procedures, and is generally seen as more inflexible (Greenstein, 1993; Spiller, 2008). The theory of transaction cost regulation, as first developed by Spiller (2010), tries to incorporate the specific influences inherent of public-private interactions into the transaction cost economics framework. Fundamentally, it studies the interactions between governments and investors that are characterized by a form of monopoly (Spiller, 2010). How this works and what implications this theory has, will be explained in this section.

#### 3.3.1. Fundamentals of TCR

Transaction cost regulation is based on two cornerstones: the aforementioned transaction cost economics, as well as positive political theory. Transaction cost regulation takes the fundamental principle of TCE (that all contracts are unavoidably incomplete) as a starting point. This fact determines that all transactions are characterized by certain hazards, which have to be mitigated by, in the case of TCR, regulation and regulatory contracts (Spiller, 2010). Positive political theory is about understanding politics with the use of analytical models, by assuming that political outcomes are the consequence of decisions by rational individuals (Austen-Smith & Banks, 1998). By highlighting the political dynamics associated with public-private interactions, this theory helps in determining the hazards involved in these interactions (Spiller, 2013).

The theory as described by Spiller (2010) is fundamentally, but not limitedly so, applicable to the utility sector. The reason for this is that utilities are characterized by special features that make them susceptible to certain problems with public-private interactions. Levy & Spiller (1994) describe three special features that characterize utilities: (1) they are characterized by economies of scope, (2) they are characterized by large transaction-specific investments and sunk costs, and (3) they are generally used by a large range of users that overlaps the population of a country (Levy & Spiller, 1994, p. 203). These characteristics form the core of the problem with public-private interactions. Economies of scale and scope firstly determine that a monopoly like structure will be created. Moreover, because a large proportion of the assets are sunk costs, the utility operator will be continuing to operate, as long as the revenue surpasses the operating costs (while making an overall loss). Lastly, because of the fact that the users of the utility overlaps the population of the country, the pricing of the output will always be political (Levy & Spiller, 1994). These facts make sure that utilities are highly vulnerable to opportunism by governments and by third-parties. Spiller (2013) claims that the investment level in a country is dependent on the governments' ability to mitigate these forms of opportunism by means of regulation. The two forms will be explained in this section.

#### 3.3.2. Governmental opportunism

Spiller (2013) calls governmental opportunism “the ability of governments to change the rules of the game via the standard use of governmental powers to extract the quasi-rents of utility investors” (Spiller, 2013, p. 234). This opportunism can occur in the form of setting prices below long-run average cost, specific requirements about the investments, equipment purchases, or labour contract conditions (Levy & Spiller, 1994, p. 204). Governmental opportunism can, however, also occur in more subtle ways. For example, via the imposition of fines or the denying of a tariff increase (Spiller, 2013).

The main reasons why governmental opportunism can be a risk were mentioned before: the existence of sunk investments, a monopoly like structure in the utility sector, and high levels of politicization. These factors make sure that utilities are highly susceptible to governmental opportunism (Levy & Spiller, 1994). The institutional environment should, however, make sure that there are limitations on the possibilities of governmental opportunism and “offer credible commitments against arbitrary changes in the rules of the game” (Bergara et al., 1998, p. 19). The main issue is whether the executive power has control over the legislative power of a country. This is the difference between a centralized and a fragmented government. In a highly centralized government, the executive has more power over the legislative, increasing the chances of governmental opportunism (Spiller, 2013).

Levy & Spiller (1994) name a couple of mechanisms that can restrain governmental action, among which: separation between legislative, executive, and judicial governments, a constitution that limits the

legislative power of the executive, two legislative houses under different voting rules, and a federal structure with strong decentralization (Levy & Spiller, 1994, p. 206).

Where these mechanisms are not in place to limit governmental opportunism, there are a couple of inefficiencies that may arise. Firstly, there will not be enough investments, because private investors don't want to take the risk. Secondly, investment may be limited to segments where there are high returns with low pay-back periods. Thirdly, there will be less money spent on maintenance. Fourth, the investments that will be done will be in less specific assets at the cost of quality. Lastly, governments may request up-front payments, but these can come at a high price and can be politically unstable (Spiller, 2013). To assure investors that government will not behave opportunistically, governments have to implement institutional arrangements. If these are not put in place, public ownership of utility assets might be the only option.

### 3.3.3. Third-party opportunism

What distinguishes a public-private interaction from a purely private interaction, is that these public-private interactions by definition rely on public money. The fact that this public money is used (without the expressed consent of the public), makes sure that these interactions have to be subject to public scrutiny (Spiller, 2013). This public scrutiny will, at first, be undertaken by agencies that supervise the public policies. These agencies are then supervised by politicians which, on their turn, are influenced by interested third parties. Especially in democratic societies, this third party supervision is elementary in order to avoid corruption (Spiller, 2013).

In public-private interactions, one can distinguish four types of actors involved: (1) a public actor, (2) a private contractor, (3) Third parties, and (4) the public at large (Moszoro & Spiller, 2012, p. 6). These third parties then consist of political opponents, competitors to the contractor, and interest groups. The problem with these third-parties is, however, that they are biased and only provide information when it works in their favour. This is a form of opportunistic behaviour by third parties. Such opportunistic behaviour can result in the challenge of public policy, and eventually the replacement of a political actor. This political actor can then be replaced by an actor that is more aligned with the interests of the third party. Subsequently, this political actor may change the public policies that were initiated by his predecessor, possibly damaging the utility investments. This process can pose particular risks to utility investors (Spiller, 2013).

The possibility of the aforementioned situation occurring does not depend on the investment made by the utility investors. The risk is mainly determined by the nature of the institutional environment of a country. In a country with a centralized political environment, the potential for third parties to intervene is limited. The reason for this is that interest groups have less influence on politicians in the top of the party. Although Spiller (2013) mentions that, when there is political instability, the potential for third party opportunism increases again, because the cost of removing a politician is lowered (Spiller, 2013). In states with a fragmented political environment, the potential for third party opportunism is the highest. The reason for this is that "governments are constrained in their ability to limit – whether by withdrawing funding, political harassment or direct violence – the development and organization of such groups" (Spiller, 2013, p. 239). One can conclude that a large extent of third-party opportunism and governmental opportunism cannot occur in the same institutional environment. Because as the institutional environment degrades, governmental opportunism thrives, and the potential for third-party opportunism is actually lowered (Bergara et al., 1998; Spiller, 2013).

The fact that both types of risks are imminent, means that parties want to safeguard their interests. On the one hand, private parties want to protect their investments. On the other hand, politicians want to make sure that the public contracts executed are successful. The reason for this is that when public contracts do not meet the expectations, it may hamper their chances for re-election (Forrer, Kee, Newcomer, & Boyer, 2010). To mitigate the hazards of third-party opportunism, contracts will be designed to be more rigid and specific. This results in higher contract costs and less adaptability (Moszoro & Spiller, 2012).

*As mentioned, the transaction cost regulation theory adds to the transaction cost approach by including the distinct characteristics inherent to public-private interactions. The core of the theory states that the investment level in a country is dependent on the ability of the public actor to mitigate the risks of governmental and third-party opportunism. These forms of opportunism are then dependent on the institutional environment of a country. Therefore, the theory can be used to study the influence of the institutional environment on the investment level. The next section will look at how the transaction cost theories have already been applied in infrastructure projects.*

### 3.4. Transaction cost theory in Infrastructure projects

Mobility infrastructure projects involving private investors are by definition a form of a public-private partnership (PPP). These PPP's are especially associated with excessively high transaction costs (Dudkin & Vällilä, 2006; Reeves & Palcic, 2017; Thomassen, Vassbø, Solheim-Kile, & Lohne, 2016). This section will go into more detail on the transaction costs related to infrastructure projects and PPP's and how these transactions costs can be minimized.

#### 3.4.1. Transaction costs in Infrastructure projects

Transaction cost economics is a theory that is suitable to describe various mechanisms in construction and in PPP's, but it has to be adjusted to the particular processes inherent to the sector. De Schepper, Haezendonck, & Dooms (2015) adjusted the transaction cost determinants to fit the construction industry. Firstly, they interpret the determinant 'asset specificity' as 'relationship specific investment', meaning the sunk cost that the actors invest in the project. Secondly, they mention that, uncertainty can be divided into project uncertainty and contract uncertainty. Thirdly, they mention the importance of frequency of interaction in PPP projects, particularly because of partnership experience and learning effects. Lastly, they add inter-project spill over effects to the theory, by claiming that certain actors are more likely to make sunk cost investments when there might be some advantages to other projects (e.g. knowledge and reputation) (De Schepper et al., 2015; Kang, Mahoney, & Tan, 2008).

As mentioned before, PPP's are especially known for having excessively high transaction costs. There are several reasons for this. Dudkin and Vällilä (2006) mention that the degree of contractual incompleteness is especially high in PPP's, raising the transactions costs significantly. They mention that the primary reasons for this are their long-term character, ownership structure, financing structure, and risk-sharing features (Dudkin & Vällilä, 2006, p. 309). Because involved parties want to decrease the uncertainty, they spend large amounts of money in setting up the contracts. This leads to excessive transaction costs, especially related to search costs (tendering and bidding) and monitoring of the contract (Dudkin & Vällilä, 2006). Moreover, because PPP's by definition include public and private actors, diverging interests between the different actors occur. These diverging interests make the PPP especially susceptible to opportunistic behaviour (Farajian & Cui, 2010).

Carbonara, Costantino, & Pellegrino (2016) add to this by focussing exclusively on the tendering period. They mention two reasons why tendering processes are more complicated compared with regular construction projects. Firstly, because a PPP integrates not only the design and construction phase, but also the finance and maintenance (as well as, in some cases, operations), the evaluation and selection is several orders of magnitude more complicated. Secondly, because governments demand competition among the participants in the tender, the number of participating bidders is increased (Carbonara et al., 2016, p. 491). All these factors increase the uncertainty, which requires the parties to spend more money in making the contracts as complete as possible, which in turn raises the enforcement and monitoring costs. One last important reason why PPP's have high transaction costs can be found when looking back at the forms of opportunism mentioned in the transaction cost regulation theory from paragraph 1.2. When either one of these hazards is involved, the uncertainty of the project increases, which again requires more effort in setting up the contracts.

So, what are these transaction costs exactly? Broadly, they can be divided into the following categories (Sollño & de Santos, 2010, p. 393):

- Pre-contractual transaction costs
  - Search and information costs: costs incurred searching for a product, what the lowest price is, etc.
  - Bargaining costs: costs incurred in setting up the contract.
- Post-contractual transaction costs
  - Policing and enforcement costs: costs incurred in ensuring that the other party fulfils the terms of the contract.

Farajian & Cui (2010) add to this by further specifying which transaction costs actually make up these groups, from the perspective of a public party. For the pre-contractual costs, they mention initiation costs, preliminary designs, feasibility studies and negotiations & contracting. For the post-contractual transaction costs they mention monitoring, dispute resolution and renegotiation (Farajian & Cui, 2010, p. 684). Hughes, Hillebrandt, Greenwood, & Kwawu (2006) mention transaction costs related to pre-tendering (marketing,

partnership establishment and reputation building), tendering (calculating the bid, bidding and negotiating), and post-tendering (monitoring, enforcement of contracts, and dispute resolution) (Hughes et al., 2006, p. 20).

### 3.4.2. Determinants of transaction costs in PPP's and the construction industry

So, what are the determinants of the transaction costs in construction and in PPP's? There have been several studies aimed at determining this (e.g. Dudkin & Väilä, 2006; Huimin, Peng, & Zhang, 2016; Li, Arditi, & Wang, 2013). Dudkin & Väilä (2006) were the first to determine and test a set of variables that influence the transaction costs in PPP's. They included project country, economic sector, project size, length of procurement process, number of bidders and year when the project was signed (Dudkin & Väilä, 2006, p. 317). Their most important conclusions are that transaction costs increase with procurement time, and decrease with increasing project size (as a percentage of total project value) (Dudkin & Väilä, 2006).

Li et al. (2013) looked at the transaction costs of construction projects in general. They developed a breakdown structure of the determinants of transaction costs based on a literature study. They grouped the determinants under the headers role of the owner, role of the contractor, transaction environment, and project management efficiency (H. Li et al., 2013, p. 550). The total breakdown structure can be found in Figure 9.

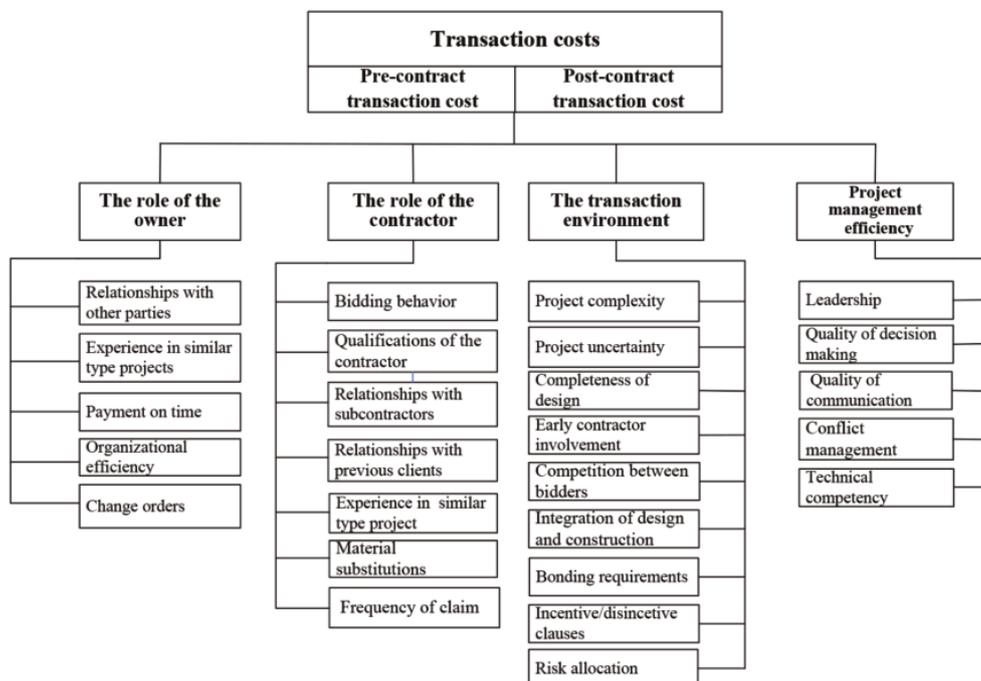


Figure 9: Determinants of transaction costs in construction projects (Li et al., 2013)

### 3.4.3. Application of TCE in the construction industry

As can be seen in the previous sections, there have been plenty of studies on the types and determinants of transaction costs in the construction industry. One of the main precepts of transaction cost economics is that these transaction costs should be aligned with the governance structures. The question is, therefore, can the governance of construction projects be described using the theory of transaction cost economics?

Eccles (1981) was the first one to attempt to apply the TCE framework to explain governance structures in construction (Winch, 2001). He mentions the existence of a 'quasifirm', which is an organizational form in construction that is both a market and a hierarchy (Eccles, 1981). The quasi-firm is a consequence of relatively stable relationships between main contractor and subcontractors due to the involvement of specific human capital investments in construction, the necessity of constant bidding in case these relationships were not there, and uncertainty about future projects. The relatively stable relationship, with the possibility of leaving the relationship at any time, makes for a hybrid form of governance (Eccles, 1981). Reve & Levitt (1984) add to this by mentioning that contracts in construction are in principle a market structure that is supplemented by hierarchy in cases of market failure. Moreover, they conclude that the relationship between client, contractor and consultant in a construction project is an example of a trilateral

governance, due to infrequent transactions and specific investments. They emphasize the existence of informal relationships and hybrid governance structures (Reve & Levitt, 1984).

The aforementioned authors applied the TCE framework to look at the governance structures of construction projects. Winch (1989) applies the framework in a different way. He looks at the amount of vertical integration in construction, i.e., the ‘make-or-buy decision’. He starts by defining the sources of uncertainty in construction: task uncertainty, environmental uncertainty, organizational uncertainty (can together be termed project uncertainty) and contracting uncertainty (Winch, 1989, p. 338). Subsequently, he mentions that construction projects are one of the most complex production endeavours. He concludes that these transaction attributes should lead to more vertical integration, but that it doesn’t happen because of high contracting uncertainties. These high contracting uncertainties lead to more subcontracting, on its turn giving contractors more flexibility and lowering their capital invested in the project (Winch, 1989).

In a later paper, Winch (2001) synthesises the past literature and tries to develop a framework for determining the governance structure in a construction project with low uncertainty (Figure 10).

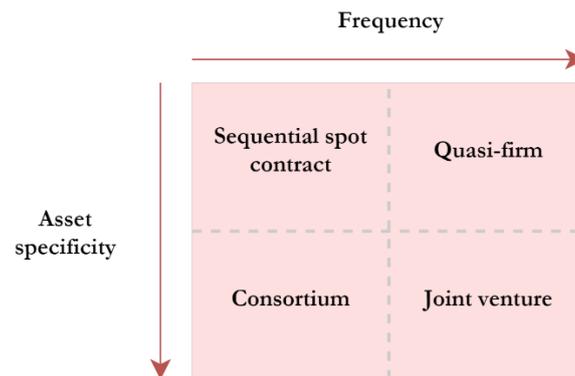


Figure 10: Governance structured aligned to transaction attributes (Adapted from Winch, 2001)

Winch (2001) uses the term sequential spot contract for a governance structure where staff is hired on an ad hoc basis when necessary. When asset specificity is low, sequential contracts and the quasi-firm are most desirable. When there is more asset specificity, one needs to pay attention to mitigating opportunism risks, making the contracts more complex. A consortium or joint-venture then allows for the possibilities of risk sharing between the parties (Winch, 2001). A joint-venture is the strategic alliance that comes closest to the characteristics of a hierarchical structure (Oxley, 1997).

The type of governance structure is closely linked to the type of contract the parties use. As mentioned before, construction projects are inherently complex endeavours. Because of this inherent complexity, complex contracts are written that achieve hierarchical effects, while not actually being a hierarchical structure (Winch, 2001). These contracts include (Winch, 2001, p. 802):

- The designation of a system that facilitates the exchange
- Determining an incentive system for motivation of the parties
- Pricing systems to manage uncertainties
- Conflict resolution measures
- Standardized operating procedures

The contract itself is mainly a measure to balance the distribution of risks between the parties (Müller & Turner, 2005). Müller & Turner (2005) mention that the type of contract used in a project should depend on who is supposed to control the risk. There are three options: either the manager control the risk, the owner controls the risks, or both control the risks (Müller & Turner, 2005, p. 401). When both control the risks, and alliance form of contract is used. This alliance form of contract inherently corresponds with a large amount of transaction costs involved in governing the contracts, because the contracts are complex and ambiguous (Müller, 2009). These transaction costs, combined with the complexity of the construction industry, lead to the wide use of standardized contracts in construction (Bajari & Tadelis, 2001).

Turner (2005) applies the TCE framework to “govern the project as a transaction”, with the goal of keeping the governance costs low (Müller, 2009, p. 68). The costs of governance in this respect are: (1) costs deriving from aligning the interests of the parties, (2) costs linked to monitoring and controlling the contract, and (3)

costs of setting up the contract and determining the governance process. These costs are based on the transactional attributes described in the TCE literature: asset specificity, uncertainty as a consequence of risk, and frequency. These factors influence the governance structure used, which on its turn influences the contract type that will be selected (Müller, 2009).

#### 3.4.4. Application of TCE in PPP's

When discussing PPP's, Grossman & Hart (1986) provide an important new perspective on the transaction cost economics theory. Hart & Grossman asked themselves: if integration always limits transaction costs, what are the limits of a firm? (Grossman & Hart, 1986, p. 693). They conclude that vertical integration (moving to a hierarchy) is more profitable when one party's investments are significantly more important than the investments of the other party. On the contrary, when the investments are roughly equal, separation between parties is the best option. Dewatripont & Legros (2005) use the theories of Hart and Williamson to describe how risk assessment and contract design should be integrated in PPP's. By using the theory of asymmetric information and incomplete contracts, they argue that endogenous risks (risks influenced by the contracting terms) are inherently present in PPP's.

Carbonara et al. (2016) use transaction costs to explain the choice between different procurement procedures in PPP's in the EU. They use the distinction of tendering procedures based on the EU directives: open procedure, restricted procedure, negotiated procedure, and competitive dialogue (European Union, 2004). Different procurement procedures manage different amounts of information, and therefore have different transaction costs. On the one end, the negotiated procedure and competitive dialogue are characterized by high costs of collecting information for the public authority. The open procedure has less costs for the tendering procedure since it does not require prequalification of bidders (Carbonara et al., 2016).

Levitt, Henisz, & Settel (2009) look at two important governance challenges related to PPP projects, which can also be found in the transaction literature: opportunism due to displaced agency and political and regulatory risk. They mention that infrastructure projects are inherently susceptible to these hazards because they are intrinsically political and involve various counterparties, which go through multiple transactions (Levitt et al., 2009, p. 4). The political and regulatory risks are related to the transaction cost regulation theory described in section 3.2. Levitt et al. (2009) go on to mention the limitation of the current approaches of PPP's to manage these hazards. They mention two approaches: making sure that one entity manages all the life-cycle costs (hierarchy) and carefully specified contractual incentives based on neoclassical contracting (market) (Levitt et al., 2009, p. 9). The problem with the hierarchical structure is that only a few actors are capable of handling the burden of incorporating all the life-cycle costs. The problem with the market structure is that actors may stimulate political intervention when disputes are handled by a third-party. They conclude that both options are not desired, but that an intermediate hybrid form needs to be found to manage the hazards described (Levitt et al., 2009, p. 12).

*One can conclude the following regarding the application of the transaction cost theories in construction and in PPP's. It has been shown that transaction costs are inherently present in infrastructure projects. These transaction costs are mainly the consequence of search & information costs, bargaining costs, and policing & enforcement costs, and are influenced by a wide variety of determinants. Furthermore, studies show that these transaction costs are especially high in PPP's. The transaction cost theory has been applied in construction industry to lower these transaction costs and to lower the risks. Mainly, studies show how different governance structures and contracts are used to provide for alignment to the transactional attributes inherent to the specific situations. Lastly, from the application of the transaction cost theories in PPP's, it has become clear that risks influenced by the contracting terms are inherently present in PPP's, that transaction costs influence the tendering procedures, and that political and regulatory risks are inherently present in PPP's and require mitigation by governance structure. These conclusions point to the fact that infrastructure projects, and specifically PPP's, especially lend themselves for analysis by the transaction cost approach. In this research, the specific transaction costs and governance challenges for investors when investing in infrastructure are analysed to determine the attractiveness for investment.*

### 3.5. Theoretical viewpoint

The first sub-question that has been formulated was: *What can the theoretical framework teach us about investment in infrastructure?* This section tried to answer this question by describing the literature of the theoretical framework and looking at the applications in infrastructure projects in general.

In its most elementary form, the transaction cost theories try to describe certain occurrences by taking the transaction as the unit of analysis. This is used in this research by looking at the transaction between investors on the one hand, and the infrastructure project on the other hand. The theory then takes the transactional attributes and the governance structure of the transaction as variables. Looking at the governance structures of the transactions means looking at the different contractual structures that are used in the transaction and the alignment of the interest of the actors. By using different kind of organisational structures and contractual agreements, parties in a construction project try to minimize the transaction costs and the chances of opportunism by opposing actors (Winch, 2001). Furthermore, these governance structures and contractual agreements are a way of distributing the risks of the parties involved in the transaction (Müller & Turner, 2005; Winch, 2001). The transactional attributes of the transaction should then be aligned to these governance structures (Figure 11). When this is not the case, actors can choose to not engage in the transaction, because the risks and transaction costs of the transaction might be too high. This specific mechanism is applied in the study as a possible explanation for the (dis)engagement of pension funds in infrastructure projects.

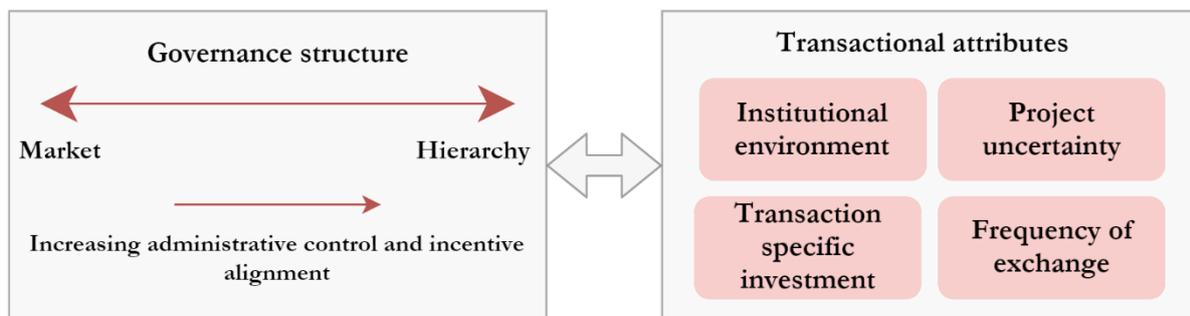


Figure 11: Theoretical view from a transaction cost perspective

The aforementioned described the use of TCE mechanisms supplemented by a part of TCR. The transaction cost regulation adds to the TCE framework by incorporating the specific risks pertaining to public-private interactions. In this case, the institutional environment of a country is the determining variable and, therefore, partly determines the willingness of investors to invest in infrastructure. Also, in this case, the governance structure is an important variable, but mainly in determining how the interests of the public and the private party are aligned. This alignment determines the chances of opportunism by the public actor. Apart from this purpose, the TCR theory can be used to study the investment opportunities for the pension funds, because the forms of opportunism described in TCR can also be important reasons as to why it can be hard for governments to initiate projects. This will be used to analyse the light rail case, in order to identify the reasons why these projects are not developed on a large enough basis.

Concludingly, the research will use TCE (supplemented by TCR) by focusing on the different attributes of the transaction between investors and infrastructure projects to determine the risks and transaction costs involved. These risks will then eventually be used to determine the willingness of investors to invest in certain infrastructure projects. Moreover, TCR will be used to study the ability of governments to initiate infrastructure projects.

## 4. Analysing the transaction: Investment in infrastructure

The theoretical framework has taught us to look at the governance structures and transactional attributes of a transaction to determine the risks and transaction costs for the involved actors. This chapter will make a start to this by describing the governance structures that characterize the transaction of investing in infrastructure projects, as well as by describing the transactional attributes inherent to these transactions. The chapter will start with a description of the governance structures, by looking at private investment in general, by looking at different investment channels, and by looking at the concept of project finance. This will be followed by describing the transactional attributes of the transaction and a conclusion concerning the alignment of the two.

### 4.1. Governance structures

The governance structure used determines the (mis)alignment of the transactional attributes and the distributions of the risks. This section will show the governance structures that characterize infrastructure projects involving private investors.

#### 4.1.1. Private investment in infrastructure

The first question one has to ask is how investors are incorporated in infrastructure projects. As mentioned before, private investment in infrastructure is hardly something revolutionary. After the second world war, infrastructure was seen as a public good and therefore almost exclusively publicly financed (OECD, 2011). This changed with the victory of the conservative party in the UK, led by Margaret Thatcher. At this time, the trend was to slim down on governments, which increased the involvement of the private sector in infrastructure (Ghobadian, Gallar, O'Regan, & Viney, 2004). These events paved the way for the development of the Private Finance Initiative (PFI) in the UK. The PFI was the example for many countries, among which also the Netherlands. At the start of the new millennium, Public-Private Partnerships (PPP's) started to pick up in the Netherlands based on the PFI in the UK (Klijn, 2009). One form of PPP that has been used often in the Netherlands is the Design-Build-Finance-Maintain (DBFM) model. Especially in the last decade, there has been great enthusiasm for the presumed advantages of the DBFM model (Lenferink, Verweij, Leendertse, & Busscher, 2017). These advantages include the optimized use of expertise of different actors, coordination between different phases, incentive for good performance, and fewer scope changes (Lenferink et al., 2017).

There are many different forms of PPP's, with differing amounts of private participation. Because of the characteristics of infrastructure projects, a public party is (virtually) always involved. This involvement can be in the form of regulator, but also by providing financial resources or by being main off-taker of the final asset (OECD, 2014b). This is why an infrastructure project involving a private party like a pension fund, always includes some form of public-private partnership. The full range of possibilities for private sector participation in infrastructure projects are shown in Figure 12. The shift to more private sector participation involves a similar increase in risk, responsibility of financing, and governance and control born by the private sector (OECD, 2014b).

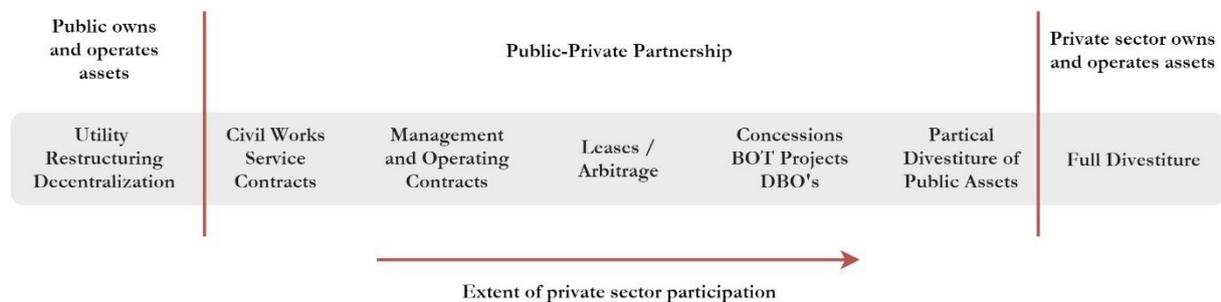


Figure 12: Private sector participation spectrum (Adapted from World Bank, 2011)

There is also an important difference of the type of project that determines the involvement of a public body. This difference is a result of some projects not being self-sustainable in terms of direct costs and profit. Because some projects are only beneficial because of the fact that they solve social problems (which do not directly deliver profits to the private actor), public bodies need to be involved to pay for these social

costs. Fully sustainable infrastructure projects mainly include power and energy sector projects, while not financially sustainable projects include social housing and schools. Partially sustainable infrastructure projects include those projects, where the private actor is not allowed to set the fees for the asset at such a level to be profitable. These include light rails, railways, and other mobility infrastructure projects (OECD, 2014b). In these kinds of projects, the risks of governmental opportunism are high when no guarantees are given by the government.

**4.1.2. The various types of investment**

The second step in explaining the governance structure is looking at the manner of investing. As mentioned before, there are many different possibilities to invest in infrastructure. These possibilities are a response to the fact that demand (because of the infamous infrastructure gap) and supply (because investors are looking for good investment possibilities) of capital don't seem to find each other in every situation. The purpose of these various investment channels is then to make sure that it becomes more attractive for investors to invest in certain projects and to gear the supply to the demand of capital (Della Croce & Gatti, 2014). This is necessary because infrastructure projects are very heterogeneous, which means that they encompass various different risk and return characteristics (OECD, 2014a).

An overview of the various different investment channels available to private investors is shown in Figure 13. The main distinction is made between debt and equity finance. On its turn, both equity and debt financing channels can be distinguished by the fact whether they are listed and traded in the market and unlisted and traded over-the-counter (OTC). The main difference between these two investment channels is that, when a form of financing is used that cannot be traded on a stock market, the asset cannot be liquified on the short-term, increasing the risk (OECD, 2014b). The various investment channels will be explained in this section, divided by debt and equity.

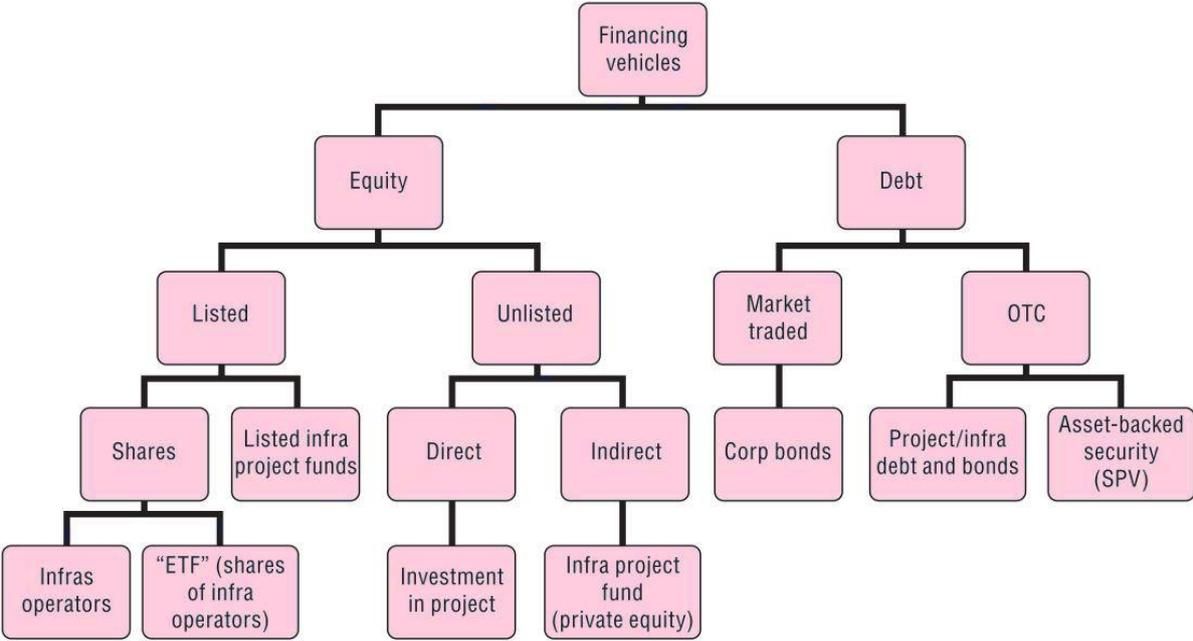


Figure 13: Different investment channels for the private sector (Adapted from Della Croce & Gatti, 2014)

**Debt financing channels**

Infrastructure projects have always been financed by a high debt/equity ratio. Typical projects can reach up to 90% debt (OECD, 2014b). The reason for this is the large amount of capital required and the provisioned cash flows that are often associated with infrastructure projects (Weber, Satub-Bisang, & Alfen, 2016). The two main ways of providing debt for an infrastructure project are through loans (in the form of project finance) or project bonds.

Project finance is a form of an asset-backed security that makes use of the project's projected cash flows for repayment (OECD, 2014a). The loans are, therefore, exclusively used for a single project. Because of the importance of project finance, the details and different forms it can take are discussed in section 4.1.3.

Important in this respect is that these loans are predominantly provided by banks, which are more experienced in controlling the risks associated with an infrastructure project (OECD, 2014a). Loans provided to infrastructure projects are usually in the form of syndicated loans, which means that the loans are provided by a syndicate of banks and financial investors (Weber et al., 2016).

For infrastructure projects with a long duration and large capital value, also project bonds can be issued. These project bonds can be privately traded (e.g. directly to pension funds) or traded on the open market, and they can either be fixed interest or variable interest. Because of the fact that the liabilities of pension funds are inflation linked, the variable interest bonds are more suitable for these type of investors (Weber et al., 2016).

### *Equity investment channels*

As mentioned, infrastructure projects have traditionally been financed with a high debt/equity ratio. This changed after the 2008 financial crisis, when cheap loans were more difficult to obtain due to new laws enforcing banks to retain more capital. This resulted into a reduction of the debt/equity ratio of typical infrastructure projects and a quest for innovative financing models containing more equity (OECD, 2014b). Equity financing corresponds with more risk (because it is subordinate to all other forms of debt), but in turn corresponds to higher returns.

Equity investing can again be done in various ways, distinguished by listed and unlisted investments. Listed equity investments are investments in infrastructure companies or funds listed on a stock exchange. In this case, companies don't invest directly into a project, but rather in a pipeline of projects. Unlisted equity investments can be done in a company that is not listed on a stock exchange (which is then not directly affected by stock market fluctuations), in unlisted funds, or directly into a project (OECD, 2014a). The two most important channels for pension funds are investing in unlisted funds, or investing directly into a project (OECD, 2014a).

Investing in a fund works through a fund manager (an investment bank or firm), which manages the fund and invests the capital into various infrastructure projects. Interested investors can invest in the fund, which saves them searching and information costs, as well as bargaining and enforcement costs, in exchange for a fee (OECD, 2014a). Investing in this manner is again possible via both listed and unlisted funds. The main difference is that unlisted infrastructure funds contain less market risk (since they are not listed on the stock exchange) and are thus less volatile and have more predictable returns (Anagnos, 2016). The benefit of listed funds is that they are more easily liquidated and are characterized by lower fees for fund managers. Institutional investors tend to be more interested in unlisted infrastructure funds, since they generate a more stable income and can be acquired in larger volumes (Peng & Newell, 2007). Moreover, institutional investors can exert more control over unlisted infrastructure funds (Anagnos, 2016).

Equity can also be invested directly into a project. This is again related to the concept of project finance. Where project finance is partly financed by debts, there is also a substantial part of equity incorporated. Pension funds can invest in these projects either through co-investment (with other investors) or by directly being involved in the project (OECD, 2014a). Both forms of investment require a large amount of in-house expertise, because one has to assess the risk/return characteristics of the project throughout its economic life (Della Croce & Gatti, 2014).

The various investment channels described above depict the investment opportunities available to private investors. The governance structure largely depends on the investment channel that is used. However, for a typical infrastructure project involving private investors, the money is eventually channelled into the project via a project finance structure. This means that, to fully grasp the governance structure that describes the transaction between investors and infrastructure projects, one has to look more closely at the contractual structures that characterize this project finance structure. After this has been done, one can draw conclusions on the typical governance structures (from a transaction cost perspective) that govern the transaction between investors and infrastructure projects.

#### **4.1.3. Project Finance**

The growth of PPP projects has simultaneously been accompanied by a growth in the concept of project finance (OECD, 2014a). Project finance is mainly about providing debt to an economic entity, which is set up using equity of project sponsors (Gatti, 2008). Weber et al. (2016, pp. 295-296) and Gatti (2008, p. 2) both mention key characteristics that characterize project finance, which will be briefly considered.

Firstly, project finance is characterized by the formation of a Special Purpose Vehicle (SPV). An SPV is a newly created legal entity, especially founded for the management of one single project. The SPV bears all the rights and responsibilities associated with the project, which means that other involved parties in principle cannot be held responsible in case of failures (Gatti, 2008). The second important characteristic of project finance is that the debt is provided via cash flow-based lending. This means that loans are based on the cash flows of the project. Therefore, the ability to raise debt in a project is dependent on the height of the provisioned cash flows that the project will generate (Weber et al., 2016). Furthermore, the lenders are given collateral for their loans (Gatti, 2008). Thirdly, project finance is characterized by risk-sharing structures that allocate the risks of the project between the parties involved. A big advantage of this is that the risks can be allocated to the parties that are best suited to manage that risk, ultimately benefitting the entire project. The fourth characteristic inherent to project finance is the limitation of liability of the parties involved. Because of the newly founded SPV, the project sponsors are only liable to the extent of their investments in the project. Lastly, project finance is characterized by off-balance-sheet financing. This means that the parties involved, including the public party, are not obliged to show the project (including its debts) on their balance sheets (Gatti, 2008; Weber et al., 2016).

An infrastructure project involving project finance includes various participants with diverging interests (Weber et al., 2016). From the perspective of investors, the most important participants include the public actor, the equity providers, the debt providers, and the non-financial contractors (among which are the EPC contractor and operators) (Weber et al., 2016, p. 303). The public actors most often serve as principal and initiator of the project. The equity providers consist of initial investors who initiate a project (most often construction or real estate companies), as well as later stage investors. These later stage investors can include institutional investors such as pension funds and insurance companies. Together, the project sponsors form an equity joint-venture (the SPV) to manage the project. While the project sponsors provide equity, the debt providers provide most of the financing for a project. As mentioned before, debt is mostly provided by banks, but can also be provided by institutional investors (Weber et al., 2016). The non-financial contractors are typically governed by contractual relations between them and the SPV. A typical structure of project finance in a PPP project is shown in Figure 14.

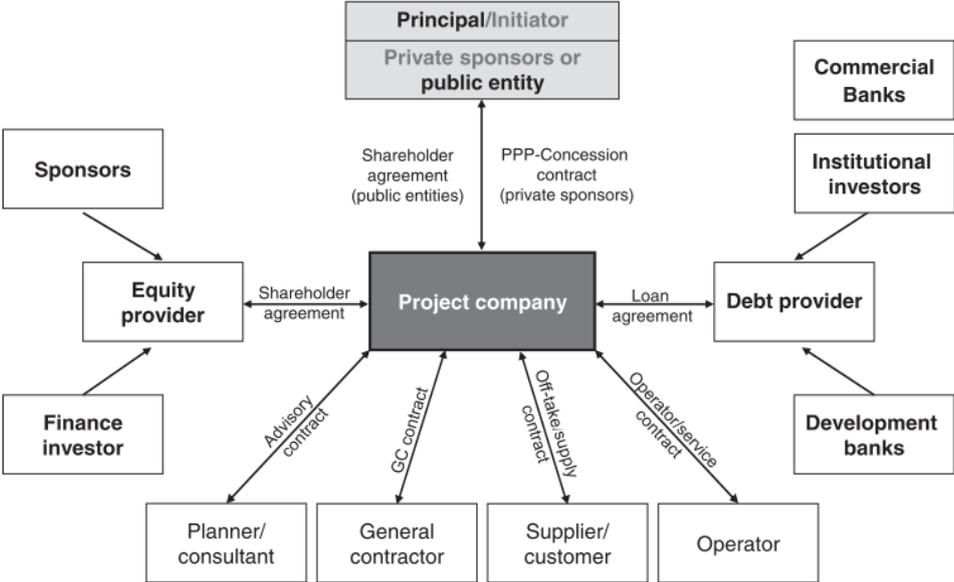


Figure 14: Typical project finance structure (Weber et al. 2016)

So, what does this mean from a transaction cost perspective? It was already mentioned that one has to look at the governance structures and align them with the transactional attributes. Furthermore, Winch (2001) already noticed that consortia in construction projects are a consequence of low frequency of exchange and high asset specificity, while joint ventures are a consequence of high frequency and high asset specificity (see section 3.4). The market – hierarchy continuum of the forms of strategic alliances can be seen in Figure 15 (Nielsen, 2002; Oxley, 1997).

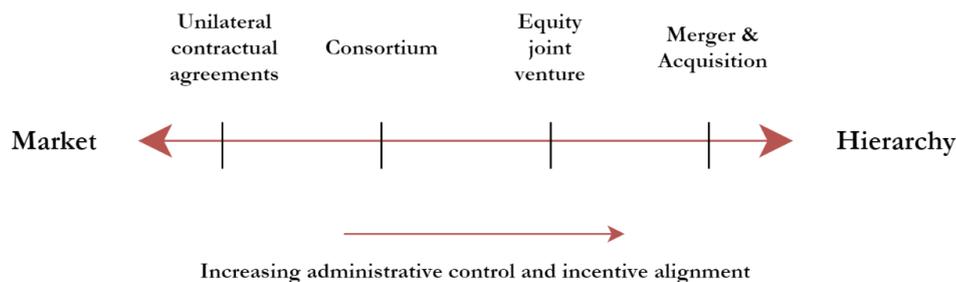


Figure 15: Market - hierarchy continuum of strategic alliances (adapted from Nielsen, 2002)

When looking at the project finance situation, one can conclude that different actors are managed in different ways. Some of the actors in the transaction are governed by an equity joint venture, while other actors are governed by a unilateral contractual agreement. This starts with the public actor. This public actor is mostly governed by a concession agreement, which sets out all legal obligations and risk allocations between the project company and the public body (Delmon, 2011). Because this has to be done for the entire duration of the project, these contracts can be very complex. As legislation, environmental characteristics, statutory provisions, and other project characteristics inevitably change over time, it is nearly impossible to account for all of this in the contract (Weber et al., 2016). Weber et al. (2016, p.310) mention that, therefore, it is more important to establish mechanisms in the contract to deal with these changes, than that everything is accounted for in endlessly rigid contracts. What might make the relationship with the public actor even more problematic is the fact that the government has provide much of the revenue streams in most infrastructure projects.

Then there are the non-financial contractors (NFC's). These NFC's are governed by contractual relations to allocate the risks inherent to infrastructure projects to the parties responsible for that respective element of the project (Delmon, 2011). Although in a lot of cases NFC's are also one of the sponsors of the project, this does not mean that the relationship can be called hierarchical. Weber et al. (2016, p.287) state that "although often stated and assumed to be the case, such a constellation does not always ensure that the interests of all sponsors including the general contractor are aligned". For example, when construction changes have to be implemented, they can charge high prices. In the end, everyone has to pay for this, while only the NFC benefits.

One can conclude that, looking at the grand scheme of things, some parties are eventually managed by unilateral contractual agreements, while others are governed by an EJV. Although the existence of the equity joint venture aligns the interests of some of the actors, there still exists a significant hazard for opportunism because of the contractual agreements. Figure 16 shows where the actors in a PPP can be plotted on the market-hierarchy continuum. A distinction is made between NFC's part of the EJV and those not part of the EJV; as this changes the control the actors can impose on each other.

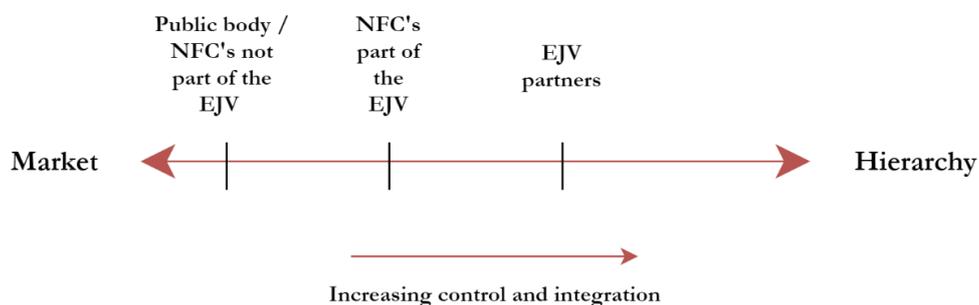


Figure 16: Market - hierarchy continuum of PPP actors

The previous sections described one part of the transaction cost perspective that has been taken in this research. To describe the (mis)alignment of the governance structures and the transactional attributes, one has to first learn about the governance structure that typically characterize the transaction. The conclusions that one can draw is that different actors are governed via a combination of unilateral contractual agreements and an EJV. This makes for a varying amount of control and incentive alignment that the actors (as part of the SPV) can exert on each other in the specific transactions. Moreover, the actual amount of risks and transaction costs that pension funds have to bear depends very much on the type of investment channel

that is used. The next section will look at the transactional attributes to determine whether the aforementioned alignment is done correctly. This (mis)alignment can determine the involved risks and transaction costs for the investors.

## **4.2. Transactional attributes: transaction specific investment & frequency**

The four transactional attributes have been mentioned before: transaction specific investments, uncertainty, the institutional environment, and frequency. Uncertainty and the institutional environment are treated in separate sections; the other two attributes are described below.

### *Transaction specific investments*

In Williamson's (1985) original formulation of the theory, the transaction specific investments are the cause of the dependencies between the actors. Because an actor makes transaction specific investments, there is a risk of losing this money or not earning it back on the transaction, which creates the risk of opportunism. For an investor in an infrastructure project, there are two types of transaction specific investments; the importance of which largely depends on the type of investment.

The first transaction specific investment that the investor makes is the actual investment itself. This actual act of investing creates the dependency between the actors. The height of the dependency depends for a large part on the type of investment. For example, when an investor invests in a greenfield project, the dependency is relatively high. The reason for this is that the investment cannot be recuperated, at least until the project is finished and making money. During this time there is constant threat of losing this investment. When investing in a brownfield project, there is always the possibility of selling of the asset (with the possibility of losing money). This makes the actual transaction specific investment lower when investing in brownfield assets than in greenfield assets.

The second type of transaction specific investments are the transaction costs involved. As has been mentioned before, PPP's are especially prone to large transaction costs. These transaction costs have already been mentioned more specifically in section 3.4.1. The transaction costs when investing in a greenfield infrastructure project are mainly a consequence of the tendering phase. The investors take part in this tendering and therefore have to partly bear the costs of the preparing of a bid. Furthermore, there are large transaction costs involved in searching & information costs. These costs include the searching for feasible projects and the assessment of the risks and return. Lastly, the preparing of the contract, setting up of the governance structures, and the monitoring of these contracts are also costs that the investors partly have to bear.

One can find proof for these claims by looking at the asset management costs of pension funds. These are costs related to the management and investment of the assets. In fact, this is just another word for transaction costs. For example, PMT mentions that asset management costs are the highest for the investment categories private equity and real estate & infrastructure (PMT, 2017). Furthermore, from the annual report of ABP, it becomes clear that asset management costs for infrastructure are about 1,56% (of the total invested assets), while on average this is only 0,64% (ABP, 2017b). These costs are directly deducted from the return one earns on an investment. The problem is that all these costs are transaction specific investments, also known as sunk costs. These costs can therefore not be recuperated when a project fails. These large transaction specific investments direct the parties to a more hierarchical structure, like an equity joint venture.

### *Frequency of exchange*

The frequency of the transaction is mainly about how often actors are involved in the same kind of project. Winch (2001) mentions that, because actors are constantly engaging in transactions with one another, the chances of opportunism decrease. Moreover, learning effects can cause actors to be more comfortable with the risks involved, lowering the required return. The frequency of exchange in infrastructure projects that are managed by a project finance form is mostly limited to a one-off exchange. The reason for this is that the project company that is set up, is mostly only set up for one specific project (Weber et al., 2016). Williamson (1985) mentions that a low frequency of exchange means that parties would go to a more hierarchy-like structure, mainly because the costs of setting up the governance structure and the specific investments are hard to recover in a low frequency of exchange situation.

### 4.3. Transactional attributes: uncertainty as a consequence of risk

As mentioned, Williamson proposed that the transaction specific investments create dependencies between the actors, which in turn create risks due to uncertainties involved in the demand (read: revenue generation) of the asset. As has been mentioned in section 3.4, uncertainty in a construction project is mainly about project complexity, stemming from the risks involved (Farajian & Cui, 2010; Müller, 2009). These make for a demand uncertainty for the investors, because more risks mean more chance that their investment will not generate revenue. This section will look at the risks for an investor in an infrastructure project. The various risks will be named, followed by a distinction of the risks per type of investment.

#### 4.3.1. Typical risks for investing in infrastructure

There are many different ways to typify and group the risks inherent to investment in infrastructure. The most important risks will be named in this section, along with a brief explanation. From a transaction cost perspective, the risks are separated in transaction risks and project risks. The most important risks from the viewpoint of investors when investing in infrastructure projects in the Netherlands include the following (Beeferman, 2008; Delmon, 2011; Inderst, 2010; OECD, 2014b; Sawant, 2011; Weber et al., 2016).

##### *Project risks*

###### *Construction risk*

This group of risks incorporates all of the risks related to the construction phase of the project. It encompasses various different forms of risks named in the literature, namely: planning, construction and completion risk, environmental risk, and force majeure risk (Inderst, 2010; OECD, 2014b; Weber et al., 2016). The reason why these are taken together is that all these risks are generally mitigated/allocated in the same way for pension funds. Furthermore, these risks are inherently only present in greenfield projects (Weber et al., 2016).

###### *Operational risk*

This group of risks encompasses all the risks that are present in the operational phase of an infrastructure asset. Some of the risks related to the construction phase are also present in the operational phase, namely environmental risk and force majeure risk. Other risks include the performance risk of the asset, supply risk (Weber et al., 2016), and asset management risk (Inderst, 2010). These risks are also present when investing in brownfield projects.

###### *Demand risk*

These risks include events that have an impact on the revenue generation of the asset. These include changes in demographics, changes in economic conditions in a country, lower than expected revenue, an increase in cost of production due to an increase in price of materials, and changes in demand (Beeferman, 2008; Weber et al., 2016). The demand risk in infrastructure projects can be highly determined by governmental opportunism from the transaction cost regulation theory. Many projects are dependent on the government for their revenue, for example because of availability payments or guarantees. When these are not given, risks exist that governments behave opportunistically.

###### *Leverage/interest rate risk*

As mentioned before, infrastructure projects are usually characterized by high leverage, i.e. a large debt/equity ratio. Over this debt, interest has to be paid. While infrastructure projects, including the payback period, might last for a few decades, commercial banks normally do not lend for periods of more than 10-12 years. This is why these debts require refinancing after a certain period of time. The corresponding risk is, therefore, that this refinancing can only be done with a higher interest rate. This can also be a problem when a variable interest rate is used for the loan period (Weber et al., 2016).

###### *Liquidity risk*

Liquidity is mainly a consequence of the fact that infrastructure projects are usually long-term commitments with the possibility of not being able to sell the asset and exchange it for liquid assets. This risk can actually be seen as an advantage for pension funds, as a premium is generally paid on illiquidity of an asset. Pension funds have long-term liabilities, and are therefore relatively comfortable with this illiquidity. Liquidity risks does vary considerably with the type of investment vehicle used (Beeferman, 2008).

### *Bidding risk*

Bidding risk reflects the risk related to the bidding process. Parties have to invest a significant amount of time and money in the bidding process. This investment is a sunk cost and will be lost when the bid is not won (Beeferman, 2008).

### *Transaction risks*

Transaction risks are risks that are described by the TCE and TCR literature. The distinction is made between transaction risks related to transactions involving private parties (governance risk) and those involving public bodies. The risks involving public bodies have been mentioned before and are closely related to the transaction cost regulation theory by Spiller (2013). Although the literature on private and pension fund investment in infrastructure mentions various definition and types of political risks, the typology of Spiller (2013) in the two different aforementioned categories is maintained. Furthermore, although risks related to governmental and third-party opportunism are also a sort of governance risk, because of their importance, they are treated separately. Both kinds of political risks are predominantly present in infrastructure projects where the revenue is (partly) depended on governmental support. The reason for this is that, in this case, the government is more involved and can therefore behave more opportunistically (Sawant, 2011).

Important to mention in this respect is the apparent criticality of the transaction risks. Sawant (2011) mentions that more than 50% of the downgrades in project finance debt are due to counterparty and governmental risk. Furthermore, Sawant (2011) mentions that the threat of holdup (risks related to counterparty opportunism) is one of most significant risks in infrastructure investing. Weber et al. (2016) mention that political and regulatory risks are the most critical ones, together with market risk. Lastly, a study by BLP/Preqin (2013) asked investors what they think is the biggest threat to infrastructure investment: 59.8% mentioned that “Government or regulatory interference – political risk” was the biggest threat (BLP/Preqin, 2013, p. 4).

### *Governance risk*

One of the foundations of the earlier mentioned TCE theory is that all contracts are unavoidably incomplete (Williamson, 1985). The specific risks deriving from this fact are governance risks. The essence of the main drivers of these kinds of risks have already been set out in section 3.2; because of bounded rationality and opportunism there are risk inherent to the exchange between parties. Governance risk is also mentioned in the literature as contract risk or counterparty risk (Beeferman, 2008; Inderst, 2010; Weber et al., 2016). More specifically, these risks include the inability of contracts to deal with changing circumstances during the project, inadequate allocation of risks, and disputes over price increases (Beeferman, 2008).

### *Risks related to governmental opportunism*

The risks grouped in this category are all the risks that are a consequence of opportunism by governments or governmental agencies. This also includes decentral public bodies like provinces and municipalities. There are multiple ways in which governments can behave opportunistically, some of which are already mentioned in section 3.3. Firstly, governments can change legislation that benefits them in certain ways (Beeferman, 2008). This can also include deregulation, nationalisation and expropriation (Sawant, 2011). Another way for governments to behave opportunistically is by not providing the private parties with the approvals, licenses or concessions that are necessary for the completion of the project (Weber et al., 2016). Lastly, an important political risk is that governments can force a renegotiation of the contracts and subsequently alter the financial arrangements (OECD, 2015b).

As mentioned in section 3.3.2, emerging economies are more susceptible to governmental opportunism, because their legal structures are not as well developed as in developed countries (Spiller, 2013). There is, however, also a significant risk of governmental opportunism in countries with a well-developed political and judiciary system. These risks are mainly the consequence of the different branches of government that are able to contest the decisions made by other public bodies. For example, when there exists a conflict of interest between a municipality and a provincial body, large risks of opportunism exist (Weber et al., 2016).

### *Risks related to third party opportunism*

The second category mentioned by Spiller (2013) is third party opportunism. These are also called social risks (Inderst, 2010; Weber et al., 2016). The essence of third-party opportunism is explained in section 3.3.3, the most important sources of third-party opportunism named in the literature are explained in more

detail in this section. This risk category is mainly the consequence of pressure groups that oppose the project (Inderst, 2010). There are various reasons why these third parties might oppose a project. Most importantly, they include environmental protection issues, noise pollution, or protection of culturally valuable sites (Weber et al., 2016, p. 278). The chances of these risks materialising are a consequence of multiple factors. On a project level, important factors are the size of the project, and whether the project is built in urban or politically sensitive areas. Large projects built in densely urbanized areas are more prone to third party opportunism (Weber et al., 2016). A more important factor in this respect has already been mentioned before. In more developed countries, there is a higher chance for third party opportunism due to the fact that politics is more susceptible to being contested by political opposition (Spiller, 2013).

**4.3.2. Uncertainty per type of investment**

The previous section showed that there is a wide variety of risks that influence the uncertainty for an investor. However, this uncertainty varies widely by the type of investment that is made. Figure 16 shows the risk-return characteristics of different types of investments.

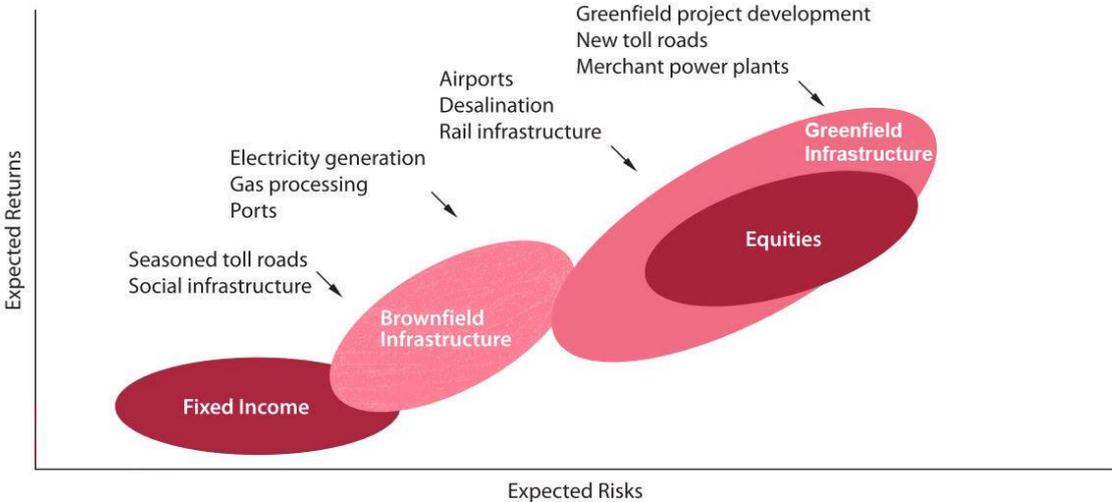


Figure 17: Risk-return characteristics of different types of investment (Adapted from Inderst, 2010)

What is important to note is the difference in risk and return of brownfield and greenfield investments. Because brownfield investments do not bear the risks related to the construction phase of the project, as well as some other risks related to that phase, the total risk is significantly lower. Correspondingly, the returns that investors earn on those projects is also lower. Apart from the phase of investment, different investment channels possess different levels of risk. The main investment vehicles with their risk characteristics are shown in Figure 18.

		Capital requirement, political and regulatory risk	
		Direct	Indirect
Time horizon, liquidity risk	Unlisted	Direct investments (PPP; project finance)	Unlisted infrastructure funds
	Listed	Stocks; bonds	Listed infrastructure funds; indexes

Figure 18: Investment vehicles and their risk characteristics (Adapted from Bitsch, Buchner, & Kaserer, 2010)

Direct investment in infrastructure projects inherently possesses the largest liquidity risk. Furthermore, the investments required to participate in PPP's and project finance are usually very high. These high capital requirements imply a large amount of sunk costs, which on their turn increase the risk of governmental

opportunism and governance risk (see section 3.3). The liquidity risk is substantially lower when investing in listed funds or stocks. The reason for this is that these securities can be traded publicly. These funds also tend to have lower political risks, since diversifying is easier because of the lower capital requirements. Unlisted funds possess the same characteristic in terms of capital requirements, but the liquidity risk is higher, since there is no easy way to get rid of the assets (Inderst, 2010). When looking at the different types of bonds, project bonds are more risky than corporate bonds, because they are generally less diversified (OECD, 2015b).

#### 4.3.3. Risk mitigation for investors

The named risks in this section are not all equivalently important for investors. It very much depends on the type of risk whether these pose extra uncertainties. Different risks can, namely, be mitigated in various different ways. Risk mitigation can either be done by reducing the probability of a risk or the severity of loss when the risk materializes. On the other hand, incentives can provide an increase in the forecasted return, which can compensate for the risk (OECD, 2015b). In this section the different risk mitigation, allocation, and incentive tools that exist to lower the risk incurred in a project are evaluated.

For many project related risks, the main allocation approach is by using non-financial contracts (OECD, 2014b). This is based on the principle that the party best suitable to manage a certain risk, should be allocated that risk. For project related risks, these parties are usually the parties that also construct and operate the project. For example, the construction risks related to an infrastructure project can be mitigated by using turnkey (EPC) contracts. This way, the construction risk is shifted to the EPC contractor, who is best able to manage the construction risk. This can also be done for the operation & maintenance risk, by shifting this risk to the O&M contractor (OECD, 2014b). The main way to mitigate the governance challenges relating to complex transactions in PPP projects has already been described in section 3.4. This mainly includes aligning the governance structure to the transaction and writing complex contracts. Yet, as mentioned before, Williamson (1985) says that “all contracts are unavoidably incomplete”, meaning these risks can never be fully mitigated for investors.

Government intervention can also be employed to mitigate risks. Historically, government intervention was mainly applied in emerging economies to enhance infrastructure development (OECD, 2015b). However, because of the apparent infrastructure gap, there are an increasing amount of initiatives in developed countries as well, where governments mitigate risks to stimulate private investment. The main goal of these government interventions has been to promote direct institutional investment in infrastructure projects (Hellowell, Vecchi, & Caselli, 2015). A couple of types of government intervention can be distinguished. Firstly, governments can provide public guarantees that guard against demand risk (OECD, 2015b). This way, the government provides minimum revenue to the project company. One example where this is done is via the availability payments in certain PPP contracts. Secondly, governments can provide guarantees in case of default or refinancing (Hellowell et al., 2015). Thirdly, governments can provide insurances to protect against certain risks (OECD, 2015b). While these interventions have been aimed at mitigating demand and default risks, governments can also play a big role in mitigating risks related to governmental opportunism. By co-investing in projects, and acting as first investor, governments show their commitment to the project and their trust in the viability (OECD, 2015b).

From the identification of the risks and mitigation tools it has become clear that there are certain risks which are more important for pension funds than others, mainly because some risks are harder to mitigate. For example, construction risks can be mitigated by allocating them to contractors. On the contrary, governance and political risks are especially hard to mitigate without making excessive transaction costs. Demand risk is only a problem when the state does not guarantee offtake. This guaranteed offtake is only present in certain infrastructure projects.

One can conclude that the uncertainty when investing in infrastructure is high due to the various risks involved. The risk that the investor takes, however, very much depends on the type of investment that is made; with brownfield projects being considerably less risky than greenfield projects (in general). This of course also impacts the return that is made on the investment.

#### 4.4. Transactional attributes: the institutional environment

The TCR theory described in section 3.3 has different implications in different countries (Spiller, 2013). Spiller (2013) mentions that governmental opportunism particularly thrives in a country with a centralized political environment, while third party opportunism thrives in a country with a fragmented political environment (because interest groups have a larger influence on politics). The Netherlands is relatively decentralised, with a central government being smaller than EU average (while the EU is already significantly above average decentralized) (CBS, 2011). This has two implications for the political risks involved. The first one has already been mentioned. Because of the fragmented political environment, third parties have more influence on politics, increasing the risk of third-party opportunism. This is also called social risk (Weber et al., 2016). Secondly, because of the fragmented political environment, there is also an increase in governmental opportunism. These risks are mainly the consequence of the different branches of government that are able to contest the decisions made by other public bodies (Weber et al., 2016). Furthermore, in the Netherlands, many different institutions, procedures and laws exist that can contest the decision to initiate infrastructure projects. Examples of these are procedures like the spatial planning act, the land-use plan, the building decree, and the environmental impact assessment. Examples of institutions and layers of governments that can contest each other are the ministry of infrastructure, the cabinet, provincial and municipal bodies, building aesthetics supervision, municipal councils, and the local building control. Apart from this, there are EU institutions which can also exert influence on the project (Hobma & Jong, 2015). Concludingly, there are many different ways where governments and third-parties can cause delays.

Another problem in the Netherlands is the way of developing infrastructure. At the national level these plans are made, which then have to be executed on municipal/local level (Hobma & Jong, 2015). A perfect example of this in the Netherlands is the case of the A4 between the Hague and Rotterdam. Although the central government of the Netherlands approved the plan of extending the highway, the local municipality of Voorburg resisted. The main reason for this was that, according to them, the residents would suffer in various ways from the development of the highway. Eventually, after large delays and cost overruns, the project was completed (Klijn, 2009).

#### 4.5. Conclusion

In chapter 3, the focus was to describe the theoretical view, using the TCE/TCR literature. The theoretical framework has taught us to focus on the governance structures and transactional attributes. This chapter has applied these theories on the transaction that characterizes investment in an infrastructure project. This has been done by first describing what governance structures are used when investing in infrastructure. Subsequently, the transactional attributes have been described that characterize the transaction of investing in infrastructure. This conclusion focusses on the implications these findings have regarding the investment in infrastructure projects.

To apply the theory on investments in infrastructure, some analogies had to be made. Originally, the TCE theory aimed at describing the governance choices that firms made, based on the asset specificity, uncertainty, and frequency of transactions (Williamson, 1985). Essentially, the investments in asset specificity creates dependencies between actors, which causes risks due to the demand uncertainty of the transaction. This makes actors inclined to move towards a more hierarchical governance structure, which gives them more control over the other actors and aligns the incentives. When this is not done, large transaction costs have to be made to mitigate the uncertainties of the transaction. However, as Williamson stated, all contracts are unavoidably incomplete. This means actors can never fully mitigate the uncertainties of a transaction. The combination of transaction costs and uncertainties then determine whether actors will choose to engage in the transaction. How these variables play out when investing, is summarized below.

##### *Governance structures*

For private investors to be involved in infrastructure, it (virtually) always requires some kind of PPP. There are multiple investment channels that investors can use to be involved in this form of cooperation. The most important ones are direct investment in projects, unlisted equity funds, and providing debt via project bonds. In all three types of investment channels, the money is eventually channelled into an infrastructure project via a project financing structure. In this project financing structure, investors (possibly by co-investing with other investors) provide equity or debt for a project, while other actors take care of the

construction, operation, and maintenance. In most cases, the investors form an equity joint venture with the other financial investors of the project. The non-financial contractors and the public party are mostly governed via concession contracts or contractual agreements, which depicts, overall, a hybrid form of governance and leaves room for (political) opportunism.

*Transactional attributes*

When investing in an infrastructure project, the money invested and the corresponding transaction costs create the dependency between the actors. The actual amount of dependency that is created depends very much on the moment where the investment is made (greenfield or brownfield). The aforementioned demand uncertainty is caused by the risks inherent to the specific project. These risks cause uncertainty in the eventual revenue of the project, causing investors to possibly lose their investment. The institutional environment adds an extra dimension to this by incorporating the specific risks of public-private transactions. In the Netherlands, the institutional environment is relatively decentralised, which heightens the chances of third-party opportunism, as well as the chances of different governmental institutions contesting each other. These specific hazards add additional uncertainty to the transaction.

The conclusion that one can draw about investing in infrastructure from a transaction cost perspective is the following. For investors, the asset specificity and uncertainties of the typical transaction of investing in an infrastructure project are high. The complex governance structures used in infrastructure projects are a way for the actors to cope with these uncertainties and transaction specific investments. According to the theory, the investors would try to move to a more hierarchical structure, which gives them more control over the other actors and provides for incentive alignment. Direct investment in projects and the corresponding equity joint venture that is mostly a result of this, seems a way to attempt this. Although this is a way to move towards a more hierarchical governance structure, it is as far as they can go. In most situations, the non-financial contractors and the public actors are still governed by contractual relations, which leaves the room for (political) opportunism. Especially because of the decentralized environment in the Netherlands, large risks for third party and governmental opportunism exist. This is fuelled by the fact that in most mobility infrastructure projects, the investors are dependent on the government for their revenue streams. This causes additional uncertainties in the transaction between the actors and large transaction costs have to be made to mitigate these uncertainties.

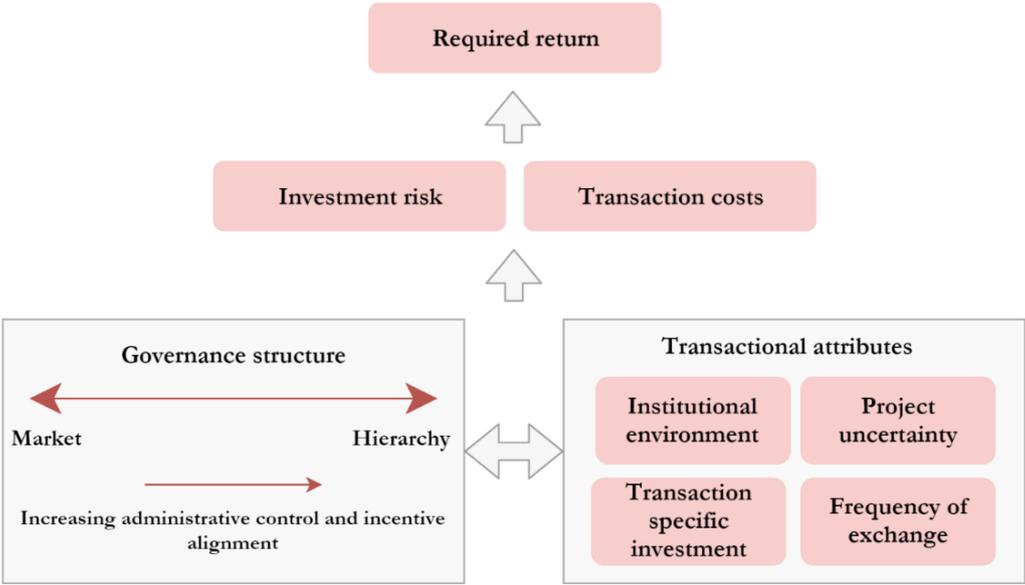


Figure 19: Transactional framework to determine investment risk and required return

One can use this analysis to describe investment choices between certain types of investment that pension funds can make (distinguishing between the investment risks and transaction costs of investments). What is special about investing (compared to other transactions), is that the decision to engage in a transaction is not solely determined by the risk of the endeavour. This is because the risks can be offset by an appropriate return (Figure 19). However, when these returns cannot be provided or earned, the investors will be reluctant to invest in the project and will look for other investment opportunities. Apart from this, investors might prefer to engage into investments where less transaction costs have to be made to mitigate the uncertainties.

This means two important focal points can be distinguished from this analysis that provide the direction for the remainder of the research. Firstly, there is the willingness of investors to take the aforementioned risks and transaction costs. Secondly, there is the ability and willingness of governments to supply the required return. This conclusion also strokes with the conclusions about the infrastructure gap in section 1.2.1. These two topics will be discussed in the subsequent chapters by analysing the investor characteristics (Chapter 5 and 6) and by analysing the light rail case (Chapter 7). Together, these form the analysis of the infrastructure gap.

## 5. Pension fund investment characteristics

In the previous chapter, the focus was on how investors are involved in infrastructure projects. From a transaction cost perspective, characteristics of the transaction between investors and infrastructure projects have been identified. However, pension funds possess certain characteristics that differentiate them from other types of actors. This changes the applicability of the transaction cost theories. This chapter will explore this by looking at what specific characteristics distinguish pension funds from other investors. First, the general characteristics of pension funds are explained. This is followed by an identification of the investment management principles by pension funds.

### 5.1. Principles

Before one can determine the investment strategies of pension funds, one has to understand the principles of why these pension funds exist and invest in the first place. Furthermore, the type of pension system also has influence on the investment strategy. This section will describe the principles of pension funds, as well as take a more detailed look at the situation in the Netherlands.

#### 5.1.1. The necessity of pension funds

Pensions are generally needed to make sure that people of old age, who are not capable of working and, therefore, not capable of providing themselves with income can be provided with basic human needs (Sullivan, 2004). The total pension that a person receives when he retires can consist of multiple different parts, including public schemes (in the Netherlands called AOW), obligatory publicly mandated pension schemes, and private retirement savings (Musalem & Palacios, 2003). The public schemes are a pay-as-you-go system, meaning that the funds are directly transferred between the present working class and the retired population (Tonks, 2006). The two other forms are built up of savings by the people, which is managed by pension funds. De Nederlandsche Bank (2014, p. 1) gives the following definition of pension funds: “A pension fund is a legal entity which receives and manages funds for at least two members, deferred members or their surviving dependants for the administration of a least a basic pension scheme”. What this means is that the pension funds manages the assets for a person that saves for their pension either voluntarily or because of a mandatory public pension scheme (Musalem & Palacios, 2003).

Pensions can generally be separated in two main categories: Defined Benefit (DB) and Defined Contribution (DC) (Tonks, 2006). A DB scheme is characterized by fixed benefits but variable contributions, whereas DC schemes require fixed contributions with variable benefits (Franzen, 2010). Due to the long-term and illiquid nature of pension fund assets, there is always a risk for pensioners that the fund underperforms and the pensioner receives less pension (Sullivan, 2004). The pension fund tries to minimize this risk by investing the savings of its beneficiaries.

#### 5.1.2. Pension system in the Netherlands

The Dutch pension system consists of three main pillars, corresponding to the aforementioned three pension schemes (CBS, 2015; Reichter, 2015; Rijksoverheid, 2018). The first one is the public pension scheme called AOW. This is a basic income that the Dutch government provides everyone above a certain age (currently around 67), regardless if this person worked in his life or not. The costs of this scheme are directly born by the Dutch working population (Reichter, 2015). The second pillar consists of collective pension schemes, which are managed by pension funds. These pension schemes are essentially savings by the Dutch working population. Although almost 90% of the working population in the Netherlands saves for their pension, they are not obliged to (Rijksoverheid, 2018). According to Dutch law, companies are obliged to outsource the management of the pensions to pension funds. These pension funds are not for profit organizations (Reichter, 2015). The third pillar consists of individual pension products that people in the Netherlands can buy, such as life insurances (Rijksoverheid, 2018).

The second pillar is the most important in this respect, as this second pillar is the reason why pension funds manage large sums of assets. The amount of pension funds that manage these assets has been steadily declining for years. At the end of 2014, there were 365 pension funds left in the Netherlands. The main cause of the decline is the fact that it is more difficult for smaller pension funds to bear the administration and transaction costs involved in the process (CBS, 2015). Although the amount of pension funds declines, the total amount of pension fund assets keeps on growing. The Netherlands is special in this respect, as it is the country with the most pension fund assets compared to its GDP. At the end of 2017, the total pension

fund assets in the Netherlands amounted to \$USD 1598 billion, which is 193.8% of their GDP (Willis Towers Watson, 2018). This means that the Netherlands is the country with the sixth largest pension fund capital in the world. Regarding the type of pension scheme in the Netherlands; 95% of the total pension schemes is of the DB type, while the remaining 5% is of the DC type. This is irregular compared to the average of the largest seven pension fund asset countries, where the percentages are 51% and 49% respectively (Willis Towers Watson, 2018).

### 5.1.3. Dutch pension funds

As mentioned, there are about 365 pension funds in the Netherlands. The largest pension funds, however, manage the bulk of the assets. As of 2018, the five biggest pension funds in the Netherlands are shown in Table 2.

Table 2: *Biggest pension funds in the Netherlands* (NOS, 2018b):

Pension fund	Number of participants	Total assets
<b>ABP</b>	2.900.000	€ 452,8 billion
<b>PFZW</b>	2.700.000	€ 197,2 billion
<b>PMT</b>	1.300.000	€ 71,8 billion
<b>bpfBouw</b>	773.000	€ 56,7 billion
<b>PME</b>	311.000	€ 46,9 billion

This means that the total amount of assets that the five biggest pension funds in the Netherlands manage is about €780 billion, some 52% of the total pension fund assets in the Netherlands. The pension funds employ different strategies than other investors to invest these assets. These strategies are explored in the next section.

## 5.2. Pension fund investment management

To distinguish pension funds from other types of investors, one has to look at their investment strategies. This section will take a look at this by analysing the fund managers who manage the investments. Subsequently, this section will explore in more detail what drives pension funds to make certain investments. It will be concluded by an exploration of the fit with infrastructure, as well as with a description of the institutional environment in the Netherlands concerning pension fund investment strategies.

### 5.2.1. Fund managers

The pension funds increase the chances of their beneficiaries actually getting their pension by investing the assets. Most of the big pension funds, however, outsource this to external fund managers. Table 3 shows the main fund managers in the Netherlands along with their main clients.

Table 3: *Pension fund asset managers in the Netherlands* (APG, 2017a; MN, 2017; PGGM, 2017):

Fund manager	Main client(s)	Number of participants	Total managed assets
<b>APG</b>	<b>ABP, bpfBouw, SPW, Pension fund cleaning and glass cleaning industries, PWRI, SPMS, PPF APG, Pension fund for the architectural firms</b>	4.527.000	€ 470.5 billion
<b>PGGM</b>	<b>PFZW, Pension fund for the general practitioners, SBSAG, SPSKN, SBPB</b>	3.000.000	€ 218,6 billion
<b>MN</b>	<b>PMT, PME, Pensioenfondsen voor de koopvaardij</b>	1.971.000	€ 129 billion

One can see that the five biggest pension funds in the Netherlands have their assets managed by three fund managers. These three fund managers manage the largest bulk of the Dutch pension fund assets. Together they manage about € 818 billion, which is about 55% of the total Dutch pension fund assets. The rest of

the pension fund assets is mostly managed by large fund managers abroad. Because these asset managers are the only big Dutch pension fund asset managers who are capable of investing in infrastructure, the focus will be on these ones. A more detailed look at these fund managers is taken in chapter 6.

As mentioned, the objective of these fund managers is to invest the assets on behalf of the pension funds. These pension funds, however, determine the main investment strategy. This includes the general amount of risk-aversiveness and the target allocations for different classes (ABP, 2017b). The next section will take a look at the main determinants for these strategies.

### 5.2.2. Distinctive characteristics of pension funds

Pension funds contain some distinctive features compared to other investors. These features separate them also in the investment choices they make. The distinctive features will be briefly discussed.

#### *Liabilities*

The objective of the fund managers, like other investors, is to maximize return with the lowest amount of risk (Tonks, 2006). This is achieved by investing in a diversified amount of assets that touches upon the frontier of efficient portfolios, i.e., the frontier where there is no option of reducing risk without reducing return (E. Davis, 2002). On this frontier, however, investors can choose the amount of risk one desires to take. This risk depends for a large extent on the liabilities that this investor possesses (E. Davis, 2002). Pension funds are guided by this liability driven investment strategy, which essentially means that their investment strategy is based on their liabilities (W. Li, Yao, & Ying, 2017). This is especially important in DB pension schemes, where the fund creates a liability against itself for the payment of the benefits to the beneficiaries (Fabozzi, 2009). This creates an additional risk for the pension funds, since they have to pay a fixed contribution to their beneficiaries, irrespective of the performance of their investments (Franzen, 2010). Concludingly, because the pension funds main (and only) focus is to provide an adequate pension to its beneficiaries, their investment strategy will be chosen in such a way that the chances are maximized that this objective will be achieved. As such, the nature of the liabilities has big consequences for the type of investments pension funds prefer to engage in.

#### *Risk*

As mentioned before, on the frontier of efficient portfolios, investors can choose the combination of risk and return they prefer. When investors desire a higher expected return, they will invest in more risky portfolios; when investors do not want to be exposed to substantial risk, they will expect a lower return. Pension funds will then choose for a strategy with an expected return that provides them with the necessary return that covers the liabilities, plus a comfortable surplus. The corresponding risk will, in most cases, be significantly lower than for various other types of investors (E. Davis, 2002).

There are essentially two contesting schools concerning the amount of risk pension funds should take (van Nunen, 2013). The first school claims that the amount of risk has to be chosen in such a way that the chances of underfunding are virtually zero. This is possible because pension funds can essentially invest all their capital in low risk/low return government bonds. In this case, the interest earned on these bonds will be just enough to meet the obligations. The other school says that pension funds should invest in higher return assets to decrease the amount of contributions that sponsors have to pay (van Nunen, 2013). In recent decades, pension funds have been investing according to the latter school (PwC, 2016). The amount of risk pension funds desire to take has not been particularly stable over time. This is especially shown in the distribution of assets pension funds invest in. A further explanation on this can be found in section 5.2.3.

#### *Long-term horizon*

Apart from this, the main difference between pension schemes and other types of investors is the long-term nature of the pension fund assets, which have to be held until retirement of the beneficiaries (Franzen, 2010). This makes pension funds especially interested in assets with a long-term nature. This appetite for long-term investments gives pension funds an advantage over other investors: because of the fact that the liabilities have such a long-term nature, pension funds are able to invest in assets that cannot be liquified on a short-term. These investments can provide pension funds with an illiquidity premium (PwC, 2016).

### *Size*

Pension funds are generally characterized by possessing large amount of assets compared to other investors (Weber et al., 2016). Because of this, they are predominantly looking for investments that are large enough for them to actually make a difference. This lowers the transaction costs per transaction. Pension funds are generally only investing in projects if they exceed a €100 million (Inderst, 2009). Although infrastructure projects generally have a large capital value, it still rules out plenty of otherwise attractive projects. The limited size of infrastructure projects is named as one of the main reasons why pension funds don't invest (enough) in the Netherlands (Wolzak, 2018). Apart from this, Gorter & Bikker (2011) mention that the size of a pension fund has an impact on the amount of risk it takes, with larger pension funds being less risk-averse.

### *Inflation*

One of the major risks for pension funds is inflation. Large inflation makes the assets that pension funds manage worth less. This is why pension funds seek to invest in projects that hedge against this inflation risk (PwC, 2016). Fund manager APG named inflation protection as its prime reason for investing in infrastructure (EPEC, 2010).

### **5.2.3. Asset allocation**

As mentioned, pension funds determine a target allocation for distinctive asset classes. This section will look at these different asset classes, as well as at the geographical location of the investments. There are essentially three main asset classes: equity, fixed income/bonds, and alternatives. These asset classes differ in their volatility and return. Pension funds generally invest in different asset classes and in different geographical areas because of diversification (PwC, 2016). A short description of the asset classes will be given along with their main characteristics. An overview of the expected return and volatility of the different asset classes is shown in Figure 20.

### *Equities*

Equity investments are characterized by high risk/high return, i.e., a high volatility (Franzen, 2010). This is initially a problem for pension funds, since they do not want to carry high risks. The reason why this asset class is still attractive for pension funds is because over the long-term equities tend to have a mean-reverting character (Spierdijk & Bikker, 2012). This means that, while equities can be volatile in the short-term, over the long-term, equities tend to revolve around a mean. This makes it less risky for investors with a long-term perspective (E. Davis, 2002).

### *Fixed income/bonds*

This asset class is characterized by low risk/low return. It mainly consists of corporate and government bonds, which carry a low return, but have a fairly certain nature. Pension funds can use these bonds to match their assets with their liabilities, and lower the risk of the total portfolio (E. Davis, 2002). The return that investors earn on the bonds is closely linked to the average interest rate in the world, which brings with it an interest rate risk (PwC, 2016).

### *Alternatives*

Alternative assets include, among others, hedge funds, private equity, real estate, infrastructure, commodities, and natural resources. (Willis Towers Watson, 2017). Alternative investments are characterized by higher returns, but with a volatility that is mostly lower than the stock market. One of the advantages of alternative assets is that they are less correlated with market fluctuations, which can help in diversifying for pension funds (PwC, 2016). Especially the potential for many different assets in many different geographically oriented situations can significantly diversify a portfolio consisting of only bonds and equities.

### *Infrastructure*

As mentioned, infrastructure is generally part of the alternative class of investments. It does, however, have characteristics that vary widely from that class (Kavanagh & Keevers, 2009). Kavanagh & Keevers (2009) mention that only certain types of infrastructure are suitable for long-term investors; they call this preferred

infrastructure. A more detailed look on why infrastructure can be suitable for long-term investors can be found in section 5.2.4.

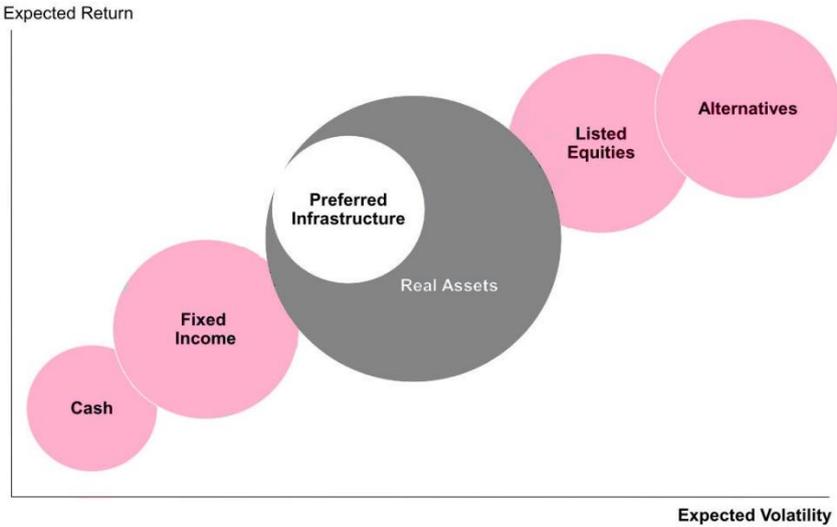


Figure 20: Expected return and volatility of different asset classes (adapted from Kavanagh & Keever, 2009)

Traditionally, pension funds always invested mainly in fixed income assets like government bonds and securities (PwC, 2016). This has changed during the past decades. In the 1990s, the strong economy made sure that pension funds started investing heavily in equities. However, the dot-com bubble in the early 2000s and the subsequent recession caused funding and solvency problems for pension funds, as well as the rise of liabilities due to a decrease in interest rates (Inderst, 2009). At this point, pension funds realized that they were not as protected against market volatility, interest rate risks, and inflation as they thought they were. Furthermore, the financial crisis of 2008 caused the yield of government bonds to decrease, which led to a further withdraw from this asset class. Consequently, alternative asset classes were getting increasingly attractive for pension funds (PwC, 2016). Figure 21 shows the asset allocation of pension funds in the different asset classes from 2009-2014, where one can see a decrease in fixed income assets, and an increase in alternative assets.

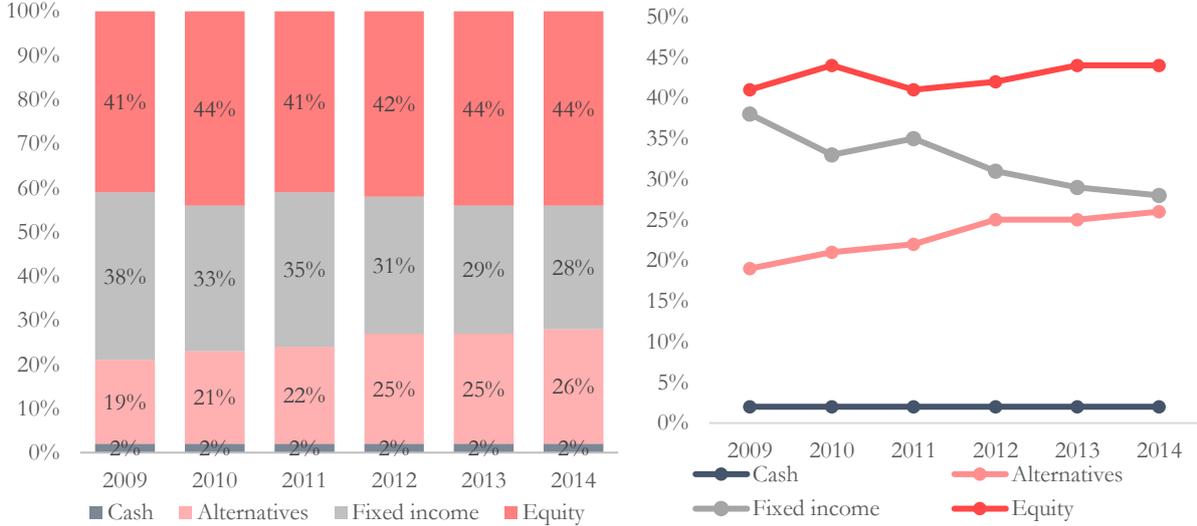


Figure 21: Asset allocation of pension funds 2009-2014 (Adapted from PwC, 2016)

Because of the difference in risk/return characteristics of the different asset classes, the mix of equities, bonds and alternatives is a good indicator for the amount of risk pension funds desire to take. Figure 22 shows the asset allocation mix of the seven biggest countries in terms of pension fund capital in 2017.

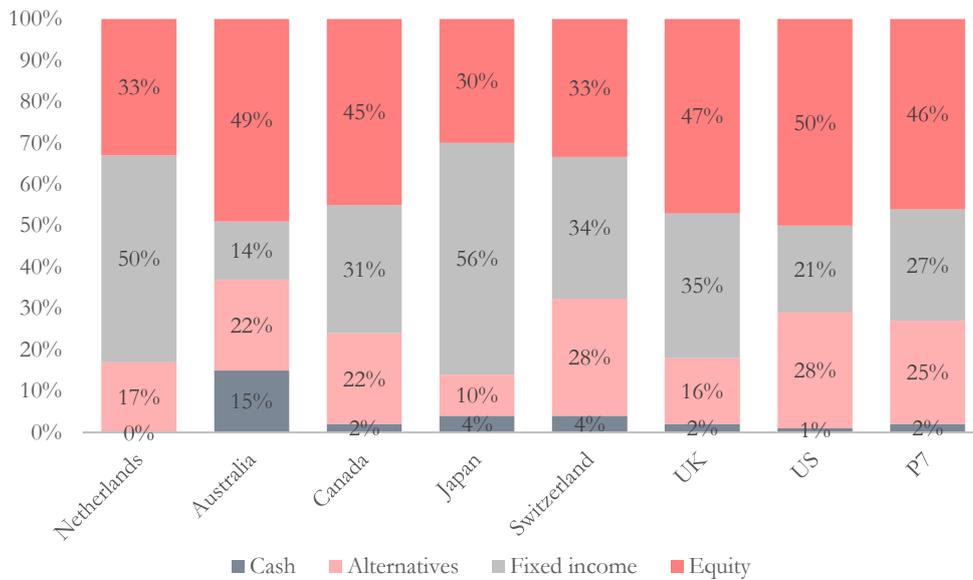


Figure 22: Asset allocation mix of the 7 biggest countries in terms of pension fund capital, 2017 (Adapted from Willis Towers Watson, 2018)

One can see that the pension funds in the Netherlands apply a relatively risk-averse investment strategy, as only Japan has a higher bond allocation. Furthermore, the average bond allocation of all seven countries is 27%, while the bond allocation in the Netherlands is 50%.

Apart from diversifying in asset class, pension funds can also diversify geographically. Because of the large amount of assets that the pension funds manage, pension funds are able to invest virtually everywhere in the world. The amount of investments that pension funds make abroad, depends on factors as currency fluctuation, inflation, and local market conditions (PwC, 2016). In countries with a stable economic situation, pension funds invest mainly because of the increased diversification and higher returns (OECD, 2017).

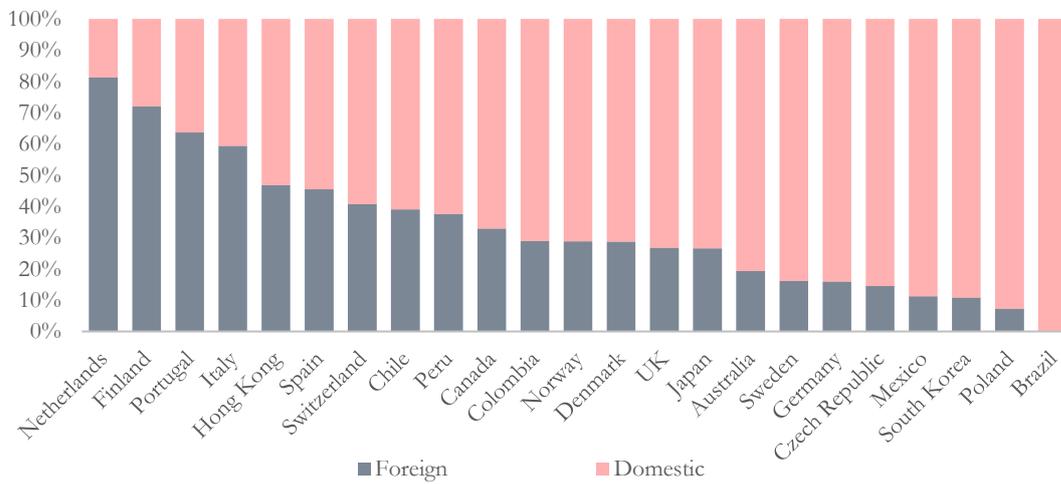


Figure 23: Percentage of investments made abroad by pension funds in 2016 (Adapted from OECD, 2017)

Figure 23 shows the percentage of investments made abroad by pension funds in different countries. One can see that the Netherlands is the country with (relatively) the most assets invested abroad.

One can conclude that there are two disadvantages for the Netherlands in terms of gaining investment from pension funds in infrastructure. Firstly, pension funds seem to be more risk averse in the Netherlands than in other countries. Secondly, Dutch pension funds invest significantly more of their capital abroad than their foreign colleagues.

#### 5.2.4. The fit with infrastructure

Now it has become clearer what the specific investment characteristics are of pension funds compared to other investors, one can draw conclusions on whether infrastructure is a good fit for investment by pension funds. One can distinguish various reasons on why this is the case. The following reasons are named (Beeferman, 2008; Bitsch et al., 2010; Della Croce, 2011; Inderst, 2010).

##### *Long-term nature of infrastructure assets*

As mentioned, one of the key distinctive characteristics of pension funds is that they possess long-term liabilities. This seems to provide a perfect fit with infrastructure projects, which typically have a duration of 25/30 years (Della Croce, 2011) and can last up to 99 years (Beeferman, 2008). However, Bitsch et al. (2010) tested the hypothesis that "on average, investors hold infrastructure investments for a longer period than non-infrastructure investments to mimic the long-term asset characteristic." (Bitsch et al., 2010, p. 111). They found no evidence for this, indicating that investors don't tend to hold on to infrastructure assets for their entire duration.

##### *Low correlation with market fluctuations*

In the literature it is mentioned that infrastructure assets can protect investors to market volatility (Beeferman, 2008; Inderst, 2010). The most important reason they mention for this is that, because of the fundamental function in society, demand is relatively uncorrelated with economic cycles (Weber et al., 2016). However, while this might be the case for some infrastructure sectors, Bitsch et al. (2010) proved that this is certainly not the case for all. They tested the aforementioned claim and found no evidence for general infrastructure investments. However, when, for example, availability contracts are used with guaranteed payment by the government, there is certainly protection against this market risk (OECD, 2014b).

##### *Stable and predictable cash flows*

Infrastructure investments are said to have stable and predictable cash flows (Della Croce, 2011; Weber et al., 2016). This is also linked to inflation protection and low volatility. Again, Bitsch et al. (2010) tested this hypothesis and again, they find no significant evidence of this. However, this also depends on the kind of infrastructure investment. Bitsch et al. (2010) looked at infrastructure in general, while one can quite certainly claim that certain types of infrastructure possess relative predictable cash flows. As mentioned, certain types of contract can hedge against inflation and demand risk, which then provide more stable and predictable cash flows. An example of this are the availability payment-based contract forms used in the Netherlands.

##### *Inflation protection*

It was already mentioned in this chapter that inflation risk is one of the key risks for pension funds. In order to hedge against this risk, pension funds are looking for investments that are linked to inflation (Della Croce, 2011). Infrastructure can be a perfect hedge against inflation, because the cash flows deriving from the investments are often inflation linked (Beeferman, 2008). This can be achieved by linking fees to inflation or by incorporating inflation linked availability payments into contracts (OECD, 2014b).

##### *Low default rates*

It is mentioned that infrastructure possesses low default rates (Inderst, 2010). Bitsch et al. (2010) tested the hypothesis that infrastructure inherently is a low risk/low return investment. They found two important results. Firstly, they found that there is evidence that default risk is significantly lower in infrastructure investments compared to other investments. Secondly, they found that infrastructure actually provides higher average returns than other investments. These results show some significant advantages for infrastructure investment.

##### *Socially responsible investing*

A special kind of characteristic inherent to infrastructure is the special place it takes in societies. Infrastructure plays a key role in the economic development of a country, as well as in meeting the social and environmental challenges that the world faces (Weber et al., 2016). The notion of socially responsible investing is becoming an increasingly important topic for pension funds: all fund managers named in this

chapter have socially responsible investing stated as one of their key objectives (APG, 2017a; MN, 2017; PGGM, 2017). As pension funds are increasingly incorporating sustainability and social responsibilities in their investment policies, this impacts the kind of investments they make (Apostolakis, Kraanen, & van Dijk, 2016). A good example of this is the recent pull back from the tobacco and nuclear weapons industry by pension fund ABP in the Netherlands (NOS, 2018a). Furthermore, PGGM installed an ethical advisement team that advises the investors on climate change, human rights, and the arms industry (OECD, 2011).

Another part of socially responsible investing that is named a lot in the Netherlands is how pension funds can contribute to economic development at home (NOS, 2017). As mentioned before, the Dutch pension funds are the world's leader in foreign investments. This means that a lot of the capital that can be used for economic development in the Netherlands is spend abroad. Governments in the Netherlands (in this case Rutte III) already named in the coalition agreement that pension funds are one of the key players in helping with sustainable development and the energy transition (NOS, 2017). Furthermore, in 2017, the then minister of economic development, Henk Kamp, specifically asked the pension funds to invest more in the Netherlands (Wolzak, 2018). Again, all fund managers name investments in the Netherlands as a key objective (APG, 2017a; MN, 2017; PGGM, 2017). However, they also mention that investing in the Netherlands is always a goal that is subjective to getting an appropriate return on their assets (NOS, 2017).

It was already named and again proved in this section that certain types of infrastructure can be more attractive to pension funds than others. Keating (2014) particularly mentions that preferred infrastructure is mainly characterized by monopoly like characteristics (meaning that companies have control over prices), a regulated return, and inflation protected payments/fees (Keating, 2014, p. 7). Kavanagh & Keevers (2009) mention that preferred infrastructure is characterized by being in a developed market and containing some kind of revenue certainty.

Until now, an identification has been done on the investment decisions made by pension funds themselves. The last section will focus on the influence legislation can exert on the investment decisions of pension funds in the Netherlands.

#### **5.2.5. Legislation concerning investments of pension funds in the Netherlands**

In many countries, the investment management of pension funds is largely influenced by legislation that determines where and in what manner pension funds are allowed to invest (Inderst, 2009). When looking at the legislation aimed at investment of pension funds in the Netherlands, one can conclude that there are virtually none. The Netherlands is one of the few countries where there are virtually no regulations concerning what pension funds are allowed to invest (PwC, 2016). The reason for this is that Dutch pension funds have a well-established track record in effectively managing their assets (Inderst, 2009). The only rule that applies to pension fund investors stems from the European Union. This rule is called the prudent person rule, which states that pension funds have to invest in the interest of their beneficiaries (Kellermann & Kreuk, 2012). Furthermore, the prudent person rule inhibits that pension funds should invest in a diversified manner (van Nunen, 2013).

The pension funds are, however, under supervision by De Nederlandsche Bank (DNB). DNB looks at the financial position of the pension funds and judges whether they will be able to comply with their liabilities in the future. According to Dutch law, pension funds have to have a minimum funding level of 105% of the liabilities (Reichter, 2015). Apart from this, additional buffers are required for certain asset classes (van Nunen, 2013).

### **5.3. Conclusion**

The purpose of this chapter was to determine the inherent characteristics of pension funds that distinguish them from other investors. This chapter tried to answer the sub-question: *What are the specific characteristics of pension funds compared to other investors that influence the decision to invest in an infrastructure project?* From the literature review in this chapter, a couple of things have become clear.

The most distinct characteristic of pension funds compared to other investors is their liability driven investment strategy, which means that the pension funds invest in projects with due regard to the liabilities they possess. This has the following consequences for the investment strategy:

- Focus on the long-term;
- More risk-averse than the average investor;

- Appetite for stable cash flows;
- Focus on inflation protection;
- Focus on large capital value investments.

When looking at the asset allocation of pension funds, one can conclude a couple of things. Firstly, pension funds increasingly invest in alternative assets. This is especially due to the low interest rate and subsequent low returns on fixed income assets. Secondly, Dutch pension funds seem to be more risk averse than their foreign colleagues, as they invest a relatively large amount in fixed income assets. Lastly, Dutch pension funds are the world leader in investing abroad. This seems to be pointing to the fact (as well as proving the claims made in the introduction) that there are possibilities with Dutch pension funds to invest more in infrastructure in the Netherlands.

In this chapter, the main reasons have been identified why infrastructure projects are a good fit for pension funds. The most important ones being: the long-term nature, low correlation with market fluctuations, stable and predictable cash flows, inflation protection, and socially responsible investing. Although these factors are the main reasons why pension funds would invest in infrastructure projects, it has been shown that these factors are certainly not always present and depend on the type of infrastructure project and/or payment structure that characterizes the project. A last factor that has been identified in this chapter is the fact that pension funds are having an increasing regard for socially responsible investing. Apart from the investment risks and transaction costs identified in the previous chapter, these factors also influence the decision whether to invest in an infrastructure project, or to allocate money into other asset classes with a different risk and return (Figure 24).

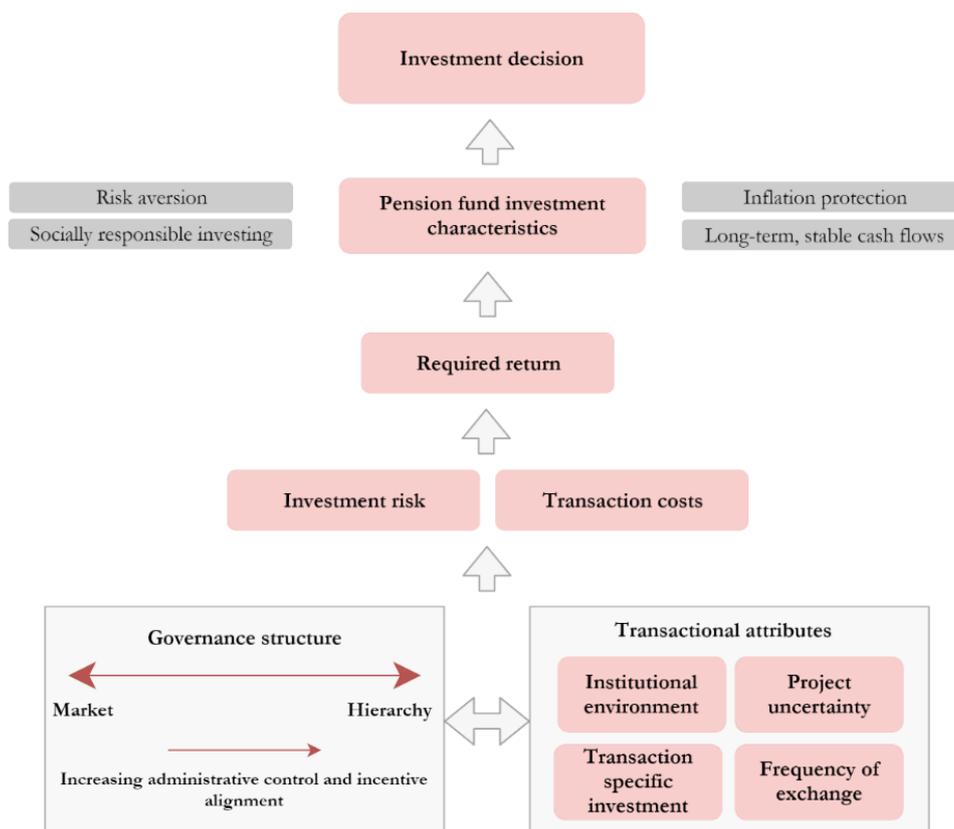


Figure 24: Identified factors that influence the investment decision

## 6. Conclusion on the barriers of investment

The previous chapters have looked at the problem in different ways. Chapter 3 explored the theoretical framework to develop a theoretical perspective on the problem. This is subsequently followed by an examination of the current involvement of investors in infrastructure, including an assessment of the inherent risks involved in chapter 4. Chapter 5 has focused on the specific investment characteristics that distinguish pension funds from other types of investors. This chapter will draw a conclusion to give an answer to the sub-question: *What conclusion can be formulated about the barriers of investment in infrastructure by pension funds?* First, the conclusion will be drawn on the basis of the literature study of the previous chapters. This will be followed by the results from the interviews that have been conducted. The last section will combine these conclusions to give an answer to the posed sub-question.

### 6.1. Theoretical view

From a theoretical view, the factors have been distinguished that influence the investment decision by investors. In this theoretical view, the investment risks and transaction costs are determined by looking at the transactional attributes and governance structures of the transaction. Moreover, this has been combined by a study on the investment characteristics of pension funds. The combination of these factors determines whether pension funds are willing to invest in infrastructure projects. This is also what can give the tension: on the one hand, the misalignment of transactional attributes and governance structure, in combination with large uncertainties and transaction specific investments, can make sure that investors are exposed to high risks in infrastructure projects. Although this can be offset by a higher return, pension funds generally do not want to engage in high risk, high return projects. They will then choose investments that contain lower risk-lower return characteristics, like buying existing assets. On the other hand, there is the problem that in typical mobility infrastructure projects governments have to provide much of the revenue streams. When investors require high returns (because of the high risks involved), the total cost of the project rises for the government. This can pose problems due to budget constraints. A lot of the projects might then eventually not be executed at all.

The combination of these characteristics is tested by performing interviews with pension funds. It is checked whether these factors are actually the largest influence on investment decisions by investors. Moreover, it is checked whether the claims that have been made about the investor characteristics are true.

### 6.2. Interviews

In this section, the interviewees will be introduced, followed by a presentation of the most important results. In the next section the conclusion will be revised on the basis of these results.

#### 6.2.1. The interviewees

It has already been mentioned that the assets that the pension funds possess are managed by fund managers. These fund managers invest the assets, but do this with specific directions from the pension funds. ABP, for example, says that its fund manager APG can deviate from the strategic weightings for each asset category (i.e. how much they are supposed to invest in each asset category), as long as it makes a positive contribution to the result (APG, 2016). In other words, the pension funds determine the investment plan, while the fund managers eventually determine where is actually invested in. Therefore, the asset managers have been interviewed. These are the three fund managers mentioned in section 5.2.1: MN, PGGM and APG. For each fund manager, there will a short review on their key figures to get a better view on their investment plans. Moreover, by looking at the investment strategies of their key customers (which are then the pension funds mentioned in section 5.1.2), one gains more insights in the possibilities for investing in infrastructure.

#### *MN*

As mentioned before, MN manages the assets of a number of pension funds, of which the most important are PMT and PME (Table 4). In total, MN manages €129 billion, almost exclusively consisting of the two aforementioned pension funds.

Table 4: Key figures infrastructure investment PMT and PME (PME, 2017; PMT, 2017)

	PMT	PME
<b>Total invested assets</b>	€ 71.812 billion	€ 46.962 billion
<b>Target allocation infrastructure</b>	Not given	0.9 %
<b>Actual allocation</b>	€ 470.000.000	€ 684.000.000
<b>Actual allocation (%)</b>	0.66%	< 1.45% (incl. forestry)
<b>Avg. ROI Infrastructure</b>	4.1%	13.1%

Both pension funds target a surplus return of 1.5%. This means that the total return on the assets has to be 1.5% higher than the expected relative change of the assets (PME, 2017; PMT, 2017). To reach this goal, both pension funds divide their portfolio into matching assets and return assets. The matching portfolio of assets contains relatively low risk assets that rise in value when interest drops (fixed income assets), while the return portfolio contains assets with a relative high risk (equities and alternative assets). The ratio of these two portfolios provides an indication of the risk-aversion of the pension funds (just as has been shown for different countries in section 5.2.3). The allocation mixes of the biggest pension funds in the Netherlands are shown in Figure 25 (ABP, 2017b; Bpfbouw, 2017; PFZW, 2017; PME, 2017; PMT, 2017). One can see that both pension funds are relatively risk-averse compared to the other pension funds. This might also be related to the size of the pension funds. As mentioned before, smaller pension funds tend to be more risk-averse (Gorter & Bikker, 2011).

MN does not invest directly in infrastructure projects. A possible reason for this is that MN is a smaller fund manager compared to PGGM and APG. This means that it is harder for them to bear the costs of investing in infrastructure. Possibly, the in-house expertise that is needed to invest directly in infrastructure might not be available. The ways of investing in infrastructure is one of the topics in the interview.

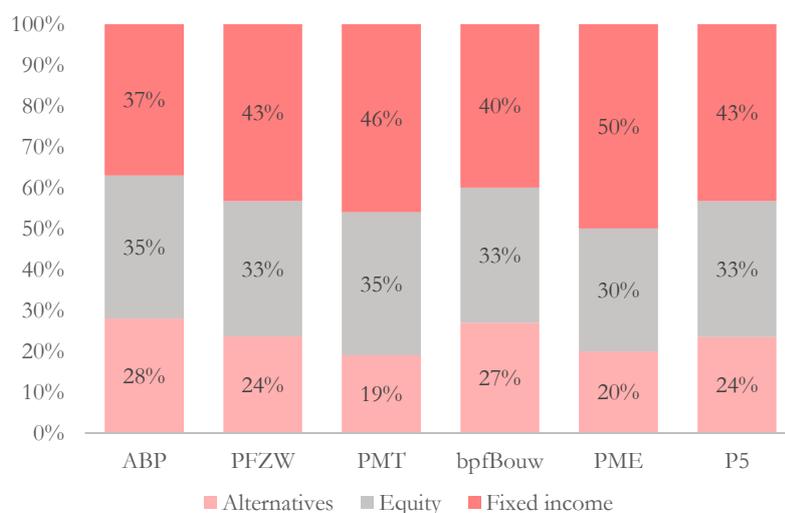


Figure 25: Asset allocation mix pension funds in the Netherlands

### PGGM

PGGM started to invest in infrastructure in 2005, when the focus was on indirect investment. Over the years, this focus has shifted more to direct investment (OECD, 2011). OECD (2011) mentions that PGGM and APG are one of the only European institutional investors who have the in-house expertise to invest directly into infrastructure projects. Currently, PGGM mentions that its infrastructure team is growing to rely less on external investment partners. By increasing the in-house expertise, investing directly in infrastructure is more transparent and requires less fees paid to external partners (PGGM, 2017).

As mentioned before, one of the key aspects of PGGM is their joint-venture with BAM PPP. In 2016, PGGM committed €620 million to this joint venture. This capital is used to invest directly in projects, in order to lower the transaction costs for the fund manager. In the Netherlands, the joint venture has invested in seven PPP projects to date (PGGM, 2016). Apart from this, PGGM plans to set up the PGGM infrastructure fund in 2019 to enhance investments in infrastructure (PGGM, 2017).

PGGM's main pension fund is PFZW (Table 5). In total, PGGM manages about €219 billion worth of assets for PFZW and a number of smaller pension funds. One can see that PFZW's allocation to infrastructure is significantly higher than the other pension funds. Of the total infrastructure investments, almost 75% is invested directly into projects. Of this allocation, almost 23% goes towards mobility infrastructure. Furthermore, the actual allocation to infrastructure has grown from 3.3% in 2016, to 3.8% in 2017 (PFZW, 2017).

Table 5: Key figures PFZW (PFZW, 2017)

	PFZW
<b>Total invested assets</b>	€ 197.2 billion
<b>Target allocation infrastructure</b>	5%
<b>Actual allocation</b>	€ 7.45 billion
<b>Actual allocation (%)</b>	3.8%
<b>Avg. ROI Infrastructure</b>	9.6%

### APG

APG first started to shift its focus to infrastructure in 2004, mainly because of diversification and inflation hedging reasons (OECD, 2011). As mentioned, APG developed the in-house expertise to invest directly into projects. Furthermore, in 2017, APG bought €700 million of 48 infrastructure projects from the Dutch Infrastructure Fund (DIF) (ABP, 2017a). APG manages the assets for several pension funds, among which are ABP and bpfBouw, shown in Table 6.

Table 6: Key figures ABP and bpfBouw (ABP, 2017b; BpfBouw, 2017)

	ABP	bpfBouw
<b>Total invested assets</b>	€ 452.8 billion	€ 52.483 billion
<b>Target allocation infrastructure</b>	3%	Not given
<b>Actual allocation</b>	€ 10.738 billion	€ 188.000.000
<b>Actual allocation (%)</b>	2.7%	0.4%
<b>Avg. ROI Infrastructure</b>	8.3%	10.9%

### Invest-NL

Invest-NL is going to be a governmentally founded investment bank that serves to stimulate investments in the Netherlands. Currently, the Nederlands Investerings Agentschap (NIA, Dutch Investment Agency) is still operational, but this will eventually become Invest-NL at the start of 2019 (Ministerie EZK, 2018). As mentioned before, Invest-NL has €2.5 billion of government funding at its disposal. An introduction will be given what the agency is planning to do with this money, which will serve as input for the interview.

As trigger for the foundation of the investment agency, the Ministry of EZK name several reasons. Firstly, because some projects are only desirable from a governmental perspective (since they solve social problems), they cannot gain financing by themselves. This form of market failure is a reason for governmental intervention. Secondly, because of the inherent political and regulatory uncertainty in many projects, private investors are hesitant to invest. By co-investing in projects, these risks can be allocated to the party that is most capable of handling these risks, namely: the government itself. Thirdly, there exist various failures of coordination between public and private parties. These can be solved by a governmental agency acting as advisor in the development of new projects. Lastly, an independent legal entity is needed to gain financing by institutions like the EIB, since they do not directly finance governments (Ministerie EZK, 2018).

Invest-NL serves many purposes. Important for this research are mainly the investment purpose and the development purpose, as described in the legislative proposal. The development purpose is described as the supporting of companies and initiatives (e.g. public-private partnerships), only if these contribute to some social transition or to the Dutch economy in general; this concerns both the start-up of innovative companies, as well as support with the initiation of certain projects (Ministerie EZK, 2018, p. 21). The Ministry distinguished four main tasks for the investment agency concerning the development purpose, namely (Ministerie EZK, 2018):

1. The accumulation of knowledge: doing research on financing needs and on market failure;
2. Advising and model development: performing research on financing instruments and the development of new financial instruments to contribute to more financing;
3. Analysis and vision development;
4. Knowledge alliances: the development of alliances with national and international institutions like the EIB.

On a more practical level, the ministry distinguishes mainly the tasks to advise on certain projects, to advise on meeting the criteria for the EIB/EFSD, as well as the inducement of co-investment possibilities. Important to mention is that the development purpose will not be funded by the aforementioned €2.5 billion, but by government subsidies.

The €2.5 billion is meant for the investment purpose of the investment agency. The investment purpose is described as the provision of financing (either directly or indirectly) for projects or companies. The investment agency will also carry risks for this purpose. The ministry names a couple of requirements for the co-investment of the agency, the important ones in this respect being (Ministerie EZK, 2018, pp. 23–24):

- A viable business case;
- The investment should attract other investors, not deter them. As such, Invest-NL is never the only investor;
- Every investment has to adhere to the economic and social requirements of the agency;
- Every investment will be tested along the requirements of Socially Responsible Investing (SRI)
- The investment process has to be transparent;
- Focus has to be on social transition in the areas of, among others, energy, sustainability, and mobility.

The investment agency especially sees a role as the bearer of risk in innovative projects. This will be done by investing using equity or mezzanine finance, and by providing guarantees to projects. By doing this, the agency hopes to attract other private investors, in order to reduce the financing gap (Ministerie EZK, 2018).

### 6.2.2. Results

The interviews have been conducted in a semi-structured manner. An example of questions that have been asked can be found in appendix A. The answers to the questions regarding the different topics have been grouped on the basis of the topic and the specific interviewee. A summary of the statements can be found in appendix B. For every category, conclusions are drawn from the different statements and presented below. The results are presented on the basis of different categories that are important for the research.

#### *Manner of investment*

As mentioned, the manner of investment says a lot about the governance structure that characterizes the investment transaction. From the interviews it has become clear that APG and PGGM mainly invest directly in projects. APG adds to this by mentioning that they can only invest more than 50% of the equity of a project when the development risks are allocated to other parties. MN only invests via funds, mainly because of the in-house expertise that is required for direct investment. Apart from this, it is important to look at the influence the pension funds have on their investments. APG mentions the importance of only investing in funds where they know where the money is eventually channelled to. Moreover, APG and PGGM both make use of an asset manager, where they have full control over what happens with the assets. Using this asset manager, they also allocate a lot of the transaction costs for small projects to these asset managers. This is in line with the theories, which state that in case of high asset specificity and uncertainty, actors require more control over the transaction.

#### *Appetite for infrastructure investment*

To find out whether the pension funds are willing to invest more in infrastructure, they were asked if there is more room for investment in infrastructure from their side. The conclusion that one can draw from the interview is a definite yes. All pension funds mention they would certainly be willing to invest more in infrastructure, if they had the opportunity. The respondents particularly mention the high returns they

earned in recent years on infrastructure as main reason for this. As most important reasons for investing in infrastructure rather than other asset classes, the pension funds mention the attractive return that is higher than real estate, diversification, inflation protection, long-term stable cash-flows, and the non-correlation with the stock market.

### *Problems with the current amount of investing*

From the interviews it has become quite clear that the problem with the infrastructure gap and the light rail is not the availability of capital. All respondents mention the wide availability of capital and the high amount of competition in the supply of capital, mainly due to the low interest rate at the moment. This means that the problem has to be found somewhere else; the respondents mention some other issues that describe the low amount of investing in the Netherlands by pension funds.

PGGM mentions that the problem is at the governments side, for two reasons. Firstly, the government has to be the one that brings the projects to the market. This means doing the initial work and getting the permits ready. They mention that the government has to invest some money in a project before the private sector can continue with it. Secondly, the government in the Netherlands also determines whether projects are made available for private investment or not. The decision is often not to do this, making it not available for investments by pension funds. Invest-NL adds to this by mentioning the problem that the government has to pay for the investment in the end. So, whether or not it is privately financed, the government eventually has to pay for a big part of the project (depending on the type of project). One can conclude that a big part of the problem is the decision-making process prior to the start of the project. Invest-NL confirms this by mentioning the long lead time of infrastructure projects in the Netherlands and the slow decision-making process, making it hard to develop new infrastructure.

### *Attractiveness of an investment*

To check the conclusions that were drawn from the literature study, the interviewees were asked about the characteristics that make projects attractive. The most important conclusion that can be drawn from the answers is that pension funds generally prefer to invest in brownfield assets; i.e., to buy existing assets. The main reason that was given for this is that, when investing in existing assets, it is easier to predict the income stream for the future (i.e., lowering the demand uncertainty of the transaction). Moreover, the typical risks related to the construction of an infrastructure asset are not present anymore. What has to be added to this is the wide availability of alternative investments possibilities. PGGM mentions that they still see plenty of opportunities in brownfield assets, so the need to invest in greenfield is not eminent.

Apart from this, other characteristics of projects were mentioned that make projects more attractive for pension funds. Characteristics include an availability-based contract, inflation linked revenues, and demand guarantees by the government. Other attractive characteristics not particularly linked to more certainty include project size, long-term nature of the asset, and social value of projects. One can conclude that especially PPP-projects in the Netherlands based on a DBFM-contract are attractive for pension funds.

### *Most important risks*

The interviewees have been asked what they think are the most important risks for pension funds when investing in infrastructure. The most important risk that one can distinguish pertains to the revenue certainty of the asset. Meaning, whether you can accurately predict the demand or revenues of the project. This is also linked with the tendency towards availability-based projects, as these projects have fairly certain revenue streams. Other important risks include those related to the construction of the asset, although APG and PGGM both mention that they are only taking construction risk when the project is large enough to make a decent profit. This is also related to the tendency towards brownfield assets.

In the previous chapters, one of the most important risks that have been identified are the risks due to governmental and third-party opportunism. More specifically, the risk in the Netherlands that lower layers of governments and third-parties contest the decisions that are made regarding the project. The conclusion that one can draw from the interviews is mainly that pension funds avoid these risks by only investing when all the permits have been approved.

### *Transaction costs*

Regarding the transaction costs per project, one can conclude that, although the pension funds mention they are important, they are not important enough to make certain infrastructure investments unattractive.

The pension funds mainly mention the importance of deal certainty: they are fine with making some transaction costs before a project starts, as long as it provides them with some certainty that they can actually invest in the project. When looking at the size of projects, one mainly sees that pension funds try to avoid the transaction costs by using asset managers. Both APG and PGGM have their own asset manager that manages the projects for them and that makes these costs. For bigger projects, both pension funds make the deals themselves.

### *Light rail*

The interviewees have been asked whether they think light rail is attractive as an investment and how they think it should be put in the market. One can conclude that, from the perspective of the pension funds, light rail can be a very attractive investment. However, for them to invest, there has to be a concrete business case. Moreover, the pension funds are not willing to take the revenue risk on a project as new as the light rail. What this means is that, for pension funds to be willing to invest, a concrete business case for light rail has to be made and the government has to take some of the revenue risks. This again points to the problem of the decision-making process.

Another interesting finding from the interviews is the role Invest-NL can have in these projects. When, because of the novelty of the project, the risks are initially too high, Invest-NL can provide equity for the first couple of projects. When there is more knowledge on the risks involved, pension funds can step in and, consequently, require less return. Moreover, Invest-NL can also help in making some costs to get through the long decision-making process and bring the projects to the market.

## **6.3. Conclusion**

The interviews provide new insights on the theoretical view that is developed in the previous chapters. The main conclusions are described briefly.

### *Transactional attributes and governance structures*

One can conclude that, in principle, the applicability of the theories has been confirmed. Most notably, the pension funds seem to be more interested in investing in existing assets than in developing greenfield projects. This can be seen as lowering the uncertainties and transaction specific investments that characterize greenfield projects. This is confirmed by a study by PWC about bridging the infrastructure gap, which states that “whilst there is a recognised need to fund new infrastructure across the world, the risks and challenges of investing in greenfield construction projects means that such projects typically remain beyond the remit of many institutional investors” (PWC, 2017, p. 7). Furthermore, pension funds generally aim at lowering the uncertainty regarding their infrastructure investments. They do this by not engaging in projects where they have to bear the revenue uncertainty, and by allocating construction and development risks to other parties.

Another conclusion that can be drawn is that transaction costs don't seem to be playing a big role in the decision to invest in infrastructure. Although pension funds mention that they are important, they are not considered a barrier to invest. The pension funds do mention, however, the importance of deal certainty. The chances that the pension funds might, in the end, not get the deal, does have an influence on the number of projects that pension funds invest in.

### *Investor characteristics*

The characteristics that distinguish pension funds from other investors have been confirmed. One can conclude that pension funds are generally looking for investments that are in accordance with their liability driven investment strategy, meaning low risk projects with a long-term, stable revenue perspective. Apart from this, they mainly prefer inflation linked revenues and projects with a social value.

### *Barriers of investment in infrastructure*

The conclusion that one can draw is that the most important barrier is not the willingness to invest in infrastructure from the pension funds' side. Although many of the barriers mentioned in the previous chapters (certain risks, transaction costs, contractual models) might be an actual barrier in other economic times, their current influence on the investment level is minimal. The low interest rate causes large competition in the supply of capital, which makes sure that pension funds are willing to take more risks and

transaction costs. However, the infrastructure gap is still there, which means a lot of opportunities are not taken by the pension funds. Two other issues can be distinguished that might shed light on this and which were also identified in the interviews and the literature study.

Firstly, although pension funds are looking for investment opportunities, they need to make sufficient returns on their investment to satisfy their liabilities. This means that, even when a project is financed by a PPP, the government has to provide the funding of the project. This funding is hard to come by due to budget constraints. Especially in the Netherlands, when funding has to come from different layers of government and institutions, it can be hard to initiate projects. To get these layers of government aligned, is a complex decision-making process.

The second problem also has to do with the decision-making process. In the transaction cost regulation theory, it was already mentioned that risks due to third-party opportunism can be especially high in decentralised political environments. This is reflected in the long decision-making processes in the Netherlands. Moreover, Spiller (2013) mentioned in his theory that, in the presence of these hazards, investments might be hard to generate, because investors don't want to take these risks. In Dutch mobility infrastructure projects, this mechanism might not necessarily reflect itself in a lack of investments, but rather a lack of involvement and commitment before all necessary permits are obtained, resulting in a wait-and-see attitude of private investors. The reason for this is that, when all necessary permits are obtained, a lot of the chances of opportunism are mitigated. This is backed by the fact that the pension funds themselves mention that they don't want to be involved in this process and only get in at a later stage, when projects are further developed and permits have been obtained. This means that governments have to initiate the projects and bring them to the market, which might be exceptionally hard for light rail projects.

What this essentially means is that pension funds are willing to invest in mobility infrastructure projects, as long as they are initiated by public parties, have a clear business case, and their risk/return characteristics are favourable. A study by McKinsey in 2016 about the general investment climate in the world confirms this: "the largest constraint [to more investment] seems to be the development of a sufficient pipeline of well-prepared, bankable projects that provide investors with appropriate risk-adjusted returns" (McKinsey, 2016, p. 17). Important to mention is that, of course, capital is always available, as long as enough return is given. More specifically, this "appropriate risk-adjusted return" naturally depends on the factors distinguished in the previous chapters (See section 5.3 and Figure 26).

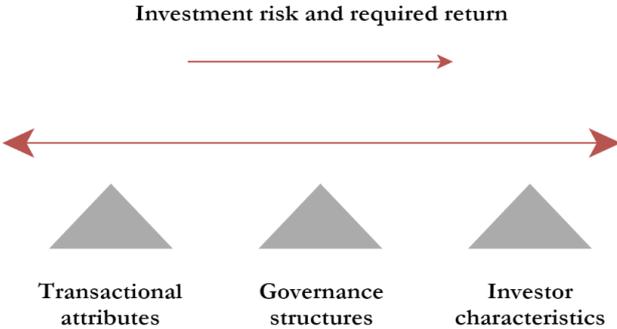


Figure 26: Investors' side of the infrastructure gap

Concludingly, although availability of capital is not the most important and only barrier, it does form part of the problem. The next chapter will look at the difficulties of creating the aforementioned pipeline of projects with an appropriate risk-adjusted return in a decentralised institutional environment like the Netherlands. This will be done by using the TCR theory and looking at the influence of governmental and third-party opportunism.

## 7. Case-study analysis: Light rail in the Netherlands

The previous chapters looked at the investors' perspective and their willingness to invest in infrastructure. While there still seems to be an infrastructure gap, investors mention their willingness to invest in projects, as long as they offer an appropriate risk/return profile. The answers from the interviews mainly point to the fact that the decision-making process regarding new projects in the Netherlands can be complex, which makes it hard to initiate projects. This chapter will test this by looking at the other side of the infrastructure gap spectrum, considering the difficulties in initiating and developing projects in the Netherlands. This is done by looking at the general difficulties regarding the development of light rail projects in the Netherlands and by looking at past light rail projects.

### *Selection of case-studies*

For the case-study analysis, two specific light rail cases were chosen. As there have not been many light rail projects in the Netherlands, there were not many candidates. The decision was made to choose two projects, one that was discontinued in the end (Regiotram Groningen), and one that is currently in the realisation phase and will be finished at the end of 2019 (Uithoflijn Utrecht). Moreover, the two cases are also different in the financing structure. The Regiotram was tendered using a DBFMO-construct, while the Uithoflijn was purely financed by the public parties. Lastly, the problems with the Regiotram seemed more political, while the problems with the Uithoflijn were mostly the result of technical issues. These differences provide for a broad view on the issues and success factors of implementing light rail in the Netherlands. For each case, interviews have been held with people involved in the projects. An overview of the interviewees can be found in appendix C.

### 7.1. Characteristics of light rail

Before the different cases are analysed, an introduction is made on the specific characteristics that are typical for light rail projects.

#### 7.1.1. General

A definition of light rail is given by the American Transportation Research Board:

*“Light rail transit is a metropolitan electric railway system characterized by its ability to operate single cars or short trains along exclusive rights-of-way at ground level, on aerial structures, in subways or, occasionally, in streets, and to board and discharge passengers at track or car-floor level”* (TRB, 2000, p. 3)

The characteristic that distinguishes light rail from other forms of transport is that it is not bound to any specific infrastructure. While train, tram, and metro each have their own specific infrastructure, light rail can make use of all three (van der Bijl et al., 2010). This means that light rail is essentially a hybrid mode between those types of transport (Figure 27).

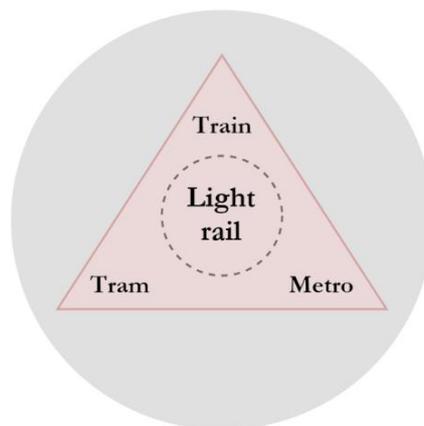


Figure 27: Light rail as hybrid form of other transport modes (Adapted from van der Bijl & van Oort, 2014)

Because light rail is a hybrid form, it contains characteristics from all the aforementioned modes of transport. These characteristics are shown in Table 7. Because light rail operates on different levels, it is more easily integrated with regular traffic. Moreover, light rail can have its own right of way, while being faster than a normal tram.

Table 7: Characteristics of different public transport modes (Mandri-Perrott, 2010; van der Bijl & van Oort, 2014)

	<b>Light rail</b>	<b>Train</b>	<b>Tram</b>	<b>Metro</b>
<b>Covering areas</b>	Medium	Large	Small/Medium	Small/Medium
<b>Environment</b>	Integrated	Exclusive	Integrated	Exclusive/closed
<b>Crossings</b>	Multiple	Few	Many	Exclusive
<b>Priority</b>	Mostly	Always	Sometimes	-
<b>Stopping distance</b>	0,4-2 km	2-100 km	0,2-0,8 km	0,4-2 km
<b>Signalling</b>	Often	Always	Sometimes	Always
<b>Capacity</b>	Medium	High	Low	Medium-High

Light rail can generally operate on the local to regional scale (van der Bijl & van Oort, 2014). The capacity of light rail is about 20.000 passengers per hour, which is more than four times the amount of regular trams and busses (Mandri-Perrott, 2010).

Van der Bijl & van Oort (2014) name five main reasons for the implementation of light rail in the Netherlands. Firstly, efficiency. Because of the high capacity to carry passengers on the local to regional scale, light rail is much more efficient than other solutions. More specifically, light rail seems to be more efficient on the local level than rapid bus transport and on the regional level than metro or regional rail. Secondly, effectiveness. Light rail is able to change the urban planning of a city by enhancing the investment climate along its tracks. Moreover, cities can be reorganised because of an improved accessibility of remote areas (Knowles & Ferbrache, 2014). Third, economy. Although it is hard to measure, there is good reason to believe that proper light rail connections in cities enhance the climate for investment and economic activity. Fourth, environment. Light rail offers many environmental benefits compared to other forms of transport that contribute to sustainable infrastructure. Among which are the reduced need for transport, a more collective way of transporting, and the use of sustainable technologies. Lastly, Van der Bijl & van Oort (2014) name equity. The meaning of equity is particularly related to social effects of the light rail. Particular examples can be the better access to jobs and quick access to facilities.

### 7.1.2. Complexities

#### *Stakeholders*

Because of the nature of light rail and the institutional environment in the Netherlands, the decision-making process can be extremely complex. Spiller (2013) already posed that decentralised political environments can be very susceptible to third-party opportunism, and the light rail is a project where this becomes evident. As mentioned, the Netherlands is an example of a country with a very decentralised institutional environment, with a central government being smaller than EU average (CBS, 2011). This means that there are a lot of institutions that can contest each other in decisions, as well as a lot of opportunities where third-parties that can do the same (Spiller, 2010). Because light rail projects typically span local, as well as regional and national levels, even more parties are involved (van der Bijl & van Oort, 2014).

Concerning governmental institutions, a couple of layers can be distinguished. First of all, since light rail operates on the regional level in the Netherlands, it is self-evident that the provinces are involved. Moreover, since light rail typically penetrates large municipal areas and cities, these municipalities are also involved. Apart from this, some areas have their own regional institutions which have an influence in the process. There are seven of these so-called transport regions ('vervoerregio's') in the Netherlands (Boertjes, 2009). Lastly, as in all infrastructure projects in the Netherlands, the national government is also involved. The main roles for the national government include infrastructure administrator, provider of grants, legislator, as well as being responsible for the railway network on the national level (De Bruijn & Veeneman, 2009).

Apart from these public parties, there are several other parties involved. Most notably, there is the party responsible for the railways in the Netherlands, ProRail. The roles of ProRail include planner and allocator of capacity of the railways, the responsible party for rail safety, and expert on management and

construction of rail infrastructure (De Bruijn & Veeneman, 2009). Apart from ProRail, there is the public transport company, NS, which operates most of the existing tracks of railway. Lastly, because of the housing and office development that is often coupled with light rail projects, as well as the typical impact light rail projects have on their surroundings, various private citizens and companies also have their stakes in the project. This makes a light rail project, and especially the corresponding decision-making, more complex than other mobility infrastructure projects (De Bruijn & Veeneman, 2009). The most important involved stakeholders are summarized in Table 8.

Table 8: Main involved stakeholders in the development of light rail

### Public parties

<i>Local</i>	Municipalities
<i>Regional</i>	Transport regions ('vervoerregio's')
<i>Provincial</i>	Provinces
<i>National</i>	Ministry of I&W

### Other stakeholders

<i>Rail authority</i>	ProRail
<i>Transport company</i>	NS
<i>Surrounding stakeholders</i>	Local inhabitants
<i>Surrounding stakeholders</i>	Surrounding companies

### Decision-making process

The decision-making process starts with the initiation phase. Because of the fact that light rail spans both local, regional, as well as provincial levels, all these public institutions can initiate the plans to develop a light rail project. For light rail projects, the initiating and managing actor will in most cases be one of the seven transport regions. The reason for this is that light rail is mostly developed from a mobility perspective (contrary to countries like the UK and France, where it is often developed from an economical perspective (Boertjes, 2009)). For mobility issues in one of the transport regions, these transport regions are generally responsible (van der Bijl & van Oort, 2014). However, because the development of light rail coincides with other development inside municipalities, the municipalities also get involved in this process. Moreover, light rail also solves mobility problems on the provincial and national level, which makes the other two aforementioned public stakeholders also (possibly) involved in this stage (Boertjes, 2009). All public institutions thereby have their own part of the problem, which makes for a complex field of decision-making (De Bruijn & Veeneman, 2009).

What makes this process even more complex is that all these institutions have their own (often constitutional) manner of decision-making. On the municipal level, three spatial plans exist which are regulated in the spatial planning act: the structure vision, the land-use plan, and the management regulation (Hobma & Jong, 2015). To develop light rail on a new track, land-use plans have to be changed. This changing of the land-use plan has to be tested against the structure vision of a municipality; a deviation from this structure vision requires sound motivation. Apart from this, there are spatial plans on the provincial level, including a provincial structure vision and general rules. The municipality is not legally bound to the provincial structure vision, but the province is. These rules apply in the same way to the national government and their structure vision (Hobma & Jong, 2015). The spatial plans are summarized in Table 9.

Table 9: Statutory spatial plans for different layers of government

<i>Municipal</i>	Municipal structure vision
	Land-use plan
	Management regulation
<i>Provincial</i>	Provincial structure vision
	General rules
<i>National</i>	National structure vision
	General rules

When developing a light rail project, all tiers of government have to agree on the plans. These governments are also bound by the aforementioned spatial plans: deviating requires a long political process (Hobma & Jong, 2015). When comparing to other (more national) infrastructure projects, one can find the same process. However, there is less involvement of regional actors and a more central actor which leads the projects, namely the ministry of I&W and Rijkswaterstaat (De Bruijn & Veeneman, 2009). Nevertheless, the Commissie Elverding (2008) studied the decision-making process in the Netherlands regarding national infrastructure and concluded that the decision-making process is exceptionally long in this respect. The main causes that were distinguished were too many layers of government, lack of knowledge with these governments, and a lack of funds available at the national level. Moreover, in the actual process of decision-making, there is generally a lack of consensus over the necessity of the project between these layers of government and an excessive number of required permits. These permits are then also seen as a way for lower layers of government to have an influence in the project (Commissie Elverding, 2008, pp. 8–9). Because of the aforementioned involvement of the different stakeholders, these problems might be even worse in light rail projects.

### *Technical complexities*

Because light rail is a hybrid form of different public transport modes, there are various technical complexities in compatibility and interfaces. The different public transport modes have different characteristics in terms of electrical current, safety systems, and platform heights (De Bruijn & Veeneman, 2009). Moreover, because light rail spans different regions, different track supervisions are crossed, which can be managed by different actors (Ten Heuvelhof et al., 2008).

### **7.1.3. Funding & financing**

It has already been noticed in the interviews with the pension funds that the main problem for light rail is more funding than financing<sup>1</sup>. Light rail projects typically incorporate various sources of funding. Because of the nature of a light rail project, there always has to be a public party which contributes to this funding. This is because the ticket revenue is almost in every case not sufficient to make the project pay for itself (van der Bijl & van Oort, 2014). The funding can come from different governmental institutions; because mobility in a city is an issue for a municipality, as well as for the province where the city is in, both parties usually contribute. Generally, these parties provide most of the funding together. However, because of the sheer size of projects and the fact that often regional governments don't have the investment capacity to fund these projects by themselves, the national government can step in (Boertjes, 2009). This can be done in a couple of ways.

One of the possibilities of contributing is via the Brede Doeluitkering (BDU). The BDU is a financial program that is supposed to connect regional projects to national policies. The BDU is paid by the ministry of I&W to regional governments, who can decide for themselves how to spend it. However, Boertjes (2009) mentions that, for large infrastructure projects, the BDU is almost always insufficient.

For large infrastructure projects, funding can also come from the MIRT (Meerjarenprogramma Infrastructuur, Ruimte en Transport). The MIRT is a program that the national government uses to finance its infrastructure. The MIRT is also a tool that is used to provide for a uniform decision-making process for infrastructure in the Netherlands (Rijksoverheid, 2017). When new projects adhere to the requirements of the MIRT, €112.5 million of the funding has to come from regional governments, while the rest is accounted for by the national government (Boertjes, 2009). However, it was already mentioned that, until 2030, the MIRT does not have any room for new investments (Verlaan, 2018).

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<sup>1</sup> It is important to make a distinction between funding and financing. Funding means paying for the project; financing is temporarily providing the project with capital by means of loans, these loans have to be paid back in the end.

## 7.2. Case study: Regiotram Groningen

The first case that will be analysed is the Regiotram Groningen. The Regiotram was a light rail project initiated about 10 years ago, but in the end was cancelled in 2012.

### 7.2.1. Case description

The Regiotram is a tram that was supposed to connect the metropolitan area Groningen-Assen. This metropolitan area is an area in the north of the Netherlands, containing the city of Groningen, as well as the surrounding areas. As most of the economic activity takes place in the Groningen urban area, large amounts of people commute to their work in the city centre every day. Because Groningen has a dense urban centre, an increasing amount of congestion takes place (Regiotram, 2012). To solve this, the municipality designed a vision for 2030, containing plans for a high quality public transport system, including light rail (Gemeente Groningen, 2012).

The initial design consisted of two light rail lines. The design of line 1 runs from the main station to Zernike; while the design of line 2 runs from the main station to Kardinge. This initial design is shown in Figure 28.

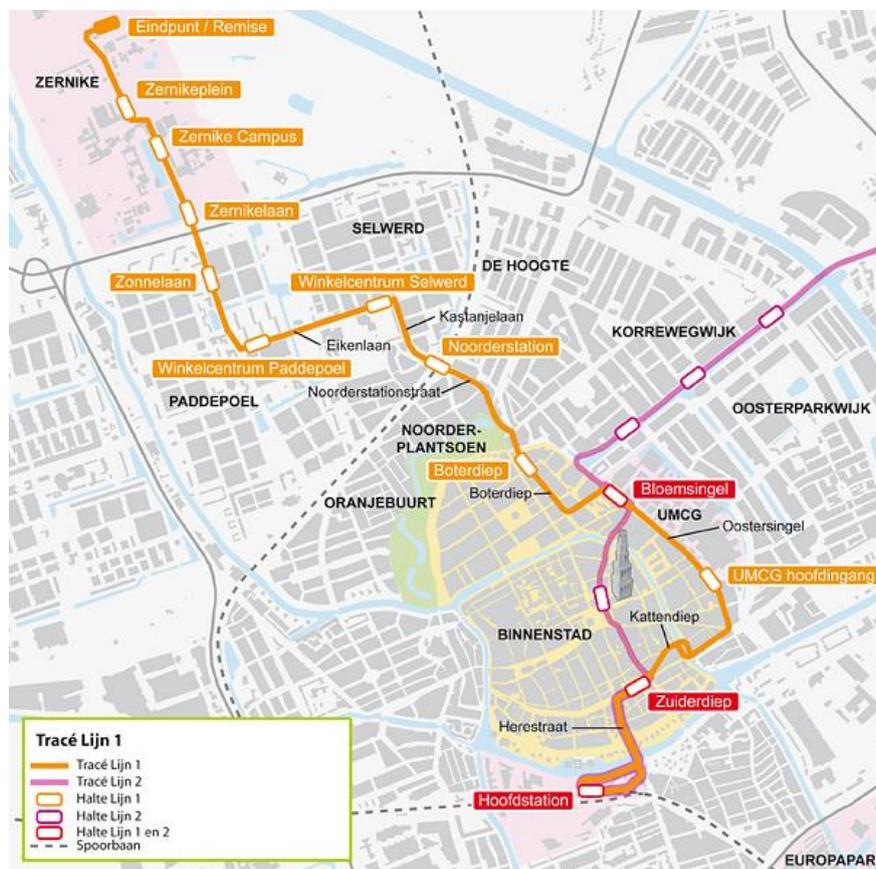


Figure 28: Initial design light rail lines Regiotram Groningen (Gemeente Groningen, 2012)

In the first few years, the light rail was scheduled to only operate on the aforementioned lines in the city centre of Groningen. After some years, however, plans were made to stretch these lines into the surrounding region (hence, the name 'Regiotram'). The main reasons for these plans were to further decrease the congestion in the city centre and to enhance the economic activity in the surrounding regions (Regiotram, 2012). Many different plans were made, including connections to De Punt, Zuidhorn, Winsum, and Bedum (Gemeente Groningen, 2012).

### 7.2.2. Decision-making process

As all projects in the public sector, the development of the Regiotram was done in a complex decision-making process, involving multiple different actors. To clarify this, the events will be described briefly.

### Initial plans

The decision-making process of the Regiotram already started out in 1997, when a research was performed on the feasibility of a new tram in the area. In 2006, the first plans were presented to introduce new forms of public transport in the city. These plans mainly concerned the aforementioned line 1. Apart from a light rail connection, other options were considered, such as a normal tram and guided buses. Eventually, in 2009, the college of B&W presented a new plan called ‘Sporen naar de toekomst’, where both line 1 and 2 were mentioned, along with other plans for and improved public transport system (Regiotram, 2012).

### Track decision

In 2009, the municipal council of Groningen determined the preferable track for line 1 and detailed it in a first design (Gemeente Groningen, 2012). Although these plans have also been approved by the province of Groningen, the plans came under pressure due to the financial crisis of 2008, which made sure that governmental institutions had to pay more attention to their financial health (PWC, 2012). Especially the political parties that were not in the municipal council at the time (among which D66), expressed their doubts about the plans. After the track decision of line 1, a track decision was also made for the track of line 2. In accordance with Dutch legislation, a procedure was held at the start of 2010 to enable third-parties to have their say in the decisions. After this procedure and comments from the third-parties, the tracks and designs were slightly changed (Gemeente Groningen, 2012). In the end it was clear that all parties involved agreed about the necessity, as well as about the plans that were made for the tram. It is even mentioned that multiple surveys were held at this point among the citizens of Groningen about the desirability of the Regiotram, concluding that, overall, the light rail line was desired (Interview: Olman).

### Business case development

After the track decisions were made and the procedures were gone through, the first business case for the Regiotram was developed in July 2010. After the development of this first business case, three actualisations have been performed. This is schematically shown in Figure 28.

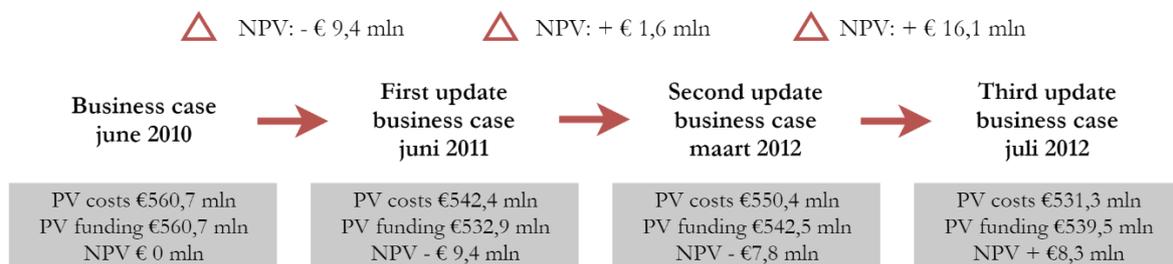


Figure 29: Business case development Regiotram (Adapted from PWC, 2012)

The business case was made in such a way that all parties agreed; public, as well as private. This can be confirmed by the initial amount of five parties that went into the tender process (Interview: Peekel).

### Tendering process

With the third actualisation of the business case, the tendering process could start. It was chosen to tender the project as a DBFMO-contract (Design, Build, Finance, Maintain, and Operate) for the full 25-year period. It was the first time in the Netherlands that a project of this type was tendered using this type of contract (Van Oort et al., 2014). The tendering was done using a competitive dialogue, which means that the tendering parties were consulted to further develop the plans. It is mentioned that a lot of input was required from the tendering parties (Interview: Peekel).

### The project's discontinuation

Before the end of the tendering process, in September 2012, the project was discontinued. The direct reason for this was the losing of support in the municipal council. The new college of B&W (including D66 which was not part of the municipal council that approved the plans), did not support a new municipal budget that included the funding of the project (Interviews: Peekel; Olman).

### 7.2.3. Organisation

#### Public parties

The project was originally an initiative by the region Groningen-Assen, the province, and the municipality. The project was set up using a project team consisting of two members of the municipal council and two members of the province of Groningen (Regiotram, 2012). Although the national government was not directly involved, they also played a role in the development of the Regiotram. To change the land-use plan and start the development of the project, the wishes of all these stakeholders had to be taken into account.

Firstly, the province developed the Provinciaal Omgevingsplan 2009-2013 (POP). This POP contained general rules that should be taken into account when land-use plans are changed. The most important of which are that changes in the land-use plan should be beneficial for the economy, employment, and quality of life in the province. Furthermore, the POP includes specific guidelines on how the Groningen urban area should be better connected by the use of high quality public transport (Gemeente Groningen, 2012).

The municipality of Groningen also had its own vision on how to improve the city. In 2009, the municipality introduced the structure vision ‘Stad op scherp’, which contained goals on how to improve the city. The most important ones being the improvement of living conditions in the city, improvement of the city as capital of the north, and the positioning of the metropolitan area Groningen-Assen as economic hub. Also in this structure vision, the municipality included a provision that aims for a high quality public transport (Gemeente Groningen, 2012).

The last important thing to notice is the designation of the inner city of Groningen as a protected area by the ministries of OCW and VROM. To change the land-use plan, the relation of the new light rail line and the protected inner city had to be taken into account (Gemeente Groningen, 2012).

#### Other stakeholders

Apart from the public parties involved, there were multiple other stakeholders who were either contesting or agreeing with the project. Among the groups opposing the project were most notably two organisations: Tram Groningen and Tram-no-way. A group fighting for the project was called GroningerTram. Apart from these groups there were also local shop owners which feared that the shopping street would be disturbed by the tram (Gemeente Groningen, 2012).

### 7.2.4. Funding & Financing

As mentioned, the project was tendered out as a DBFMO-contract. This means that the financing is entirely for the private consortium that wins the tender. To fund the project, the costs were planned to be born by a combination of ticket revenues and public funding. The public funding was supposed to be born by municipality, province, and the region Groningen-Assen (Gemeente Groningen, 2012). Mostly, the funding that had to be brought up by the municipality and province came from a compensation that they received from the national government for the discontinuation of the ‘Zuiderzeelijn’ (Interviews: Peekel; Olman).

The project was tendered out using a ceiling price. Meaning, the public parties paid a fixed price to the winning consortium. This means that the winning consortium also had to bear part of the revenue risks of the project. The total costs of the project were amounted to be about €555,5 million, while the fixed price was about €450 million (Regiotram, 2012). The funding structure is shown in Figure 30.

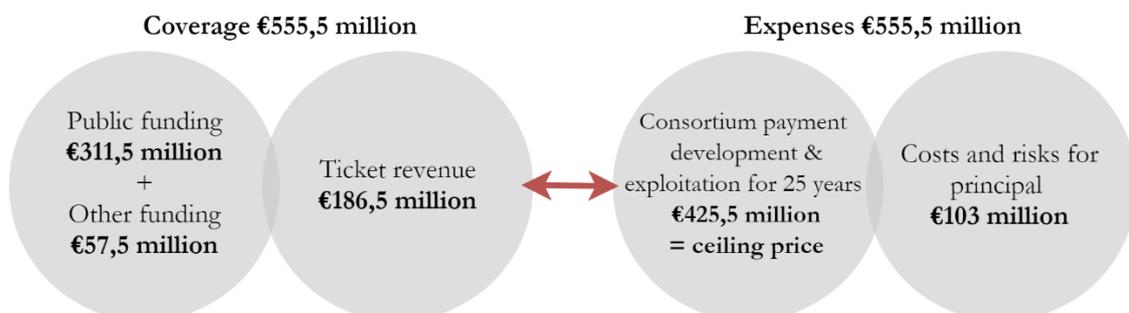


Figure 30: Funding structure Regiotram (Adapted from Regiotram, 2012)

### 7.2.5. Problems

The direct cause of the discontinuation of the project was a lack of support the project had in the municipal council (Interviews: Olman, Peekel). However, this distrust obviously had its own reasons. A couple of which can be found by studying the literature and conducting interviews. It has to be mentioned that different sources, in this respect, also mention different reasons.

It was the first time that the DBFMO contract was used (DBFMO) for this kind of project. From the interviews it became clear that the main reason for this was that the project team wanted as little interfaces as possible with the project (Interview: Rijkens). In the municipal council there was little knowledge of this innovative contract type, causing distrust among political opponents (Interview: Peekel). Apart from this, it is named that during the tendering phase, the provision of information to other stakeholders (mainly other politicians) was not done in a correct way. This further degraded the trust among the politicians (Van Oort et al., 2014).

However, in the end, one can conclude that there is one main reason for the discontinuation of the Regiotram, and that is politics (Interviews: Peekel, Olman). It has been mentioned that all parties agreed on the project in the initiation phase. Both between the public parties (municipality, province, and region Groningen-Assen), as within the municipality there was full agreement on the necessity and plans of the tram. More near the end of the project, this changed. It was already mentioned that one of the opposing political parties, D66, was not part of the municipal council when the project was initiated. This changed, however, when new municipal elections were held in 2010. New aldermen in the municipal council as a consequence of these elections are named as one of the main reasons for the discontinuation (Interview: Olman). Apart from this, the new constellation in the municipal council also made sure that new parties were able to block decisions. In the end, it has also been mentioned that the eventual blocking of the project had to do with a retaliation between different parties (Interview: Olman). The parties that blocked the decision, named as prime reason financial problems in the municipality (Binnenlands Bestuur, 2015).

There was also disagreement between the public parties. While the province of Groningen was trying to proceed with the plans, they couldn't without the €80 million of funding by the municipality. At this point, already €40 million was invested in the project by both municipality and province. The municipality was forced to repay many of the involved actors after these events had unfold.

### 7.3. Case study: Uithoflijn

The second case study is about the Uithoflijn in Utrecht. The Uithoflijn is currently being realised and is planned to be finished (after one and a half years delay) at the end of 2019.

#### 7.3.1. Case description

The Uithoflijn is a light rail project that is supposed to connect the city centre of Utrecht with science park De Uithof (Figure 31). De Uithof is an area with large economical value and accessibility is considered to be essential. The current public transport leading to the area (consisting of buses) was predicted to not keep up with the growth of the Uithof. Because of the expansion of many institutions, including universities and research institutes, a projected amount of 60.000 public transport travellers is projected in 2020. This would make it the busiest bus connection of the country. Furthermore, several studies showed that these amounts of travellers cannot be accommodated by only a HOV-bus line. These factors eventually led to the plans for the development of the Uithoflijn (POUHL, 2018).

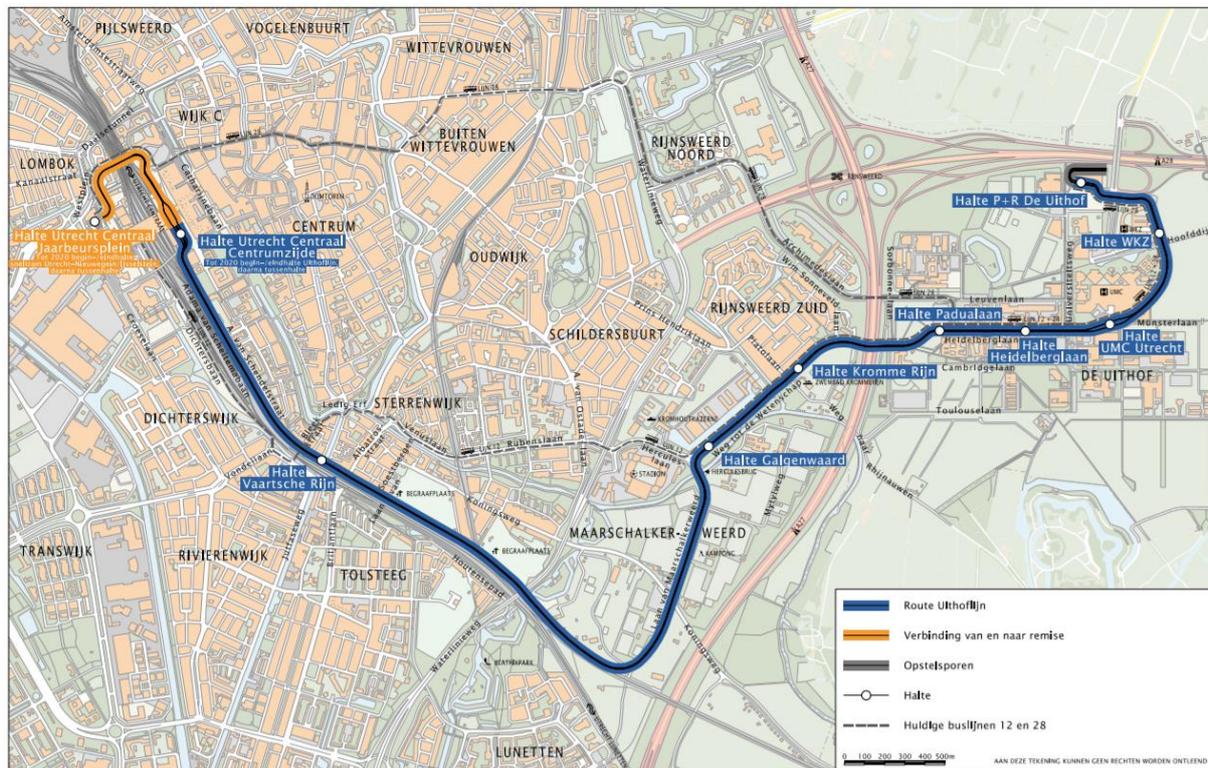


Figure 31: Track Uithoflijn (POUHL, 2018)

#### 7.3.2. Decision-making process

The decision-making process from the initiation of the plans until the current state is explained briefly.

##### Pre-initiation

The first steps towards the development of the Uithoflijn were already made in 2003. At this time, the masterplan for the development of the area around the central station was made. In the plans, a future tram/HOV-bus line was already taken into account. In the following years (2004-2006), the track for a HOV-bus to the Uithof was designed. However, in 2006 it became clear that the amount of travellers was too large to be able to be serviced by only a HOV-bus line (Gemeente Utrecht, 2011).

##### Initial plans

The decision-making process started out in 2007, when this realisation led to a first study on a tramline in the city by the BRU (Bestuursregio Utrecht) and the municipality. At this time, there was only a HOV-bus servicing the area. This study led in 2009 to a report where the ambition was stated to realise five tramlines in the region of Utrecht, including a tramline to the Uithof. At this point, a study was done on the

aforementioned five tramlines. The study concluded that multiple lines would be suitable to be made into tram lines. It was decided that the Uithoflijn would be the first one of these lines to be realised, possibly followed by others (Gemeente Utrecht, 2011). Eventually, the municipality of Utrecht and BRU signed an agreement to come to a go/no-go decision regarding the new to build line in 2011 (POUHL, 2018).

### *First design*

These plans eventually led to the two parties making the designs for the tramline and putting it up for public scrutiny in 2010. After this stage, the decision was made to continue with the process and to perform a study on the finances, granted that a subsidy would be provided by the national government (POUHL, 2018). This subsidy was granted in 2011, after a positive result was found in a Social Cost-Benefit Analysis (SCBA) by the ministry of I&W. These events led to the final decision in 2012 by the BRU and the municipality of Utrecht to continue with the project. Van Oort et al. (2014) mention that the agreement on the necessity for a capacity improvement was the key success factor in this phase. At this point, the municipality and the BRU transferred the responsibility of the project to the Projectorganisatie Uithoflijn (POUHL) (Provincie Utrecht, 2017).

### *Realisation*

In 2013, the design of the line was finalised and put out for tender. In 2013 and 2014 the preparations were made for the construction of the line by constructing the foundation and bridges. At the end of 2014, BAM was chosen to begin the construction of the actual tramline. The construction would start in 2015 and would be finished late 2017 (Provincie Utrecht, 2017).

### *Change of responsibility*

At the start of January 2015, the province of Utrecht took over the principality from the BRU. Reason for this was a change in Dutch law about the 'plusregio's' (cooperation of municipalities), leading to the eventual discontinuation of the BRU. The PUOHL was now a cooperation of the municipality and province of Utrecht (POUHL, 2018).

### *Cost overruns and delays*

At the start of 2018, it became clear that the project would be delayed by one and a half years. This delay has a projected additional cost of €84 million. Due to extra project risks, the project is expected to be finished only at the end of 2019 (Hoekstra & Franck, 2018).

### **7.3.3. Organisation**

As mentioned, the responsibility of the project was born by a project team. This project team was initially a cooperation of the BRU and the municipality of Utrecht; later this changed to the province and municipality of Utrecht. The province and municipality both contributed to the steering group of the Uithoflijn. A council of directors was then formed which consists of delegates from province and municipality, as well as a delegate from the tram company. The council of directors is responsible to choose a project director and they are together responsible for the project organisation (Interview: Schütte; POUHL, 2018). The organisational structure is shown in Figure 32. The project organisation eventually outsourced the construction and exploitation in parts to various parties (Deloitte, 2017).

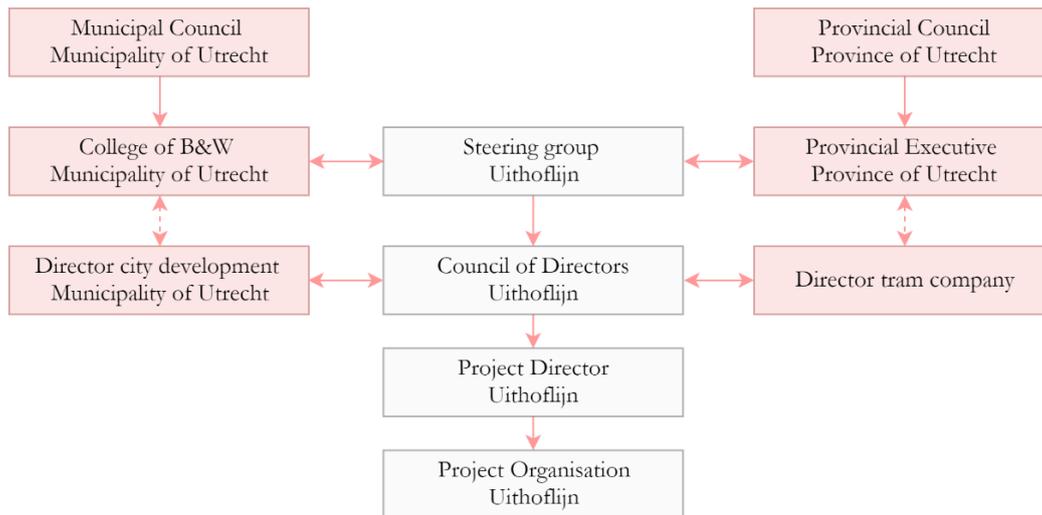


Figure 32: Organisational structure Uithoflijn

In 2017, Deloitte performed an audit on the process of the project and concluded that one of the main complexities was the large amount of parties involved in the project. The parties involved in the various sections of the project are shown in Figure 33.



Figure 33: Various actors involved in the process of the Uithoflijn (Deloitte, 2017)

In the audit, it is mentioned that this complex governance structure involving multiple parties made sure that there was no clear idea about the division of tasks and scope, which resulted in continuous discussions (Deloitte, 2017). This was fuelled by a reorganisation in the public transport department of the province of Utrecht. Moreover, it is mentioned that, because of the multiple public institutions involved, a horizontal governance structure was needed. This horizontal structure, however, resulted in a situation where it was not clear who carried responsibility for certain tasks. Resulting in long decision-making processes (Deloitte, 2017; Interview: Schütte).

Another consequence of the complex governance structure and multiple parties involved that is mentioned is the lack of a common ambition and core values (Deloitte, 2017). Between province and municipality of Utrecht, as well as the project organisation, there were differences in thinking, which caused friction between the parties. Lastly, because within the public parties there was little knowledge on novel projects like this, a high amount of subcontracting of services was required. This made it difficult to benefit from learning effects in the project (Deloitte, 2017).

#### 7.3.4. Funding & Financing

The total cost of the project were initially projected to be around €427 million (POUHL, 2018). After the national government did a SCBA on the project, they decided to contribute €110 million, as part of the MIRT program. It is mentioned that, without this MIRT funding, it wouldn't have been possible to realise the project (Interview: van den Boogaard). The rest of the funding had to be brought up by a combination of the municipality (30%) and the province of Utrecht (70%) (Provincie Utrecht, 2017). The financing of the project was divided into two sections: the construction of the infrastructure (€340 million) and the exploitation and rolling stock (€85 million). The construction of the infrastructure is financed by the aforementioned combination of national government, and the province and municipality of Utrecht. The cost for the exploitation and rolling stock are planned to be covered by the future proceeds from tickets (Provincie Utrecht, 2017).

As mentioned, at the start of 2018, the project turned out to be costing at least €84 million more than was budgeted. These costs are born for €59 million by the province, and for the other €25 million by the municipality (Hoekstra & Franck, 2018).

### 7.3.5. Problems

There were a couple of issues that the Uithoflijn had to deal with during plan development and realisation. It was already mentioned that the project turned out to be one and a half years delayed and €84 million euros over budget. From the interviews and the documents, a couple of reasons can be identified for this.

Firstly, there were some technical and interface complexities surrounding the project. The main technical complexities were due to the line running past the Utrecht Science Park, which made sure that limits were placed on the maximal disturbance that the train could cause (Interview: van den Boogaard). Apart from this, there was an important interface that the project had with the central station of Utrecht, which was also being built at the time (Interview: Schütte). The main problems with this interface was that the projects were managed by different parties. The Uithoflijn was managed by a combination of the province and municipality of Utrecht, while the Central station was managed by the municipality. Eventually, this interface led to large delays (Interview: Schütte).

Other challenges that have been named were mainly due to governance complexities. As mentioned before, many parties were involved in the process of realisation and (planned) exploitation. Moreover, the project was managed by a combination of (initially) the BRU, the municipality, and the province. This made the project even more complex, and eventually also led to delays in decision-making, delays in realisation, and cost overruns (Interviews: Schütte, van den Boogaard; Deloitte, 2017).

### *Success factors*

The question that is important at this point is what made this project successful (successful in this sense means that the project will be realised in the end), contrary to other light rail projects. The main reason that is named is that, in this project, there was full agreement on the necessity of the line (Van Oort et al., 2014; Interview: van den Boogaard). Both province, municipality, and BRU fully agreed that the buses that initially serviced the line to the Uithof, would not be sufficient in the future. This led to commitment of all parties involved (Interview: Schütte). Apart from this, another success factor that is named is that the new tramline runs on tracks that were initially made for HOV-buses. This means that land-use plans did not have to be changed drastically, and chances of third-party opportunism were diminished (Interviews: Schütte; van den Boogaard).

## 7.4. Light rail analysis: the investors' side

The initial chapters of this research analysed infrastructure investment from a transaction cost perspective, using TCE supplemented by TCR. This chapter used the TCR theory to explain the difficulties in developing light rail projects and bringing them to investors. However, as mentioned, there are two sides to the issue. This section will use the analysis in this chapter to describe the investment risks and required return for light rail in the Netherlands from the investors' side, using the same transaction cost analysis as in chapter 4. The purpose of this analysis is to show why the government has to be the one to initiate these projects and provide guarantees. Moreover, by using the analysis on a specific case, the purpose and mechanisms become clearer.

### 7.4.1. Transactional attributes

#### *Transaction specific investments*

For investors to be involved in light rail projects, some specific investments have to be made. Mostly, some specific knowledge and competences have to be gained to be able to manage the projects. However, from the interviews with the pension funds, it became clear that this knowledge might already be there. APG mentioned that they have considerable experience with these type of projects (Appendix B). The second part of the transaction specific investments is the sunk part of the actual investment that has to be made, which is largely related to the type of investment (greenfield or brownfield). For investors to solve the problem with light rail, they have to invest in the projects from the initiation onwards, as this is the problem at the moment: the problems are not initiated on a large enough basis. When investing in greenfield light rail projects, there is a constant threat of opportunism until revenues are earned.

#### *Uncertainties*

From the analysis in this chapter, it became clear that large uncertainties are involved in developing light rail projects. Although most of the uncertainties distinguished are particularly present in the pre-initiation phase (governmental and third-party opportunism), there are especially large uncertainties in the revenue generation of the assets. Light rail projects are typically not able to generate enough revenue to provide the investors with sufficient returns, so either governments have to step in, or large risks have to be taken by investors. Apart from this, the analysis has shown that light rail projects are characterized by other large uncertainties during development and exploitation, owing to interfaces with other development projects and technical novelties.

#### *Frequency*

The light rail projects in the Netherlands are generally one-off endeavours; initiated, developed and financed by parties who don't have experience regarding these projects (Interview: Peekel). Public parties, as well as private parties, are not involved in a structural way. This is opposed to, for example, road and rail infrastructure, where public parties like Rijkswaterstaat and ProRail in the Netherlands are constantly involved. This means that, with every new project, actors have to gain knowledge and experience about how to best realise these projects. This creates additional uncertainties for the projects and actors involved. From the interview with one of the consortium managers for the Regiotram, it became clear that becoming more experienced with these projects and being structurally involved was one of the plans. Strukton even initiated their own brand for light rail, called *TramTeam*, which was eventually discontinued because not enough light rail projects were initiated (Interview: Peekel).

#### *Institutional environment*

As mentioned, the institutional environment in the Netherlands is relatively decentralised, which heightens the chance for governmental and third-party opportunism. The focus in this chapter was to describe the difficulty in developing projects under influence of these types of opportunism. However, these forms of opportunism still remain important hazards for investors. Even after the arrangement of all necessary permits, third-parties and different governmental institutions can still behave opportunistically. This is especially present in light rail projects, where several public bodies are involved. This can be a threat for the investment return for possible investors.

#### 7.4.2. Governance structures

The governance structures used in the light rail projects that have been analysed differ significantly. Where the Regiotram was supposed to be tendered out to a consortium; the Uithoflijn is executed traditionally, using contractual agreements with various parties. Yet, one can see that in both projects, the incentives were not aligned enough to mitigate chances of opportunism between parties. In both projects, problems existed between municipalities and province. This happened while they were involved together in a joint venture to govern the projects (Interviews: Schütte, Olman). This shows that, even in a joint venture, chances of opportunism exist between various actors (see section 4.1). This is fuelled by the fact that multiple different public and private parties are involved.

One can conclude that, from the investors' side, large uncertainties are involved when investing in light rail projects, especially in revenue generation and political opportunism. This explains why the investors require guaranteed returns by the government before investing. Moreover, it explains why investors are hesitant to be involved the pre-initiation phase. These conclusions show the other side of the infrastructure gap spectrum. Moreover, it explains why governments have to be the ones to initiate these projects, as well as the ones to provide most of the funding.

### 7.5. Conclusion

This chapter tried to answer the question: *what opportunities do investors have in the light rail project?* The aim of this question was to look at the infrastructure gap from the supply of projects' side, contributing to the knowledge why investments are at the current (low) level. To answer the question, the factors have been reviewed that make it difficult to initiate and develop projects from a transaction cost regulation perspective.

#### *Inherent complexities in initiation and development*

There are some inherent complexities in light rail projects which are not found in typical infrastructure projects. Opposed to, for example, highways, mobility in urban areas is mostly an issue for lower layers of government (municipalities, provinces, transport areas). These lower layers of government have to work together to make decisions regarding these projects, as well as in realisation and exploitation. Moreover, these lower layers of government also have to bear most of the costs of the project (together). Light rail is an extremely costly endeavour for budget constrained municipalities and provinces and, in most cases, light rail projects are the most expensive projects that municipalities deal with in a long period of time. Apart from this, since light rail typically runs through dense urban areas, lots of people have to deal with the impact that the construction, as well as the eventual exploitation, has on their lives. While some of the surrounding inhabitants will cheer for an implementation of light rail in their city, others will be opposed to having a light rail line run through their streets.

These factors make light rail projects highly political endeavours. By looking at the cases and using the theory, three factors can be distinguished that increase the chances of the forms of opportunism in light rail projects (and possibly public projects in general) and thereby hamper projects from being initiated. Firstly, it was already mentioned in chapter 3 that public projects are especially political because public budget is used and decisions generally have impact on the lives of inhabitants (Moszoro & Spiller, 2018; Spiller, 2013). In the cases it has been shown that when large amounts of public budgets are used (especially of small public parties) and projects have a large impact on the lives of many inhabitants, decisions get highly political. Moreover, the cases also showed that, when more public parties are involved, the chances of opportunism increase dramatically. The reason for this is that more politicians can contest decisions and more different views and visions are held. Figure 34 shows the three aforementioned factors. These are the three factors that have been found that make projects more political. The fact that light rail projects are highly political, makes for a long and (possibly) disastrous decision-making process. Moreover, hazards during construction and exploitation increase the required return for investors, eventually making it hard to initiate new projects.

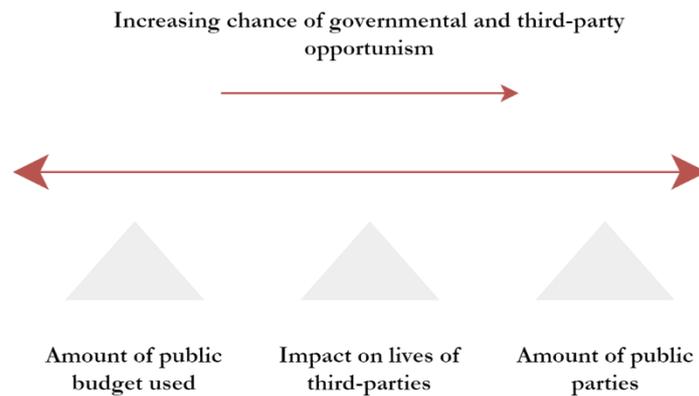


Figure 34: Distinguished causes of governmental and third-party opportunism

In the two cases that have been studied, this mechanism can be observed. Firstly, the Regiotram showed that political opportunism is an important hazard in light rail projects. Because of the high costs for the municipality, as well as the impact on inhabitants in the city centre, there have been constant discussions on whether to continue with the project or not. In this (extreme) case, it even led to a discontinuation of the project. In the case of the Uithoflijn, one could actually see that, when there is general consensus over the necessity of the line, these projects can be successful in the end. Because there was consensus with the municipality, as well as with the province and BRU, the project will be realised in the end, even under the influence of complex governance structures, large failures, and delays. Part of the reason for this was also the fact that the track of the line would run on already existing HOV-bus tracks, making the impact on the lives of inhabitants minimal.

### Key factors in finding solutions

The answer to the posed question is complex and comprises of several different factors, which will also be used in the next chapter to describe the areas where solutions can be found. Whether investors have an opportunity to invest in a mobility infrastructure project in the Netherlands, is mainly determined by whether projects are initiated by governments. It has been shown in this chapter that (at least in the case of light rail) this can be largely explained by governmental and third-party opportunism. But what does this mean for the investors? Essentially, it all boils down to creating political will to go through with certain projects (lowering political opportunism). As mentioned, this depends on the three factors distinguished above. Creating political will means paying attention to these key factors:

1. Funding of the project
2. Stakeholder management
3. Creating political will by aligning different public parties

Applying this to the infrastructure gap, one can use these results to increase the pipeline of projects. The findings can be confirmed when looking at studies about the infrastructure gap, where key factors are named for ensuring a sufficient project pipeline. A study by McKinsey (2016) finds that revenue generation, aligning stakeholders, and project preparation are key. Moreover, they mention that “a great deal of infrastructure development fails at the outset. Land rights may need to be obtained from many owners, political support and funding may need to be secured from multiple jurisdictions, or business models may depend on a large number of co-investors for ancillary revenue generation.” (McKinsey, 2016, p. 24). Lastly, Wyman (2017, p.11) mentions that aligning the interests of numerous stakeholders is key in developing new infrastructure and closing the infrastructure gap. These studies all point to the same three key factors as mentioned above.

Whether the projects will eventually be initiated (and whether investors will have the opportunities to invest), will depend on the management of these key factors. To speed up the development of light rail in the Netherlands and to aid in closing the infrastructure gap, the solutions on the side of the supply of projects have to be looked for in these areas. The next chapter will synthesize on this information and the information found in the previous chapters to recommend solution areas that can be used to develop solutions for reaching the aforementioned goal.

## 8. Synthesis and solution development

The previous chapters have focused on different parts of the problem that was posed at the beginning of the study. The initial chapters have looked at the problem from the investors' side, while the case studies have used the TCR theory to include the availability of projects. This chapter will first synthesize on this information to come to a conclusion on the barriers and opportunities of investment by pension funds in Dutch mobility infrastructure projects. Subsequently, this problem analysis will be used to come up with solution areas where solutions can be found to provide pension funds with more investment opportunities. The next chapter will draw a conclusion on the main question.

### 8.1. Synthesis

The synthesis consists, as mentioned, of two parts. The investment risk and required return have been mapped out by looking at the transaction between investor and infrastructure project. The ability of governments to initiate projects has, subsequently, been analysed using a TCR perspective. Combined, these two parts form the analysis of the infrastructure gap from a transaction cost perspective. One can schematically show this analysis as shown in Figure 35.

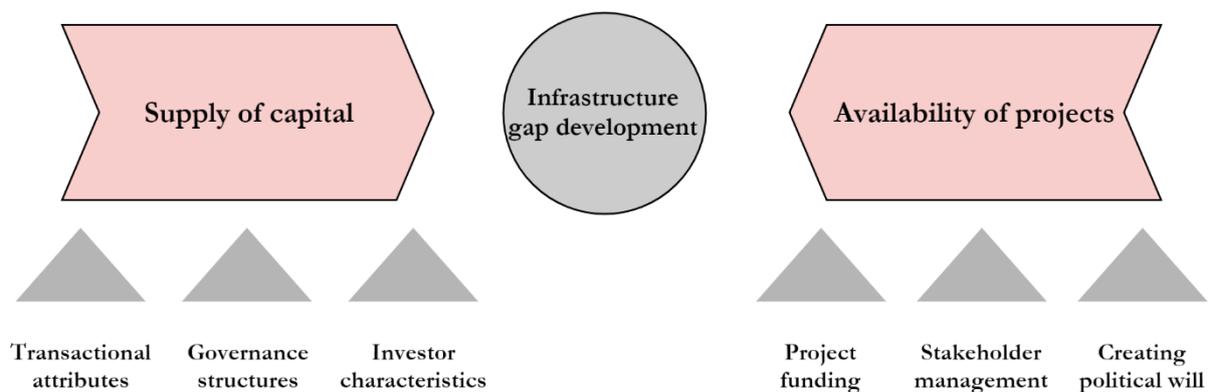


Figure 35: Analysis infrastructure gap from a transaction cost perspective

When looking at the barriers for investment by pension funds, it has been shown in this research that one should pay a close attention to the availability of projects. More specifically, availability of finance is not the most important issue for infrastructure projects in the Netherlands. This is because many investors are currently looking for good investment opportunities due to the low interest rate. From that side, competition in the supply of capital seems to be the most important problem. Of course, capital is always available, as long as enough return on this capital is provided. The fact that investors require high returns because of the inherent uncertainties and governance structures of certain infrastructure projects is an important constraint on the creation of a sufficient pipeline of projects. More importantly, these facts do provide opportunities. The large availability of finance and the quest of investors for good investment opportunities provide possibilities for the initiation of new projects: because of the large competition in the supply of capital, prices of capital drop. Moreover, investors are willing to make more transaction costs for the initiation and development of new projects in exchange for more deal certainty (Interviews: Appendix B).

Yet, the most important barrier for pension fund investment in Dutch mobility infrastructure seems to be the initiation and subsequent realisation of a sufficient pipeline of infrastructure projects, i.e., investment opportunities. Although for many projects there is awareness that something needs to be done, not enough new projects are initiated. The three aforementioned identified key factors for light rail development provide a clue for this. Budget constrained governments struggle to supply the necessary funding for projects, especially when multiple public parties are involved. Due to political fragmentation and third parties opposing decisions, this problem becomes even more apparent. Eventually, new projects are not initiated by public parties on a large enough basis to close the infrastructure gap and provide sufficient investment opportunities for pension funds.

Although the analysis has been done by considering the two sides of the infrastructure gap spectrum which have been identified in the introduction, one cannot deny that both sides are interconnected. Whether

funding can be arranged for projects also depends on the cost of capital for the project. Furthermore, whether investors are willing to supply capital for a project also depends on whether stakeholders and different public bodies are aligned on the plans. Eventually, all factors together contribute to a solution for the infrastructure gap (Figure 36). The next section will use these factors to look at certain areas where solutions for the issue can be explored, to identify how opportunities for pension funds can be grasped.

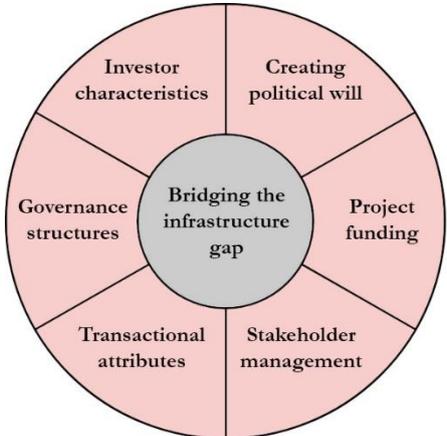


Figure 36: Factors contributing to the infrastructure gap

## 8.2. Solution development

The analysis of the problem is used to identify certain areas where solutions can be found for the infrastructure gap, for light rail in the Netherlands, and to provide pension funds with more investment opportunities. These solution areas are specifically aimed at pension funds and light rail (because the problem analysis was based on this as well), but might also be used to look for solutions for the general infrastructure gap in the Netherlands. In order to identify these solution areas, the factors identified in the previous section will be used. All solutions are aimed at a better alignment of the six identified factors: the factors related to the supply of capital are aimed at lowering the required return for investors, while the factors related to the availability of projects are aimed at improving the pipeline of investable projects. The red parts in the figures next to the solutions show which factors are affected.

### 8.2.1. Approach

As mentioned, the solutions are developed by using the key factors identified in the previous section. Using these key factors, initially, six different solution areas are identified. These solution areas are shown in the next section. To provide for a validation of the solutions, a consultation with experts has been held. The purpose of this consultation was to check the solutions with experts on light rail projects. This makes it possible to provide recommendations on the proposed solutions, as well as to provide for an unbiased opinion.

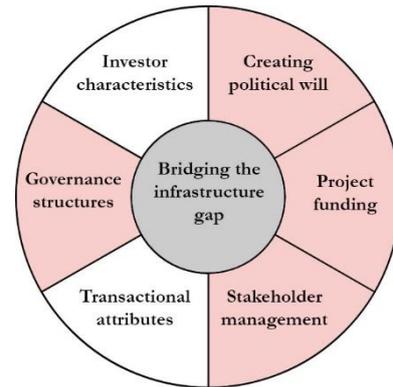
#### Consultation approach

The consultation was done in an expert session with advisors from AT Osborne. In this expert session, the solutions were discussed with experts on light rail projects and on mobility in general. The validation was done as follows. First, the general analysis of the six identified factors was presented. Subsequently, each developed solution was presented, along with the reasoning behind it. Concludingly, a discussion was held, where the comments for each solution were noted. A summary of the statements that have been given is provided in Appendix D. The comments have subsequently been incorporated in the solution areas. The final solution areas are shown in the next section.

### 8.2.2. Solution areas

#### *Provide national recommendations*

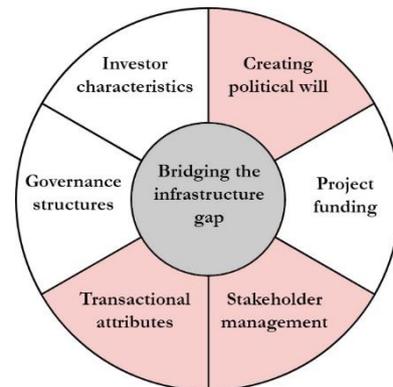
The call for light rail shows that certain problems exist that have to be solved (Duursma & Verlaan, 2018; Verlaan, 2018). However, the problem with light rail (and with public transport in general) is that no uniform problem perception exists, as well as no general idea on which solution should be employed to solve this problem (Interview: Olman). This is fuelled by the fact that many different public parties have to work together (national, regional, municipal), who all might have different ideas on how problems should be solved. This means that, for light rail projects, the three aforementioned factors (funding, stakeholders, and public parties) are hard to get arranged and aligned. A way to improve this is to develop a clear vision on how the problems in the cities should be solved. Important in this respect that this is done by an independent party. Although mobility is mostly an issue for municipalities and provinces, the national government could help speed up the process by being this independent party in determining which regions are most suitable for light rail projects.



The Ministry of I&M developed a national vision on infrastructure in 2012 (Ministerie van Infrastructuur en Milieu, 2012). This national vision includes problems, ambitions and goals, without clear ideas on how these problems should be solved. Moreover, light rail is not included in the vision (Ministerie van Infrastructuur en Milieu, 2012). Concludingly, an overarching plan on how problems in certain areas should be solved could help align stakeholders and different public parties, as well as adequately divide critical funding. This vision could be developed by the national government, as well as by a (new) independent authority for light rail like Rijkswaterstaat.

#### *Focus on programs, or develop in phases?*

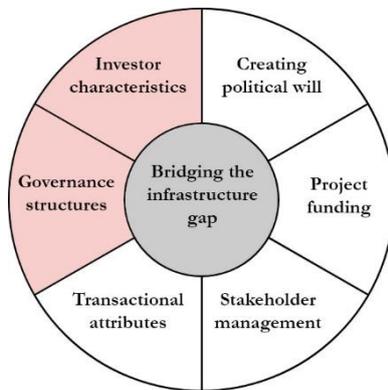
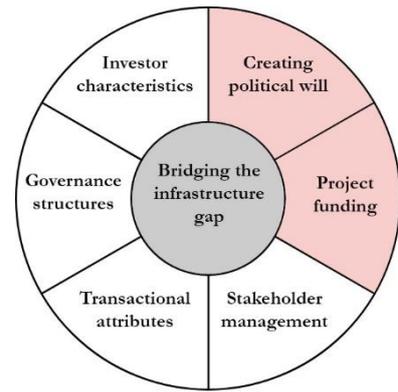
It has been mentioned a couple of times in the interviews that one of the problems with light rail is that the projects are all initiated and realised separately and that there is no integral approach to these projects (Interviews: Invest-NL; Olman). This happens, while many of the problems distinguished in the case-study analysis are universal for all light rail projects. When projects are developed in programs, learning effects can cause many advantages and might solve some of those problems (see explanation of the transactional attribute frequency in section 3.2.1). However, it has also been shown that light rail projects are hugely expensive, and require funding from different layers of government. This means that developing multiple light rail projects together is not realistic (Interview: Olman; Railforum, 2018). This touches upon a dilemma, is it better to realise multiple light rail projects together in a program or to phase and only do one at a time?



A solution could be found in Belgium. In this country, the Flemish government found the same problem with political complexities in the development of mobility projects as was found in this research. Because they saw that learning effects could help dealing with political complexities in mobility projects, they created the Werkvennootschap (De Werkvennootschap, 2018). The aim of this organisation is to integrally work on mobility projects and coordinate the efforts of multiple players, thereby helping to initiate and realise these projects and speed up the decision-making process. A same solution could be employed in the Netherlands. While it seems unreasonable to develop a large program of light rail projects at the same time, a stream of projects could be initiated and realised subsequently. Learning effects can then still be employed to help these projects in dealing with stakeholders and political complexities, as well as in lowering uncertainties of the projects. Moreover, this can reduce the transaction costs for investors, as they can use their experience and knowledge for multiple projects. The aforementioned Invest-NL could play the same role in the Netherlands as the Werkvennootschap in Belgium. A function like this for Invest-NL fits within their task area (Interview: Invest-NL; explained in section 6.2.1).

### Choose wisely

A solution area that touches upon the two previous ones is that certain projects have to be chosen to be initiated, and they have to be chosen wisely. This solution area is derived from a couple of aspects. Firstly, the call for light rail was accompanied by a (maybe excessive) call for funding for various different light rail projects (Duursma, 2018). Yet, it was already mentioned that not all projects can actually be realised right away due to budget constraints. Light rail expert van der Bijl stated in an article in the NRC that actors should think in small steps, making it more realistic and fundable (Duursma, 2018). Apart from this, there is a big variety in necessity of light rail connections and their correspondent revenue generation (Railforum, 2018). This means that, first, proper research has to be done to choose the best projects, with the most chance of success and with the most generation of revenue. This helps to align interests, adequately divides funding, and makes sure the projects with the most chance of success are realised first. Once a couple of projects have been realised, learning effects can make it easier to continue the process. When this is done, it might also be possible to realise more complex projects with less revenue generation. The improvement of the national infrastructure vision could be accompanied by advice on the areas where light rail might be needed the most, and where the most can be earned. This is again something that might be done by a party like Invest-NL.



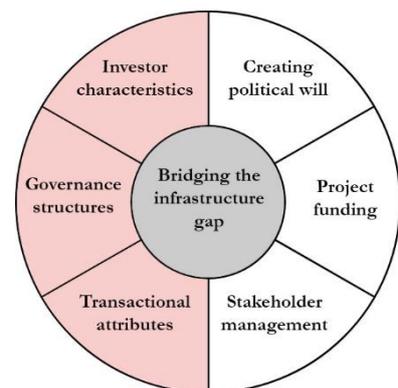
### Cooperate with investors for project initiation

As mentioned, the fact that investors are looking for good investment opportunities also provides some possibilities. Pension funds mention their willingness to make transaction costs in exchange for more deal certainty (Interviews: Appendix B). A solution could be found by exploiting this willingness in looking for viable projects. In fact, institutional investors in the Netherlands have bundled their resources before in order to achieve the same thing. This has been attempted by founding the Nederlandse Investeringsinstelling (Dutch Investment Agency, NLII). However, this organisation was founded to make projects that are already in the market more suitable for investment by institutional investors. Essentially, they are looking for ways to gear the investment (e.g. infrastructure projects) to the financing style of institutional investors, for example by creating investment funds (NLII, 2018). However, this seems not to be the essence of the problem (hence, the discontinuation of the organisation). Most Dutch institutional investors have mechanisms in place that also make it possible to invest in smaller projects (Interviews: Appendix B). Moreover, there is plenty of financing available. The problem is, as mentioned, more in the initiation and business case development of projects. This is where the focus should lay. Maybe investors, in their quest for investment opportunities, could be more involved in the pre-initiation phase.

This again touches upon the previous solution areas; investors could play a role in looking for good projects and developing business cases, as well as in lobbying for projects. The key in this solution is for the investors to be aware of the investment opportunities that exist, as long as these projects are initiated and brought to the market. This might persuade them to be more involved in the process.

### Innovative models for financing

It has been mentioned that one of the key reasons for a high cost of the project are the pricing of the risks (Interview: Olman). Moreover, it has been shown that the required return for investors largely depends on the transactional attributes and governance structure of the transaction. To lower the cost for the project, and thereby make it easier for projects to be initiated, these factors could be improved. A good example of this is in the to be developed Thames Tideway Tunnel. This sewer underneath the Thames in London is one of UK's biggest infrastructure projects (Plimmer, 2017). The equity for this project has been provided by a consortium of institutional investors, including pension funds. The

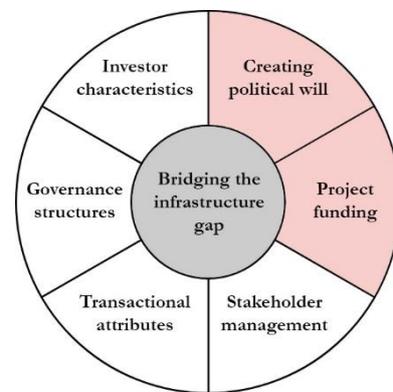


government will provide the project with an insurance, bearing the price of costs overruns and incidents during construction (Grant & Pooler, 2015). This backstop minimizes the risk in the project and encourages investment by institutional investors. Experts mention that this financing model, including protection against certain risks by the UK government, can also be extended towards roads and transport infrastructure (Out-law, 2015). This form of mezzanine capital providing has also been proposed in the interviews with the pension funds (Appendix B). One of the proposals that is made includes a financing model where the government provides insurance against large losses for the investor, but profits from large upsides in revenue generation. This solution makes use of the principal that there are certain risks that are better born by certain actors, to lower the overall cost of the project and attract more investors.

Another part of this solution that is worth mentioning is the mitigation of the political risks of the projects. Olman (Interview) mentions that the biggest risk for light rail projects are the public parties themselves. Moreover, the pension funds mention that large cost reduction can be realised if the public parties take the initiative and make sure that a clear business case exists and permits are granted (Interviews: Appendix B). One can conclude that governments can play a big part in reducing costs of projects by reducing the political risks. This is also named as one of the main tasks for Invest-NL (section 6.2.1), although from the interviews it became clear that they see this as a tough objective (Interview: Invest-NL).

### *Consider different funding models*

One of the key limiting factors that is mentioned is project funding. The reason for this is that public transport projects are generally not generating enough revenue to be self-sufficient (see section 4.1). This means that investors will always rely on governments to provide most of the funding. Tight budgets then mean that many projects will not be initiated at all. In order to solve this, governments and investors can look at models that decrease the necessary funding of their projects. One of the models that has been named is value capturing (Railforum, 2018). This is a model that uses the value increase of the surrounding areas to partly fund the project (Offermans & Velde, 2004). Because light rail projects generally make sure that areas increase in value, this can also be used in the Netherlands. Another thing that can be used has been proposed by the pension funds (Interviews: Appendix B). They mentioned that the government can circumvent tight budgets by selling of existing assets. For example, roads can be sold to investors, after which these investors receive availability payments as in DBFM-contracts. Lastly, the fees for users on public transport could be increased (Railforum, 2018). By increasing fees on high demand public transport lines, the part of funding that the government has to provide can be smaller. However, one has to take into account that increasing fees also makes sure that less people will make use of the form of public transport, possibly diminishing the effect of the newly developed public transport.



## 9. Conclusion, Discussion & Recommendations

The final chapter concludes the research. This is done by combining the previous chapters in an attempt to answer the main question posed at the beginning of the study. After a general conclusion is drawn, there will be a discussion of the results, as well as a short description of the limitations of the research. The chapter will be concluded by recommendations for policy makers.

### 9.1. Conclusion

The aim of this research was to contribute to the knowledge of the infrastructure gap, by looking at both the investment of pension funds in infrastructure projects, as well as by looking at the supply of projects. In order to do this, an analysis has been done from a transaction cost perspective. To arrive at a conclusion, the sub-questions will be addressed first, followed by an answer to the main research question.

#### 9.1.1. Sub-questions

##### *1. How can the theoretical framework be used to analyse investment in infrastructure?*

The first sub-question was posed to determine how the theoretical framework can be used to analyse investment in infrastructure. The theoretical framework consists of transaction cost economics (TCE) and transaction cost regulation (TCR) theories. The commonality between these two theories is that they take the transaction as the unit of analysis. While TCE considers purely private interactions; TCR looks at a transaction between a public and a private actor, taking TCE as a basis. Therefore, both theories could be combined to analyse the transaction between investor and infrastructure project.

The foundation of the transaction cost theories lies in the bounded rationality and opportunism of actors. These factors make all contracts unavoidably incomplete and, as a consequence thereof, make them susceptible to opportunism. The theory consecutively poses that the existence of transaction specific investments and uncertainty increases the risks of opportunism. Actors will have to make large transaction costs to mitigate these risks or will not engage in the transaction at all. This has been applied in the research by making the analogy to investors and infrastructure projects. Whether the investor will engage in the transaction (i.e., invest) will depend on the uncertainty related to the transaction and the governance structure that characterizes this transaction.

Transaction cost regulation has been used to add the distinctive characteristics inherent to public-private interactions. The core of the theory states that the investment level in a country is dependent on the ability of the public actor to mitigate the risks of governmental and third-party opportunism. These forms of opportunism are, in turn, largely influenced by the institutional environment of a country. To study the investment level, this institutional environment has been taken as a variable to determine the influence of the public-private interaction.

The conclusion on this sub-question was that the theoretical framework can be used to study the investment of pension funds in infrastructure projects. More specifically, by looking at the alignment of transactional attributes and governance structure of the transaction, the risks and transaction costs could be determined. These two factors influence the decision for investors to invest in an infrastructure project. Apart from this, TCR can be used to consider the difficulties in initiating infrastructure projects from a public party perspective.

##### *2. What governance structures and transactional attributes characterize the transaction of investing in infrastructure?*

The answer to the first sub-question provided the framework for the analysis of the other sub-questions. First, the framework was used to analyse the transaction between investor and infrastructure project. To do this, the characteristic governance structures and transactional attributes for infrastructure projects in the Netherlands have been analysed. Subsequently, the (mis)alignment of the two has been determined, which causes the risks and transaction costs of the transaction.

The governance structures of the transaction have first been analysed. One has to acknowledge that, for investors to be involved in an infrastructure project, it (virtually) always requires some kind of Public-Private Partnership (PPP). Although investors can make use of multiple investment channels, money is typically channelled into a project using a project finance structure. In this project finance structure, various governance structures can be distinguished with multiple actors. While the interests of some actors

are aligned, most notably the public actor is managed via a contractual agreement. This leaves room for (political) opportunism.

Concerning the transactional attributes of the transaction, a couple of analogies to investing had to be made. When investing in an infrastructure project, the money invested and the corresponding transaction costs create the dependency between the actors. The actual amount of dependency that is created depends very much on the moment when the investment is made (greenfield or brownfield). The aforementioned uncertainty is caused by the risks inherent to the specific project. Lastly, the institutional environment has been found to be relatively decentralised in the Netherlands, causing the risk that third-parties and different public parties contest decisions made by policy makers.

The conclusion of the transaction analysis is that the transactional attributes would describe a more hierarchical structure that aligns the incentives of the multiple actors. Although the EJV that is mostly used aligns the incentives of most actors, there is still room for opportunism with some of these actors. Combined with the general uncertainties surrounding infrastructure projects, the threat of opportunism causes high transaction costs, as well as results in investors requiring higher returns on their investment due to these uncertainties.

### *3. What are the specific characteristics of pension funds compared to other investors that influence the decision to invest in an infrastructure project?*

The analysis revealed that there are large uncertainties and transaction costs involved in investing in infrastructure projects, which might not be found in other investment opportunities. Because uncertainties can be offset by adequate return, it will eventually depend on the type of investor whether the investment will be made (as well as on whether the required return can be provided, which is treated in the fifth sub-question). To determine the likeliness of pension funds investing in certain infrastructure projects, their investment characteristics have been analysed.

The most distinct characteristic of pension funds compared to other investors is their liability driven investment strategy, which means that the pension funds invest in projects with due regard to the liabilities they possess. Consequently, pension funds are generally more risk-averse than the average investor and are looking for investments with a long-term, stable cash-flow. Dutch pension funds are special in this respect, by being even more risk-averse than their colleagues abroad, and by being world-leader in cross-border investing.

One can conclude that pension funds will be hesitant to invest in infrastructure projects with high risk/high return characteristics. Moreover, pension funds will be more willing to invest in greenfield than in brownfield projects. Lastly, projects where large risks for governmental and third-party opportunism exist are likely to be passed for other infrastructure projects. These factors also have an influence on the relative amount that is invested in infrastructure compared to other asset classes.

### *4. What conclusion can be formulated about the barriers of investment in infrastructure by pension funds?*

The insights gained from the second and third sub-questions have been synthesized and combined to a final conclusion on the barriers of investment by pension funds from a transaction cost perspective. This conclusion is subsequently tested by interviews with the pension funds themselves. For these interviews, the biggest asset managers in the Netherlands have been interviewed, as well as the new investment agency in the Netherlands (Invest-NL).

The conclusions are two-fold. While most expectations from the theoretical analysis have been confirmed, the influence of the economic situation shed new light on the issue. Most notably, in normal economic times, pension funds would still prefer to invest most of their capital in brownfield assets and projects that are characterized by lower uncertainties. However, because of the low interest rate and large competition in the supply of capital, pension funds are fiercely looking for new investment opportunities in infrastructure; including greenfield projects. This means that the interviews point to the fact that the most important barrier for investment is competition in the supply of capital and that the solution for the infrastructure gap is likely to be found on the availability of projects' side of the issue.

However, the analysis remains crucial when shifting the attention to the other side. Whether projects will eventually be realised depends to a large extent on the amount of funding public parties have to supply. This amount of funding is, in turn, dependent on the amount of return that investors require, which can be described by the theoretical analysis. Moreover, the most important conclusion from the initial

analysis will be taken into account to analyse the projects. This conclusion is the fact that investors seem to have a wait-and-see attitude when it comes to the initiation and development of new projects. As a result of this wait-and-see attitude, public parties have to be the ones to initiate new projects. This mechanism is analysed in the last sub-question.

#### *5. What opportunities do investors have in light rail projects?*

To analyse the infrastructure gap from the side of the availability of projects and to provide pension funds with investment opportunities, light rail in the Netherlands has been analysed. The purpose of this analysis was to look at the factors that might prohibit light rail projects from being realised, lowering the availability of investment opportunities. To do this, light rail has been analysed in general, as well as by looking at two cases from a transaction cost regulation perspective.

TCR theory claims that the investment level of a country is dependent on the ability of that country to mitigate the chances of third-party and governmental opportunism. Due to the decentralised institutional environment in the Netherlands, these forms of opportunism particularly show themselves in different governmental institutions and third-parties contesting each other in decision-making, which eventually slows down or even halts new projects from being initiated. From the analysis of the investors it became clear that, in the Netherlands, most investors are quite comfortable with these risks, because they mention that most of these risks are mitigated when permits are arranged. This pointed to the fact that the acquiring of these permits is the actual bottleneck. In light rail projects, one can observe this mechanism. From the analysis, it has become clear that light rail projects contain some factors that make them inherently political and thus hard to realise. Two such factors are the large amounts of public budget used and the profound impact of such projects on people's lives. The fact that multiple public parties are involved, makes both factors even more imminent. More public parties, means more chances of opposition, and thus less chances of successful and swift decision-making. Concludingly, together with the TCR theory, three key factors can be distinguished that are the main determinants of this political complexity, namely: the amount of public budget used, the impact on the lives of inhabitants, and the amount of public parties involved.

The answer to the last sub-question can be found in these factors. In order to provide investors with enough investment opportunities and to close the infrastructure gap, projects have to be initiated and brought to the market by the government. In light rail projects, it has been found that this is especially difficult when these factors are highly present. Therefore, to provide investors with more investment opportunities, attention must be paid to these factors.

#### **9.1.2. Research question and main conclusion**

The answers to the sub-questions are combined to give an answer to the main question. The research question posed at the beginning of the research is the following:

*What barriers and opportunities can be distinguished for pension fund investments in Dutch mobility infrastructure projects?*

The most important barrier identified in this research is the availability of infrastructure projects (i.e., investment opportunities) with an appropriate risk-adjusted return. This is proven by the fact that pension funds are looking for good investment opportunities in infrastructure, but cannot seem to find them. The fact that there are not enough projects available for pension funds does have important reasons.

Firstly, pension funds depend on other parties for the initiation and front-end development of their projects. In mobility infrastructure projects in the Netherlands, this is in most cases a public party (because in the end, they have to provide the funding). This wait-and-see attitude is caused by the fact that pension funds are not allowed to take the same risks as project developers, due to their liabilities. A consequence of this is that pension funds will wait for other parties to initiate and develop the projects. Because of the large sums of capital that pension funds possess and the competition in the supply of capital that is currently soaring, enough projects cannot be initiated on a large enough basis to increase their (relative) allocations to infrastructure.

Yet, the infrastructure gap remains and officials in the Netherlands keep calling for more investment in infrastructure by pension funds. An answer to this can be found by considering the following. Mobility infrastructure projects in the Netherlands depend on public parties initiating projects and providing necessary funding. This, however, has turned out to be too difficult to close the infrastructure gap and provide pension funds with enough investment possibilities. On the one hand, pension funds are required to make sufficient returns on projects, influenced by the inherent uncertainties, transaction costs and

chances of opportunism. This can make it challenging for governments to provide the necessary funding. On the other hand, political complexities make it hard to initiate projects on a large enough basis. When looking at light rail projects, the most important reasons identified in this research are political ones. Due to the fragmented institutional environment in the Netherlands, decisions about these projects are profoundly hard to make. In projects like the light rail, where decisions have to be made by multiple public actors, impacting numerous stakeholders, and using tight budgets from different public parties, decision-making can be too slow to generate enough projects to close the infrastructure gap.

These conclusions about the barriers have been used to look for areas where solutions can be found in order to exploit the opportunities available. These opportunities are derived from the fact that pension funds actually desire to invest more in Dutch infrastructure and that the cost of capital is considerably low due to the aforementioned competition. Opportunities can be exploited both by looking at pension funds themselves, as well as by increasing the supply of projects. When looking at pension funds, they can be more involved in the initiation and development of projects. Pension funds in the Netherlands are already among the top of the world when it comes to investing in greenfield projects; thinking about moving up even higher in the chain is worth the effort.

On the other hand, when looking at light rail, a streamlining of project initiation and development by governments has a big chance of creating more opportunities. Developing national recommendations and looking at programs of projects can be key in aligning public parties and stakeholders, as well as in adequately dividing tight public budgets. Moreover, innovative models for financing and funding have to be considered to lower the overall costs of light rail projects, to increase revenues earned, and to decrease the risks for investors. This can make sure that investors such as pension funds are more willing to invest in these projects. These solutions are primarily aimed at light rail, but can serve as suggestion for where solutions can be found for the general infrastructure gap in the Netherlands. A combination of the aforementioned factors could aid in allowing investors to invest more in Dutch infrastructure, as well as in closing the infrastructure gap.

Concludingly, the most important message from this research is the following. Although pension funds can have a stake in closing the infrastructure gap and implementing light rail, they will not be the ones to solve the problem. Pension funds are eventually always dependent on politics in order to be able to invest more in infrastructure. In the end, solving the infrastructure gap boils down to creating political will. More specifically, when there is actual profound willingness with all (public) actors to develop new (light rail) projects, inevitably some ways will be found to do this. In this case, problems such as funding, financing, stakeholder management, and mostly decision-making will undoubtedly be overcome. In this respect, the impact of what Spiller described as governmental and third-party opportunism is crucial. The many public bodies, their corresponding ways of decision-making, and the large interest and influence of third-parties are big threats to creating this political will. It is just hard to develop a sufficient pipeline of infrastructure projects in the Netherlands when the interests of all these actors have to be aligned.

Yet, although difficult, the tools that have been given in this research can aid in making projects more attractive, both for investor, as well as for the public parties. This can help in creating political will, as well as speed up decision-making. However, although it has been shown that decision-making can slow down project initiation, it is important to realise that this process is necessary to achieve democratic solutions. Therefore, when thinking about how to close the infrastructure gap by speeding up decision-making, one should pay close attention that democratic principles remain intact.

### **9.1.3. Contribution to literature**

The main goal of this research was to solve the problem posed at the beginning of the research. However, this has been attempted by applying theories to the issue which have not been applied in such a way before. As a result, two important aspects have been learned that form a contribution to the literature. Firstly, it has been shown that the TCE theory can be used to describe the transaction of investing in infrastructure. Although some assumptions had to be made, the theory can describe the height of the investment risks and transaction costs that investors are exposed to. Furthermore, the TCR theory has been applied to the Netherlands, to see how the mechanisms of this theory translate to the Dutch situation. An important finding is the fact that, in the Netherlands, the forms of opportunism seem to show themselves more in the ability to initiate and develop projects, than in keeping investors from investing. The main reason for this is that investors are quite comfortable with these risks when all permits are arranged. Moreover, investors can

simply require higher returns. An added contribution to this theory is the seemingly large influence that the fragmented political environment has on the issue in the Netherlands, as well as the substantial influence of the various different public bodies.

## 9.2. Limitations

There are two important limitations that need to be discussed. The first limitation concerns the analogy that forms the backbone of the research. The conclusions that have been drawn about the infrastructure gap and investment in infrastructure are derived from this analogy. The analogy consists of the pension funds on the one side, and light rail projects in the Netherlands on the other. Of course, one can neither make definite conclusions about investing in infrastructure, nor about the infrastructure gap in general, simply by analysing a big and complex issue like the aforementioned with a mere analogy. Both parts of the analogy are quite specific: pension funds are a rather special type of investor, while light rail are unique kinds of projects. However, the research does not claim to provide definite conclusions on the issue. Rather it aims to provide guidance in identifying problem and solution areas. The conclusions that have been drawn are primarily applicable towards the analogy. Moreover, the recommendations about how opportunities can be grasped serve as guidelines for parties involved in the issue. Eventually, they are the ones that should be eager to exploit the opportunities and solve the problems.

The second limitation concerns the research method. The problem has been analysed from a transaction cost perspective. This means that all conclusions and recommendations are drawn from this perspective. This might result in two specific problems. Firstly, as mentioned, it is the first time that both theories are used on an issue like this. Because the theories are in principle not meant to be applied to investing, issues can arise. In the research, this has been tackled by operationalizing in such a way, that the theories are applicable to the problem. Doing this might cause unforeseen issues in compatibility. Apart from this, looking at a problem from this perspective might result in a too narrow view on the issue. The theories direct the research in a way that is suitable for the chosen theories, possibly overlooking other factors that may be a cause of the problem. Both problems have been attempted to solve by incorporating views of multiple interviewees.

## 9.3. Recommendations

To conclude the research, recommendations are given. The general recommendations are aimed at policy makers and investors involved in the development of infrastructure in the Netherlands. Additionally, recommendations are given for further research.

### 9.3.1. General recommendations

This research started with the introduction of the infrastructure gap. All over the world, there exists a gap between investment needs and the governments' ability to fund new infrastructure. In the Netherlands, this especially causes a constraint on economic growth. From the analysis of pension funds and the light rail project it becomes clear that, while there certainly is willingness to invest more in infrastructure, there is a lack of ability to create a sufficient pipeline of investable projects. It is in the best interest of public parties, investors, as well as other stakeholders to find solutions for this problem.

The problem analysis of this research and the corresponding solution areas that have been identified can aid in this goal. It is recommended that involved actors become aware of the problems that have been identified in this research. For investors, it is important to be aware of the opportunities that exist for them to invest more in infrastructure. Moreover, awareness among them needs to be raised that a more pro-active stance in the development process of new infrastructure might actually provide them with more possibilities for investment in infrastructure. Apart from this, public parties have to be aware of the effects that a low investment level in infrastructure can have on a country. Furthermore, they should realise that there are considerable opportunities for more development at the moment. By exploiting the investors, low cost of capital can be realised, and infrastructure can be developed at a lower cost.

The involved actors can use the proposed solution areas as a guideline to develop more tailored solutions. Moreover, they can be used to get actors more aligned to achieve a common goal: enhancing people's lives by improving the state of the infrastructure in the Netherlands.

### **9.3.2. Recommendations for future research**

Some parts of the study lend themselves particularly well for future research. Firstly, as mentioned, the TCR theory manifests itself in a rather different way in the Netherlands than Spiller (2013) had originally proposed. Although the forms of opportunism are the same, they seem to affect the initiation and development of projects more than the investors' willingness to invest. How exactly this mechanism applies in the Netherlands, could be the subject of future research.

A second important research area is the application of the theory in different infrastructure sectors. As mentioned, the infrastructure gap has been analysed specifically by looking at light rail projects. Therefore, different conclusions could be drawn when looking at different types of projects. To fully grasp how the infrastructure gap works in the Netherlands, future research could be aimed at different sectors.

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## Appendix A: Interview guide pension funds

This appendix shows an interview guide that is used for the interviews with the pension funds. For each pension fund, slightly different questions were asked. The interview guide shown in this appendix is the one used for the interview with fund manager PGGM, and serves as an example. The interview was performed in Dutch.

### Interview guide

#### Introductie

Toestemming vragen om interview op te nemen

Korte introductie van onderzoek - heeft u hier nog vragen over?

Wat is uw functie binnen PGGM?

#### *Huidige situatie*

1. Op welke manieren investeren jullie op dit moment in infrastructuur?

Greenfield/brownfield, fonds-direct, beursgenoteerd, eigen vermogen-vreemd vermogen

1A. Als jullie direct investeren, vanaf welk moment stappen jullie dan doorgaans in een project?

1B. Wat voor rol vervullen jullie dan in projecten behalve enkel het verschaffen van kapitaal?

2. Worden over het algemeen de doelstellingen van hoeveelheid investeringen in infrastructuur gehaald?

2A. [Indien nee] Wat zijn volgens u de belangrijkste redenen dat dit niet gebeurt?

2B. Zijn er genoeg projecten in Nederland hiervoor?

3. Allocatie naar infrastructuur verschilt nogal per pensioenfonds (PGGM 3,8%). Daarnaast zie ik dat infrastructuur een aardig rendement heeft gehaald voor PGGM vorig jaar. Denk u dat het over het algemeen goed zou zijn voor pensioenfondsen als er meer zou worden geïnvesteerd in infrastructuur?

3A. Ziet u nog mogelijkheden in Nederland voor meer investeringen in infrastructuur voor uw fonds?

#### *Investeren in infrastructuur*

4. Welke factoren worden allemaal meegenomen bij een beslissing wel of niet te investeren in een infrastructuurproject?

4A. Dus als ik het goed begrijp gaat het vooral om: Risico; rendement; transactiekosten?

5. Wat maakt een specifiek infrastructuurproject nou attractief om in te investeren?

5A. En behalve risico/rendement?

6. Zijn er dan ook nog bepaalde specifieke voorwaarden waaraan een infrastructuurproject moet voldoen, wil het attractief zijn om in te investeren?

7. Wat ziet u als de belangrijkste redenen om niet te investeren in een infrastructuurproject?

8. Wat zijn volgens u de belangrijkste voordelen van het investeren in infrastructuur voor pensioenfondsen?

9. In hoeverre is socially responsible investing een factor in investeringsbeslissingen?

#### *Investeringsvormen*

10. Investeren jullie bij voorkeur direct in een project? (Beursgenoteerd - niet beursgenoteerd fonds, directe investering in een project, etc.)?

10A. In hoeverre speelt liquiditeit daarin een rol?

10B. Speelt de behoefte aan in-house expertise hierin een rol?

11. Zijn er genoeg infrastructuurfondsen beschikbaar om in te investeren?

#### *Transactiekosten en grootte van projecten*

12. Met transactiekosten [beheerkosten] bedoel ik de kosten die gepaard gaan met het zoeken naar juiste investeringen, het meedoen aan tenders, de kosten van het opzetten van de contractstructuren, het monitoren van het contract en project, etc. In hoeverre spelen deze kosten een rol bij de keuze om te investeren in een infrastructuurproject?

12A. Welke kosten zijn dan het belangrijkste?

12B. Denkt u dat als deze kosten lager zouden zijn het zou leiden tot meer investeringen in infrastructuur?

13. Houden jullie een minimale grootte aan waar een individueel project aan moet voldoen voordat er door jullie wordt overwogen om erin te investeren?

13A. Wat is de belangrijkste reden dat projecten minstens een bepaalde grootte moeten hebben en hoe groot is dat ongeveer?

13B. Stel dat transactiekosten worden verlaagd voor individuele projecten, zouden dan kleinere projecten aantrekkelijker worden?

13C. Misschien is één project te klein. Maar wat als er nou een programma aan (lightrail) projecten komt waar aan het eigen vermogen bijgedragen kan worden?

### *Risico's*

14. Wat zijn volgens u de belangrijkste risico's voor pensioenfondsen bij investeringen in een infrastructuurproject?

15. Hebben constructie gerelateerde risico's een grote invloed op een keuze om te investeren?

15A. Ook als deze gealloceerd worden naar bv een EPC-aannemer?

16. Met contract risico's bedoel ik het risico dat een van de tegenpartijen de afspraken van het contract niet na komt, ook door het onvermijdelijke dat een contract niet altijd water dicht is. Voorbeelden zijn: inadequate verdeling van risico's, onvermogen van het contract om met veranderingen om te gaan, dispuut over prijsstijgingen, etc. Hoe belangrijk is dit risico voor de beslissing om te investeren in infrastructuurprojecten?

17. Met politieke risico's heb ik het over het risico dat overheden regels veranderen, geen vergunningen verschaffen, etc. Hoe belangrijk is dit risico voor de beslissing om te investeren in een infrastructuurprojecten?

17A. In Nederland spelen decentrale overheden een relatief grote rol; ook hierin speelt een risico van oppositie. Hoe belangrijk is dit risico om te investeren in een project?

18. Met risico als het gevolg van derde partijen heb ik het over oppositiegroepen, milieugroepen, omwonenden en lagere overheden die protesteren tegen beslissingen waardoor projecten vertraging oplopen. Hoe belangrijk is dit risico voor de beslissing om te investeren in een infrastructuurproject?

19. De contractvorm heeft veel invloed op de risico's die de partijen lopen. Wat is de invloed van het terugverdienmodel op de investeringsbeslissing? (Dan heb ik het over inflatie gelinkte vergoedingen, availability gebaseerde vergoedingen, garanties door de overheid, etc.)

19A. Zijn projecten gebaseerd op een beschikbaarheidsvergoeding in die zin aantrekkelijker voor pensioenfondsen?

19B. Zijn stabiele cash flows iets wat infrastructuur over het algemeen aantrekkelijker maakt?

### *BAM Joint-venture*

20. Wat zijn de belangrijkste redenen voor het aangaan van de joint venture?

21. Wat is het voordeel wat jullie hiermee behalen?

22. Dit kapitaal wordt dan als risicodragend vermogen ingebracht in projecten?

23. Kunnen de projecten waar jullie dan kapitaal voor leveren hierdoor kleiner zijn?

24. Wat willen jullie bereiken met het PGGM infrastructuurfonds?

### *Oplossingen*

25. Heeft u zelf nog ideeën over wat de overheid dan wel specifieke projecten zelf kunnen doen om investeringen vanuit pensioenfondsen te bevorderen?

26. Misschien zijn er niet genoeg projecten in Nederland om in te investeren, maar er zijn in ieder geval genoeg mogelijkheden. Daarnaast is het rendement hoog en zijn er veel voordelen aan infrastructuur. Ziet u nog mogelijkheden om hierin een wat meer pro actievere houding in te nemen? Kijken naar projecten die nog benodigd zijn, wat eerder in het proces instappen?

27. De overheid heeft een nieuwe investeringsinstelling opgezet, genaamd NL-Invest, waarbij de overheid €2.5 miljard beschikbaar heeft gesteld voor investeringen. Denkt u dat het meedoen van deze instelling in projecten een positief effect heeft op het aantal investeringen van pensioenfondsen in infrastructuur?

28. Denkt u dat het verlagen van de transactiekosten voor pensioenfondsen voor investeringen in infrastructuur een significant positief effect heeft op het investeringsniveau?

29. Denkt u dat het verlagen van de risico's door middel van garanties door de overheid een significant positief effect heeft op het investeringsniveau?

### *Lightrail*

30. Zijn er bepaalde karakteristieken van lightrail projecten die het wel/niet aantrekkelijk zouden maken?

30A. Individuele projecten van lightrail kunnen te klein zijn. Zien jullie er iets in als er nou een programma komt aan hetzelfde soort light projecten waarin jullie kunnen investeren?

Afsluiting

Akkoord gaan met notulen

Vragen voor mogelijkheid om later vragen te stellen

Delen van resultaten

## Appendix B: Summary of statements interviews

This appendix shows a summary of the statements derived from the interviews with the pension funds. The statements are collected and grouped on specific categories. On request, full transcripts of the interviews are available.

<b>Manier van investeren</b>	<b>APG</b>
Hoofdvraag: op welke manieren investeren jullie op dit moment in infrastructuur?	We doen alleen niet beursgenoteerd met ons team. Fondsen en direct.
	We investeren alleen in fondsen met een duidelijk doel.
	We investeren alleen zelf voor een minimum van €100 miljoen, anders doen we het via een manager.
	Voor een passieve investering kunnen we meer dan 50% in equity stoppen, actief minder dan 50%. Passief wil zeggen een SPV waar de O&M en alles is uitbesteed.
	We willen sturing kunnen geven aan ons geld, daarom stoppen we geen geld meer in fondsen waar we niet van weten wat er met het geld gaat gebeuren.
	De UK asset manager vertegenwoordigt APG dan in onderhandelingen en in projecten. Binnen SPV's zijn zij de contractpartij.
	<b>PGGM</b>
	PGGM investeert direct in projecten.
	PPP's zijn over het algemeen relatief kleine projecten, daarom doen we dat ook altijd in portefeuilles. Er gaat 20, 30, 40 miljoen risicokapitaal in, dus wij zoeken daar altijd samenwerking met een partner die dat voorwerk doet. Dan hebben we afspraken dat wij geen ontwikkelingsrisico en biedingrisico lopen, wij stappen pas later in.
	Voordelen joint venture BAM? PPP is een hele aantrekkelijke markt, maar de projecten zijn te klein. Het haalt ook de middle-man eruit. We kunnen het ook in een fonds investeren, maar dan zitten er weer allemaal partijen tussen.
	<b>MN</b>
	MN investeert alleen in fondsen. Mede door de behoefte aan in-house expertise.
<b>Invest-NL</b>	
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<b>Problemen met investeringen in infrastructuur</b>	<b>APG</b>
	Het wordt vooral veroorzaakt door de concurrentie.
	We zouden meer in Nederland willen doen maar de returns zijn op dit moment gewoon echt te laag.
Hoofdvraag: wat is volgens u de grootste reden dat er op dit moment niet meer in infrastructuur geïnvesteerd wordt door pensioenfondsen?	Grootte en aanbestedingstraject van projecten maakt het lastig voor pensioenfondsen om naar dat soort projecten te kijken.
	<b>PGGM</b>
	Nederland is te klein om veel in te investeren.
	Je ziet in Nederland ook van de totale infrastructuur markt dat een groot deel gewoon niet voor ons toegankelijk is voor privaat kapitaal.
	In feite is het een vraagstuk wat bij de overheid ligt. En de overheid heeft een investeringsagenda, ook op het vlak van infrastructuur of gebiedsontwikkeling, waar infrastructuur een component van is, en bij de overheid ligt de vraag hoe ga ik dat invullen. Ga ik dat met de overheidsfinanciering, overheidskapitaal invullen of kies ik daar een private oplossing voor. De keuze is in Nederland vaak om het met overheidsgeld te doen.
De bottleneck zit aan de kant van de opdrachtgever of de initiatiefnemer, ja kun je een project ontwikkelen, naar de markt brengen.	

	We kunnen het niet sneller investeren.
	Kijk wat ik wel merk ik dat vanuit de overheid heel vaak gekeken wordt van hé, er is een financieringsprobleem, maar vanuit ons perspectief is er totaal geen financieringsprobleem. Heel de wereld wordt overspoeld met geld.
	Als er ergens een tekort aan is, dan is het regievoering op investeringsagenda van, en met name het in detail uitwerken. Nou en nogmaals het offshore wind verhaal in Nederland geeft aan hoe je dat op een ongelooflijke efficiënte manier kunt doen. En daarvoor moet de overheid investeren in kennis en een klein beetje geld meenemen om wat aanloopkosten te pakken, maar de markt pakt het daarna heel snel op.
	<b>MN</b>
	De overheid is ook niet bereid om forse premies te gaan betalen om pensioenfondsen in te laten stappen. Dus dan gaan wij gewoon ergens anders heen.
	Niet elke infrastructuur beleggingsmogelijkheid sluit aan bij de wensen van de pensioenfondsen. Dus ondanks dat er een enorme gap is, ook in Nederland wil men graag meer infrastructuur, komen sommige dingen gewoon niet van de grond, omdat de beleggingsmogelijkheid zelf gewoon niet interessant genoeg is.
	Ja en de relatieve attractiviteit van de asset. Hetzelfde type belegging in België of in Engeland of in Amerika als die beter is dan doen we die.
	<b>Invest-NL</b>
	Geen probleem op dit moment, er is eigenlijk genoeg investeringsgeld in de Nederlandse economie. Pensioenfondsen zeggen er zijn niet genoeg goede projecten. Probleem is meer dat projecten te klein zijn. We moeten zorgen dat die projecten gebundeld worden.
	Er is op dit moment geen probleem om aan kapitaal te komen als je een goede business case hebt. Eigen vermogen is dan een beetje lastiger.
	Zelfs als de business case er is, dan kan een pensioenfonds nog zeggen, ik ben wel bereid het te doen, maar dan wil ik 6% rendement op het risicodragend vermogen dat ik in breng. Dat kan nog te hoog zijn.
	Pensioenfondsen pakken wel een rolletje om risicodragend vermogen voor elkaar te krijgen, want daar zien ze een leuk rendement. Maar dan moet er wel een stabiele Nederlandse overheid achter zitten en een hele goede business case.
	Om de infrastructure gap te dichten vergt het toch altijd weer bekostiging. Van wegen verbreden krijg je geen extra inkomsten. Dus dat moet dan komen uit geld wat in de rijksbegroting apart wordt gezet. Dat gecombineerd met die ongelofelijk lange planologische voorbereidingstijd. Dus ik ben daar heel pessimistisch over eigenlijk.
	De oplossingsrichting is niet in de financiering, maar bijna voor heel veel sectoren, ook voor de verduurzamingsopgave zit iedereen zich suf te piekeren kunnen we het allemaal financieren. Nee, kunnen we het bekostigen.
	Ja in China daar is de politieke besluitvorming natuurlijk veel sneller. Is het veel makkelijker om daar te investeren. Hier heb je zo lange doorlooptijd van alle procedures en zo veel partijen die weer roet in het eten kunnen gooien.

<b>Doelstellingen</b>	<b>APG</b>
Worden over het algemeen de doelstellingen van hoeveelheid	Allocatie is 3% maar dat wordt meer gedreven door hoeveel we weg kunnen zetten. We zouden wel meer weg willen zetten maar er is simpelweg te veel kapitaal om goede deals te doen.
	<b>PGGM</b>

investeringen in infrastructuur gehaald?	We zouden wel meer willen investeren in infrastructuur, maar er is gewoon niet genoeg aanbod.
	<b>MN</b>
	Doelstellingen qua hoeveelheid investeringen in infrastructuur worden gehaald, rendement ook. Er is nog wel ruimte voor meer beleggingen in infrastructuur.
	Er zijn genoeg fondsen op de markt om in te beleggen. Als je daar 50 of 100 miljoen in kwijt wilt, is dat geen enkel probleem.
	Het zit niet aan de ideale allocatie. Wat de boer niet kent lust hij niet. Het heeft ook een tijd geduurd voordat men comfortabel werd met infrastructuur.
	Pensioenfondsen krijgen ook steeds meer geld, dus het is moeilijk om de allocatie op peil te houden dan wel te verhogen. Dat is ook een uitdaging.
	<b>Invest-NL</b>
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<b>Attractiviteit van investeringen</b>	<b>APG</b>
	We investeren liever in een bestaand project. Als je in een bestaand project stapt, heb je beter zich op de cash flows. Dat maakt de investering stabiel, en dan vereisen we ook minder rendement.
Wat maakt een specifiek infrastructuurproject nou attractief om in te investeren?	Kijk je naar een availability based programma een beetje als je niks fout doet dan weet je precies wat je gaat krijgen dus dat is voor ons een perfecte investering.
	Maar dan moet er zeg maar alle vergunningen moeten er al zijn en dan moet eigenlijk het EPC-contract er zijn en dan hoeft het alleen nog maar gebouwd te worden. En dan hebben we eigenlijk een verschil als het dan zeg maar om een PPP-contract gaat dan heb je eigenlijk dat, dan wordt het gewoon gebouwd en vanaf dan beginnen de beschikbaarheidsvergoedingen, dat is voor ons prima.
	Als wij een investering doen dan zoeken we toch wel vaak naar iets wat of al bestaat of wat nog gebouwd moet worden maar waarbij we zo snel mogelijk na de bouw gewoon die beschikbaarheidsvergoedingen krijgen en als ze daar nog een soort commercieel risico moeten lopen dan valt het voor ons al heel snel af.
	Maar als het om beschikbaarheidsvergoedingen gaat dan kunnen we het wel doen. Mits de EPC is gedaan en vergunningen en dat soort dingen.
	Het gaat vooral om of we een goed beeld hebben van de revenues van een project. Het gaat dus vooral om risico-rendement profiel. Daarnaast: inflatie component en looptijd van het project, of het in Nederland is.
	Nou kijk als er een maatschappelijk tintje aan zit zoals lightrail, mobiliteit te vergroten en ja dan denk ik dat dat zeg maar nog een streepje voor heeft.
	<b>PGGM</b>
	Dus wij zoeken bijvoorbeeld in duurzame energie naar investeringen waar de omzet, de opbrengsten, maar ook de kosten over de langere termijn zijn vastgelegd. In Noord-Amerika kan dat nog, in Europa kunnen we bijna geen afnamecontracten meer afsluiten.
	Ook bij tolwegen, we hebben of een contractueel afgesproken iets, of we hebben een concessie waar we een bepaalde prijsafpraak in hebben en waar wij het volume risico van het verkeer moeten inschatten, nou dat is altijd GDP gerelateerd dus daar kun je wel een inschatting van maken.
	Dus je ziet in onze hele portefeuille, het gaat eigenlijk over die hele lange termijn, twintig dertig jaar, een grote mate van zekerheid hebben op de kasstromen.

	DBFM-contracten zijn zeker aantrekkelijk. Die zitten wel heel erg aan de laag risico kant van het spectrum en dat betekent ook een relatief laag rendement. Dus we hebben die zeker ook in de portefeuille, alleen het rendement profiel is momenteel dusdanig, iedereen wil deze assets hebben, dat is wel een hele competitieve markt.
	Kijk bijvoorbeeld naar offshore wind, dat zijn veel grotere investeringen nou daar hebben we in het verleden zijn we ook wel in de bouwfase ingestapt om een stukje bouw risico te nemen. Dus het is heel erg afhankelijk van het type investering, de omvang en welke rol wij daarin kunnen spelen.
	Onze voorkeur is liefst operationele assets die al gebouwd zijn, omdat het ons te doen is om, die de lange termijn kasstroom, en wij zoeken niet zozeer naar het bouw rendement, of het ontwikkelrendement of het bouwrendement.
	Wij zoeken echt gewoon die 20, 30 jaar stabiele inkomstenstroom.
	We hebben, zeker als het over bouwprojecten gaat hebben we altijd iemand nodig die dat stuk heel goed snapt. En dat maakt de markt al een stuk kleiner. En daar zal wel een rendement tegenover staan, maar wij zien momenteel nog zoveel kansen in gewoon de bestaande investeringsmogelijkheden dat we dat op dit moment veel interessanter vinden.
	Welke factoren worden meegenomen? Past het binnen de beleggingsopdracht/risico-rendement profiel, hebben we voldoende zeggenschap, of er voldoende langetermijnperspectief in zo'n investering of sector zit. Past het binnen de ECG-visie.
	Belangrijk is een inflatie-link. Dat maakt het zeker voor pensioenfondsen wel een hele interessante maar wel heel nadrukkelijk gekoppeld met het risico/rendement profiel wat ik eerder heb beschreven. En dat soort investeringen zijn interessant.
	<b>MN</b>
	Je hebt gewoon een beleggingsmix en daar gaat een deel van naar infrastructuur.
	Inflatie component is alleen belangrijk als het Nederlandse inflatie is.
	Het is makkelijker om gewoon iets te kopen wat al bestaat.
	Zit de overheid een beetje krap bij kas, dan kunnen ze ons ook die grote A-wegen over laten nemen. Zo werkt het niet in Nederland, wel in Amerika. Dus dat is wel interessant want dan ligt er al iets, en dan neem je iets over, dan ben je dat hele ontwikkelingsrisico ben je kwijt. Daarom ligt onze focus met name op bestaande infrastructuur.
	<b>Invest-NL</b>
	Pensioenfondsen willen verhandelbaar papier hebben. De leningen van DBFM-contracten zijn redelijk verhandelbaar, dat maakt het voor pensioenfondsen interessant.
	Projecten zijn meestal niet groot genoeg, dus moet je een pijplijn aan projecten hebben.

<b>Redenen voor investeren in infrastructuur</b>	<b>APG</b> We investeren in infrastructuur omdat het een ander risicoprofiel geeft dan andere beleggingsklassen. Attractiever rendement dan onroerend goed, zonder de volatility van de beursgenoteerde markt.
Hoofdvraag: Wat zijn volgens u de belangrijkste voordelen van het investeren in	<b>PGGM</b> Het doel van infrastructuur in de beleggingsportefeuilles is vooral lange termijn, stabiele kasstromen genereren. Bij voorkeur inflatie gelinkt, met een lage correlatie met listed aandelen.

infrastructuur voor pensioenfondsen?	<b>MN</b>
	Infrastructuur is een hele interessante beleggingsklasse, maar het zijn keuzes die je maakt. Als het gaat om inflatie protectie dan kun je je afvragen of dit de juiste beleggingsklasse is. Wel voor stabiele cash flows, het is een diversifyer.
	Voordelen infrastructuur: rendement, lage correlatie met andere asset klassen, hield zich staande tijdens de crisis.
	Nadelen: illiquide, als er iets fout gaat sta je meteen met je kop in de krant.
	<b>Invest-NL</b>
	-

<b>Risico's</b>	<b>APG</b>
Hoofdvraag: wat zijn volgens u de belangrijkste risico's van het investeren in infrastructuur?	Voor ons risico's is zeg maar de meeste projecten waarin wij investeren hebben geen beschikbaarheidsvergoedingen. Dus volume risico, risico rondom de prijs, herfinancieringsrisico, CAPEX, als de O&M anders uitvalt dan dat je inschat, en zeg maar het competitieve voordeel meer zeg maar een deal risico dat het niet, niet doorgaat.
	Volgens mij worden contract risico's in het huidige systeem redelijk goed afgedekt.
	Risico's van decentrale overheden zijn geen reden om in iets anders te investeren. Maar je moet dat wel echt goed in kunnen schatten en daarom ook pas later instappen.
	Als we kijken naar onze eigen investeringen, dan stappen over het algemeen in wanneer iets construction ready is. Eigenlijk zijn al alle vergunningen al verleend, het hoeft er nog niet te staan maar we willen geen risico meer lopen dat we geen vergunningen krijgen. En als er dan een EPC-contract onder zit waarbij we het constructie risico grotendeels hebben afgeleverd, dan is het voor ons oké.
	<b>PGGM</b>
	Belangrijkste risico's greenfield investeringen? Het heel ontwikkel, bouwrisico, is een belangrijke. En daarna ook van ja in hoeverre kun je hier de omzet en de kosten goed inschatten over een hele lange termijn.
	Heb je een concessie met een vaste vergoeding per jaar, waarbij je kosten ook lange termijn kunt vastleggen, ja dan is dat een veel robuuster model dan dat je niet weet hoeveel mensen er gebruik van maken. Het is allebei infrastructuur maar het ene gaan we voor, de ander totaal niet.
	We zijn wat terughoudender voor bouwrisico's, want we denken dat het niet altijd juist geprijsd wordt.
	Risico's dat decentrale overheden tegen gaan werken is voor ons niet zo belangrijk omdat we geen projectontwikkelaar zijn. Ja als dat een private partij is dan ja, net als je vastgoed ontwikkelt of een windpark, of wat dan ook, ja dat is een risicovolle business. Rendement is er ook naar. Maar dat is niet waar wij in actief zijn. Wij stappen pas naderhand in.
	Het is niet zo dat wij geen bouwrisico willen lopen maar vaak zijn de projecten daar te klein voor.
	De charme van PPP's is dat de risico's worden verdeeld naar de partij die die risico's het beste kunnen dragen of het beste kunnen inschatten en ook het beste kunnen dragen. En die krijgen daar de vergoeding voor.
	In de praktijk dat die risico allocatie zoals ze dat in Nederlandse PPP-modellen doen dat dat gewoon heel positief werkt. Dus dat is een robuust model waar wij als investeerder ook heel comfortabel mee zijn.
	Rigide contract is erg prettig want het geeft een kwaliteitsstandaard. Maakt de markt ook liquide voor kapitaalverschaffers.
	<b>MN</b>

	<p>Met een gediversifieerd portfolio ben je de meeste individuele risico's wel kwijt. Belangrijke risico's die nog overblijven:</p> <ul style="list-style-type: none"> <li>• Currency risico's</li> <li>• Interest risico's</li> <li>• Inflatie risico's</li> <li>• Demand risico's</li> <li>• Political risico's</li> <li>• Regulatory risico's</li> </ul>
	<p>Ja, in Nederland heb je natuurlijke verschillende departementen en die doen allemaal hun eigen ding. Dus ruimtelijke ordening kan wel bedenken van we moeten iets hebben, er moet daar een weg of daar meer water hebben, en financiën kan zeggen ja maar daar hebben we op dit moment helemaal geen budget voor. Het zijn allemaal, heel veel politieke invloed en spelletjes die er gespeeld worden, het zijn heel veel krachten die vrijkomen bij processen. Dat gaat van heel laag decentraal niveau, gemeenteniveau, tot minister niveau. Overall zit een bepaalde stroperigheid zit erin en de kans dat pensioenfondsen daarin dan mee doen, weet je wel, laat maar.</p>
	<p>Het is natuurlijk heel frustrerend als je bezig bent met een tolweg en het wordt weer, ik bedoel de bouw, het wordt weer vertraagd door allerlei processen, en allemaal heel begrijpelijk, maar er zit een bepaalde onzekerheid in zo'n proces en als iets in plaats van twee jaar, vier jaar duurt, om aan te leggen, dan gaat je rendement gaat ook hard naar beneden.</p>
	<p>Enige waar wij nog technisch risico nemen is dingen die er echt niet zijn zoals energietransitie, grote windmolenparken die op zee gebouwd worden. Waar je in één keer schaal kan maken, voorziet in de behoefte die er op dit moment is. Daar kan je nog wel rendement maken, wat voldoende attractief is, die dat soort risico's afdekt.</p>
	<p>Vastgoed dat kan ook soms lang duren voordat je uiteindelijk iets voor elkaar krijgt als je iets moet ontwikkelen. Maar als het eenmaal loopt, vastgoed is wat dat betreft dan dat je zegt we gaan een hele grote verbinding noord-zuidlijn bouwen ofzo. Dan ben je jaren bezig voordat je überhaupt het plan hebt gemaakt en alles door hebt, dan dat je zegt van we bouwen twee panden op een aangewezen locatie.</p>
	<p>Illiquiditeit is niet erg, daar word je voor betaald.</p>
	<p>Je moet de risico's neerleggen bij de juiste partij of anders moet de vergoeding die vereist is gewoon hoger liggen om daarvoor te dekken.</p>
	<p>Reden dat er in Nederland minder risicovol belegd wordt is dat hier de DNB focust op de dekkingsgraad.</p>
	<p><b>Invest-NL</b></p>
	<p>Voor pensioenfondsen is het heel erg van belang of er een volumerisico in zit, dus of je afhankelijk bent van gebruik.</p>
	<p>Dat vergunningen verlenen, dat wordt eigenlijk door alle financiers weggedrukt. Pas als er onherroepelijk en onvoorwaardelijk vergunningen zijn afgegeven, ga je financieren</p>
	<p>Als bank wil je geen constructierisico, maar als institutionele belegger ook niet. Het wordt vervelend als je het risico door belegt aan een EPC-partner en die komt dan onder druk te staan.</p>

<b>Transactiekosten</b>	<b>APG</b>
Hoofdvraag: In hoeverre spelen transactiekosten een rol bij het investeren in een infrastructuurproject?	<p>Voor kleine projecten ben je meer transactiekosten kwijt dan voor grote projecten. En daarvoor schakelen we vaak die managers in omdat die daar wat efficiënter mee om kunnen gaan dan wij.</p> <p>Maar uiteindelijk vinden we kosten wel belangrijk, maar meer in het licht van hoeveel deal certainty levert het ons op. Dus we zouden best wel iets</p>

	meer willen spenderen aan kosten om uiteindelijk iets voor elkaar te krijgen als we dan ook zeker weten dat we die transactie hebben, dan dat we iets minder kosten maken.
	Zou de equity fund competition het attractiever maken? Ja absoluut. Als het maar de deal certainty verhoogt. Uiteindelijk maken de kosten per project niet zoveel uit, als het maar de deal certainty verhoogt.
	Nou kijk uiteindelijk komt het er gewoon op neer dat we onze tijd maar aan bepaalde deals kunnen besteden. Maar de omvang doet er in dat opzicht iets minder toe want als het groot genoeg is dan zouden wij het als team zelf doen. Als het wat kleiner is dan ligt het zeg maar bij de managers die we daarvoor hebben. Dus uiteindelijk bestrijken we de markt wel.
	Wat voor ons een hele belangrijke factor is, is of we competitief kunnen zijn. Als we iets kunnen doen wat langer duurt om het te regelen maar waarbij de deal certainty veel hoger is, dus dat wij de deal uiteindelijk doen, dat is voor ons echt een van de belangrijkste factoren bijna.
	Ik denk dat wij zijn niet zo bang om deal transactiekosten te maken maar we maken altijd een inschatting van nou ja goed hè wat is de zekerheid dat we een deal krijgen, hebben we daar die kosten voor over dat is uiteindelijk de inschatting die je maakt.
	<b>PGGM</b>
	Transactiekosten belangrijk? Ja het is natuurlijk een meer bewerkelijke manier van investeren. Of je het zelf doet of niet is meer een strategische keuze. De reden om het zelf te doen is vooral of het voor ons stuurbaar, beheersbaar, begrijpelijk is en lage kosten heeft.
	Minimale grootte van projecten heeft meer te maken met dat we niet te veel projecten kunnen doen. Grotere projecten hebben ook wat minder concurrentie.
	<b>MN</b>
	Transactiekosten spelen een grote rol. Pensioenfondsen, met name Nederlandse pensioenfondsen kijken heel sterk naar wat kost een belegging. Wat ben ik kwijt aan beheerskosten, wat ben ik kwijt aan performance fees, wat ben ik onderliggend kwijt aan transactiekosten. Welke overige kosten spelen nog mee bij het managen van een fonds in de asset. En wat voor nettorendement hou ik daar dan aan over.
	Zou het helpen als deze kosten lager zouden zijn? Nee, het helpt, maar maakt niet zo veel uit. Het gaat er vooral om dat je een paar keer schiet, en dan mist.
	Een equity fund competition scheelt wel tijd, maar dan moet er wel iemand zijn die het ontwikkelt. En het moet ook maar net attractief zijn voor pensioenfondsen.
	<b>Invest-NL</b>
	Transactiekosten vertalen zich direct in renteopslag, risico-opslag. En dan ga je natuurlijk ook nog kijken naar de succeskans. Je moet in die aanbestedingen, in die tenders, mee gaan doen. 1 op de 4 verlies je. Ja, dat kan je alleen maar goedmaken door op sommige projecten een hogere vergoeding te vragen. Dus ja er moeten heel projecten op de markt komen wil het gaan functioneren op die manier. En lightrail is wat dat betreft nog veel te weinig een portefeuille.
	Equity fund competition werkt alleen maar als er een andere partij is die die projecten helpt ontwikkelen, en daar ligt denk ik de uitdaging. Het helpt wel de transactiekosten te verkleinen en het helpt ze inderdaad instappen, dus ja dat zijn mooie constructies. Het gaat alleen maar werken als je dus een groot genoeg stroom met projecten op gang weet te helpen. Dat is in Nederland lastiger dan in Engeland.

Oplossingen	APG
<p>Hoofdvraag: Heeft u zelf nog ideeën over wat de overheid dan wel specifieke projecten zelf kunnen doen om investeringen vanuit pensioenfondsen te bevorderen?</p>	<p>Wat je ook wel eens bij wegen ziet, is dat de overheid zegt van nou je krijgt van ons een beschikbaarheidsvergoeding maar hè als ik jou eigenlijk een soort voor geef ja dan wil ik ook wel meeprofiteren van de upside bijvoorbeeld, en dan ga je een soort winstdelingsmechanisme zitten waarbij de overheid zegt van ik wil dat je ook een stukje traffic risk neemt.</p>
	<p>Of bijvoorbeeld inderdaad een model waarin je een soort, ja voor beide de equity bijna één pot voor maakt voor zeg maar projecten maar dan zouden de banken allemaal met elkaar concurreren. En de equity zeg maar een soort van gegarandeerd zijn, maar ook daar kun je juist een competitief voordeel in halen als je daar scherp in bent. Dus dat lijkt me heel lastig.</p>
	<p>Maar als je dan beschikbaarheidsvergoeding van de overheid wil krijgen weet ik niet of het daarmee toch weer binnen de Europese aanbestedingsregels valt.</p>
	<p>Op zich wel een interessante gedachte want weet je als wij zouden denken als we meer de ontwikkel kant op zouden gaan en we zouden bijvoorbeeld een nieuwe snelweg willen aanleggen, maar dan willen we wel zeker weten dat we ons rendement maken.</p>
	<p>Wij zouden met plezier projecten overnemen als het al gerealiseerd is en we kunnen een trackrecord van bezoekersaantallen zien.</p>
	<p>We zien ook in sommige projecten we een returnband hebben dat we een soort bodem krijgen in onze return van bijvoorbeeld 5%. En dan zegt de andere partij oké ik garandeer jullie een return van 5% maar als het boven een bepaald percentage komt dan is dat voor mij.</p>
	<p>Het zou op allerlei verschillende manieren ingestoken kunnen worden. Bijvoorbeeld beschikbaarheidsvergoedingen om de debt te servicen. Maar dan lopen we 100% risico op het equity stuk, dan moet ons rendement dus ook wel iets hoger zijn. Dan gaan we zo'n investeringsmogelijkheid als snel vergelijken met een tolweg in Frankrijk of een vliegveld in België.</p>
	<p><b>PGGM</b></p>
	<p>En de rol die wij kunnen spelen is of in greenfields nieuwe dingen oppakken, is overigens wel een wat lastiger, wat moeilijker pad.</p>
	<p>Maar je zou ook kunnen zeggen ik verkoop een aandeel in een bestaande infrastructuur, een rail concessie of wat dan ook, als overheid, omdat ik daarmee geld ophaal om mijn infrastructuur investeringsagenda te versnellen. En dat is bijvoorbeeld iets wat wij ook regelmatig aangeven.</p>
<p>Je wil alleen dat aanbesteden waar je natuurlijk het beste, de hoogste prijs voor krijgt als overheid zijnde.</p>	
<p>Als de overheid zich zou structuren als een bedrijf dan zou je je investeringsvragen allemaal centraal willen neerleggen in een groep mensen of een team wat de hele investeringsagenda gaat doorlopen en gaat kijken, wat kan ik efficiënt in de markt zetten, waar is het risico/rendement profiel heel aantrekkelijk voor de markt, waar gaat de markt een premie voor betalen, en dat zet ik in de markt.</p>	
<p>En de dingen die risico/rendement technisch lastig liggen, bijvoorbeeld omdat het een nieuwe lightrail verbinding is waar nog geen traffic cijfers van bekend zijn en als je het aan de markt overlaat gaan ze dat in prijzen als een risico, dus dan krijg je risico-opslag. Misschien is dat helemaal niet interessant en moet je iets anders kopen en geld vrijmaken om zo'n project op te zetten.</p>	
<p>Als je je lastigste klussen door de markt laat oplossen, dan krijg je daar de slechtste prijs voor zeg maar. En als je je diamantjes met een mooie strik erom in de markt zet, ja daar stort iedereen zich over elkaar heen, want daar wordt de hoofdprijs voor betaald. Dus dat is handiger om die weg te zetten.</p>	

	<p>Als je het voor infrastructuur beleggen binnen in ieder geval hoe wij het doen aantrekkelijk wil maken, dan zul je het op een bepaalde manier moeten structureren. Omdat ja, zoals ik in het begin uitlegde, wij moeten onze opdrachten uitvoeren en dat is een heel specifiek doel van infrastructuur beleggingen binnen de pensioenportefeuille. En dat betekent automatisch relatief laag risico en rendement.</p>
	<p>Manieren om investeringen vanuit pensioenfondsen te bevorderen? Als je zeg maar geld wil ophalen in private markten, of dat nu in financiering is bij banken of kapitaal bij financiële investeerders zoals wij, ja dan zul je moeten spelen volgens de spelregels van die markten.</p>
	<p>En dus je zult je project zo moeten structureren, ontwerpen en structureren en vormgeven dat het toegankelijk is voor privaat kapitaal. En dan ook in een vorm die privaat kapitaal heel aantrekkelijk vindt. Dat zou ik sowieso doen want dan krijg je meer bieders en dan krijg je dus concurrentie dat is alleen maar voordelig. Dat zal soms lastig, vervelend zijn, ja maar zo werkt het, en dat geeft in ieder geval de beste oplossingen.</p>
	<p>Ik vind nog steeds het offshore windpark in Nederland zijn absoluut een succesvoorbeeld. Dat hebben ze gewoon heel goed in de markt gezet door zelf het project te ontwikkelen, het hele voorwerk zelf in eigen regie uit te werken en met een compleet pakket naar de markt te komen waar de markt heel graag op heeft geboden en nou het resultaat is een buitengewoon efficiënt investeringsagenda tegen veel lagere kosten dan iedereen ooit gedacht had.</p>
	<p>Ik zie ons niet de stoel van ontwikkelaar nemen.</p>
	<p>En als het wel om het geld gaat, bijvoorbeeld omdat je budget op is, ja dan kun je de private markt aan spreken. Maar dat zou ik dan doen in gedeeltelijke privatiseringen zoals bedrijven dat ook doen, dan ga je gewoon je kapitaal efficiënter maken.</p>
	<p>Privaat kapitaal is gewoon heel flexibel in die zin, als de spelregels maar duidelijk zijn. En je kunt natuurlijk wel op verschillende manieren aanvliegen, maar als lightrail zeg maar in 2030 pas budget heeft, ja dat is nog 13 jaar. Je kunt best iets opzetten dat je zegt van nou, op een of andere manier stoppen wij nu het geld erin en over 10 of 12 jaar worden we uitgenomen. Dat zou kunnen. Maar ook daar gaat het weer om dat de overheid de eerste stap zet van hoe wil ik het financieren, hoe wil ik het structureren.</p>
	<p><b>MN</b></p>
	<p>De projecten moeten voldoende groot zijn, die aangeboden worden. Ze moeten overzichtelijk zijn. De overheid moet zoveel mogelijk onzekerheden in het proces wegnemen. Het hoeft niet zo zeer te zijn in een garantiestelling op de inkomsten, dat kan je gewoon in de prijsstelling kan je die tackelen, maar met name over gaat het project wel door. Van hoeveel inzage geef je in de invloed, sta je toe in het proces, waardoor een proces of dunder gaat worden, of een stuk langer gaat duren. Dat maakt een project minder attractief om überhaupt te starten.</p>
	<p><b>Invest-NL</b></p>
	<p>Het zou eigenlijk zo moeten zijn, hoe krijgen we nu die projecten zo aantrekkelijk dat Nederlandse pensioenfondsen er ook in zouden willen investeren. Dan krijg je rente omlaag, maar die is nu al zo idioot laag. Misschien is dat over vijf jaar wel weer nodig.</p>
	<p>Voor kleinere projecten is het moeilijk om pensioenfondsen een rol te geven. Handiger om dan projecten te bundelen en dat banken dan een bond uitgeven die pensioenfondsen op kunnen pakken. Maar krijg het in Nederland maar is voor elkaar om vergunningen rond te krijgen van een aantal projecten achter elkaar.</p>

	Overheid kan ook helpen door het organisatorisch zo te maken dat je wijkgericht iets kan aanpakken zodat de investeringskosten per woning veel lager worden. Dus dat zullen ze de komende jaren wel gaan doen denk ik. Maar het is een ongelofelijke opgave ook weer. Maatschappij is steeds lastiger om besluitvorming te nemen. Dus de politieke risico's of die reguleringsrisico, dat is zo'n groot risico.
	Bij het sluizenprogramma zag je dat één team in de planologische en contractvoorbereiding zat en meerdere sluizen de markt zette. Zoiets moet je eigenlijk ontwikkelen voor lightrail, in plaats van dat, nou ja, gemeente Rotterdam een lightrail project maakt, de gemeente Utrecht allemaal houden ze hun hand op bij het rijk we hebben wat extra geld nodig. Ja blijft een beetje aanmodderen dan.

Light rail	APG
Hoofdvraag: zijn er bepaalde karakteristieken van lightrail projecten die het wel/niet aantrekkelijk zouden maken?	Die lightrail projecten zijn voor ons heel interessant, want het klinkt gek maar die zijn groot genoeg voor ons om daarin te stappen.
	Maar het hangt ook wel van de modellen af. Van is het pure beschikbaarheidsvergoeding en wil de overheid het risico lopen als daar geen kip in die lightrail voertuigen zit. Dat ze dan eigenlijk wel die beschikbaarheidsvergoedingen moeten betalen maar geen revenues hebben. En dat maakt die projecten vaak voor de overheid alweer duurder.
	Zeg maar de willingness is er, en de ability om het te doen ook. Wat ons zeg maar tegenhoudt, van het doen, is dat het nog niet staat, dus het is iets nieuws. En dat maakt het voor ons lastig.
	En je kan ook zeggen van ja, weet je misschien moet je die lightrail projecten juist allemaal opknippen, want als je er tien hebt en je schrijft op allemaal in, dan ga je ervan uit dat je er uiteindelijk wel twee of drie hebt.
	Vooraf bij lightrail als dat door de verschillende provincies heen gaat, dat wordt echt een drama, maar dat is ook de reden waarom we het niet zelf doen maar daar managers voor inschakelen om dit te managen. Dat soort dingen kunnen we echt allemaal niet managen en zij zijn erin gespecialiseerd.
	Er zou ook een potje geld kunnen komen waar die lightrail projecten mee gefinancierd kunnen met wat volumerisico, en als wij dan 5 jaar trackrecord kunnen zien zouden we die best wel willen overnemen.
	Dat zijn meer secondary transacties. Ja maar zeg maar dat zicht wat wij dan hebben op de recente historie levert voor ons een beetje operationeel trackrecord op waar we beetje comfort aan kunnen ontleen dat zeg maar de rendementen die wij daarin voorzien, dat dat ook daaruit kan komen uiteindelijk.
	Ik denk dat voor ons de belangrijkste factor vooral bij lightrail dat dat is van ja hoe ziet het vergoedingensysteem eruit is het inderdaad gewoon beschikbaarheidsvergoeding of komt er een stukje volumerisico in en ja afhankelijk van zeg maar de hoeveelheid volume risico die we lopen of de onzekerheid daar omheen, ja dan hangen er andere rendementsverwachtingen aan wat het al dan niet duurder maakt.
	De manier waarop wij het zouden willen zien bij een lightrail bijvoorbeeld, is een puur availability based model. Als er dan niemand in die lightrail stapt, dat wij dan nog steeds ons geld krijgen.
	Ja ik kan me voorstellen dat lightrail wat minder gecompliceerd is om te bouwen. Ik denk dat zeg maar het hele vergunningentraject en het aanloop traject denk ik dat enorm gecompliceerd is maar ik denk dat de bouw uiteindelijk wel redelijk makkelijk is.

	Dan heb je ook nog PPP-projecten waar er een soort variabele component in zit en dat is volgens mij wat bij lightrail bijvoorbeeld wel is van toepassing is.
	<b>PGGM</b>
	Ik heb ook op dat krantenartikel in de NRC gereageerd, omdat ik, we zagen de bal weer richting de pensioenfondsen komen en toen hebben we gezegd nou ja, weet je, wij zijn er klaar voor.
	Om lightrail neer te leggen, daar zijn natuurlijk verschillende bekende modellen, je kunt gewoon het bestaande PPP-model kiezen. Dat je zegt, nou ik wil hier een PPP van maken met een beschikbaarheidsvergoeding en ik heb hier een stuk spoor dat moet je oppakken daar moet je lightrail van maken. Ja weet je dat is één model, het andere model is dat je een full greenfield neerlegt met traffic risk, nou dat wordt een hele lastige denk ik. Dat zul je veel moeilijker voor elkaar krijgen.
	Het is een keuze van gaat de overheid het zelf financieren of zet je het in de markt. Als je het in de markt zet ja dan zul je het zo moeten structureren dat het toegankelijk is voor privaat kapitaal. En het alternatief is iets anders privatiseren om kapitaal vrij te maken dan heb je je handen vrij om ermee te doen wat je wil.
	<b>MN</b>
	Lightrail is voor ons niet interessant, wel voor APG en PGGM.
	<b>Invest-NL</b>
	Het probleem bij lightrail is meer de business case en besluitvorming. Tot de tijd dat het tracé en ligt en de vergunningen binnen zijn, zal elk pensioenfonds zeggen interessant, hou me maar op de hoogte. Maar ze zullen echt nog geen geld investeren.
	Geld lenen is bij lightrail het probleem niet, maar de bekostiging. Wie wil die metro daar neer leggen en exploiteren? Het is gewoon kostbaar met heel veel kans op kostenoverschrijdingen, exploitatierisico, dat risico is te hoog voor private investeerders. Hoe ga je die investering terug verdienen.
	Bij die DBFM-contracten voor snelwegen en windmolenparken zie je dat het eigenlijk ook heel professioneel wordt voorbereid met standaardcontracten. Met lightrail zijn we daar totaal niet zo ver in dat er één organisatie is die dat helpt voorbereiden. Elke gemeente heeft tot nu toe zijn eigen lightrail project een beetje opgezet, dat is niet professioneel genoeg.
	Het zou best kunnen zijn dat bij de eerste twee projecten met lightrail die via private financiering naar de markt wil brengen als projectfinanciering, Invest-NL misschien bereid moet zijn om 50% van het risicodragend vermogen in te brengen. Omdat anders de marktpartij die de lightrail aan moet leggen en moet exploiteren niet genoeg eigen vermogen op tafel kan leggen om überhaupt vreemd vermogen aan te trekken. Maar ik denk dat het proces om te komen tot een financierbare business case dat dat eigenlijk de grootste opgave is.
	Pensioenfondsen zullen pas in lightrail willen stappen als er een Nederlandse Rijkswaterstaat voor lightrail komt die meerdere lightrail projecten helpt ontwikkelen met een goede business case, een standaardcontract, dat goed geolied is.
	Anders zal het inderdaad risicodragend vermogen proberen te mobiliseren bij Invest-NL. Dat zal bij de eerste twee misschien ook nodig zijn. Dat invest-NL zegt, oké wij willen wel risicodragend vermogen verschaffen want de pensioenfondsen willen nog niet instappen omdat het allemaal nieuw is. Dat is ook de rol van Invest-NL denk ik. En als het dan eenmaal volwassen is als DBFM voor wegen, ik denk dat dan Invest-NL ook een

	stapje terug moet doen want dan zijn er genoeg pensioenfondsen of andere partijen die risicodragend vermogen in willen brengen.
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<b>Invest-NL</b>	<b>APG</b>
Denkt u dat het meedoen van Invest-NL in projecten een positief effect heeft op het aantal investeringen van pensioenfondsen in infrastructuur?	Ik zou verwachten dat zij dat geld kunnen investeren in zeg maar iets risicovollere projecten. Dus waar het rendement wat lager is dan wat wij zouden kunnen accepteren.
	<b>PGGM</b>
	In een hoogconjunctuur zijn overheidsinstanties als Invest-NL minder belangrijk.
	<b>MN</b>
	-
	<b>Invest-NL</b>
	Invest-NL kan als partner dienen als pensioenfonds niet alleen risicodragend vermogen wil dragen. Maar ook voorwerk om bijvoorbeeld lightrail verder uit te werken en dan overdragen aan private partij.
	Behoeft in Nederland is aan risicodragend vermogen, kregen we niet los van de EIB, daarom is Invest-NL opgericht.
	Doel Invest-NL dat alleen een partij het niet aandurft, maar samen misschien wel. Als de markt een beetje faalt, dan zal Invest-NL instappen.
	Reguleringsrisico's kunnen verminderd worden omdat Invest-NL overheid gerelateerd is, kan feedback geven aan overheid.
	Invest-NL kan niet grote risico's opnemen en uiteindelijk moet Invest-NL ook gewoon rendement opleveren.
	Invest-NL helpt in het opzetten van investeringsplatforms om financiële middelen te bundelen. Hier zouden ook institutionele beleggers aan bij kunnen dragen.
	Het is ontzettend lastig om nieuwe investeringen te realiseren die maatschappelijk gewenst zijn, zeker infrastructuur. Invest-NL heeft wel opties door risicodragend mee te investeren, maar kan ook gewoon pas iets doen als er een goede business case is.
Per sector is het verschillend wat het probleem is, en iedereen wijst naar elkaar. Dat is het coördinatiefalen wat Invest-NL kan proberen op te lossen.	
Het doel van Invest-NL is om met zo goedkoop mogelijke middelen een investering voor elkaar te krijgen. Dan maakt het niet zoveel uit of het van pensioenfondsen komt, want er zijn ook veel buitenlandse institutionele beleggers die investeren in Nederland.	

## Appendix C: Interviewees case-studies

This appendix shows the interviewees which were interviewed for the case-studies. On request, full transcripts of these interviews are available.

### *Case study 1: Regiotram Groningen*

#### *Interviewee 1*

Name: Paul Peekel

Company/institution: Strukton Integrated Projects

Function: Tender manager of one of the consortia that bid on the project

Date: 29/08/2018

#### *Interviewee 2*

Name: Menno Olman

Company/institution: Project Team Groningen

Function: Project leader of the project for the public parties

Date: 13/09/2018

#### *Interviewee 3*

Name: Rudolf Rijkens

Company/institution: AT Osborne

Function: Independent audit of the business case of the Regiotram

Date: 31/08/2018

### *Case study 2: Uithoflijn*

#### *Interviewee 1*

Name: Alexander Schütte

Company/institution: Municipality of Utrecht

Function: Project Manager CS area Utrecht

Date: 05/09/2018

#### *Interviewee 2*

Name: Eelco van den Boogard

Company/institution: Municipality of Utrecht

Function: Project manager of the Uithoflijn and Programme manager mobility municipality of Utrecht

Date: 06/10/2018

## Appendix D: summary of statements expert session

This appendix shows a summary of the statements made in the expert session. The statements are translated from Dutch.

### *Solution 1: improving national infrastructure visions*

Nr.	Statement
1.1	It is better to make a vision on light rail, instead of improving the national infrastructure vision.
1.2	This is a good solution, as the various public parties do not have a structured way to make these plans.
1.3	You could help the pension funds to look at the national level.
1.4	You are turning purpose and goal around; instead of looking what solution fits the problem, you are looking where light rail can be implemented.
1.5	I would combine this solution with the accessibility programs ('bereikbaarheidsprogramma's') from the MIRT of the national government.
1.6	I would pay more attention to which party is up to this task. Maybe it is the national government, but it can also be another party.
1.7	I am not sure if the national government is really independent in this situation.
1.8	It is good because part of this solution is also in the assumption that we did, that it is actually a regional solution for a national problem. What is also good is that it is something regional, but that you approach is nationally.
1.9	It is good because we have these partial solutions for light rail, so who is going to put them all together to look how these solutions look together in a program and what that means for national investment.
1.10	In the accessibility programs all the actors are put together; there is also an active attempt to work together with municipalities and provinces.
1.11	I think you should approach it nationally, but that is different than a vision. That is too top down.
1.12	You don't want the national government to tell everyone what to do.
1.13	It is about that someone portrays where we are now.
1.14	And it is true, light rail is not a regional solution, it is part of a national problem.

### *Solution 2: focus on programs, or develop in phases?*

Nr.	Statement
2.1	In combination with solution 1, it is good to also put them in the right order.
2.2	It is true that it is not realistic to make multiple light rail projects at the same time.
2.3	A program could help in lowering complexities through learning effects.
2.3	It does work well to structure the decision-making for lower layers of government, but also for the national government to divide its budgets.
2.4	I think that it is good for both technical complexities, as well as for learning, to have a stream of these projects, so in that sense it's a good idea.
2.5	I haven't heard of the Werkvennootschap, but it seems like an interesting idea to have a party involved in multiple of those projects.

### *Solution 3: Choose wisely*

Nr.	Statement
3.1	Is this solution then putting it in the right order? At solution 2 you already made a sort of program; do you have to make decision inside that program then?
3.2	It is important in this step that a proper decision should be made on whether light rail is actually the solution for a problem in a certain area.
3.3	Then it is important to look at the preconditions, to decide which one you start first.
3.4	This is good because now it is of course very trendy to name light rail as the solution to everything, while people should first think clearly on whether light rail is actually the solution for certain areas.
3.5	In a lot of areas light rail might not be the solution, so then thinking about this is a good idea.

3.6	You hear about light rail projects in very small towns. Of course, that is nice, but they will not be as profitable as some other ones. So, using this solution it would be good to distinguish between those projects.
3.7	They keep hoping on light rail projects, while in those areas it would be better to just develop a bus line and focus the attention on areas where it is actually necessary.

#### *Solution 4: employ investors for project development*

Nr.	Statement
4.1	It is good because pension funds look at two things: 1. The amount of expected return of a project, and 2. The risks of the project. Those are exactly the two things we just distinguished to put projects in front of the pipeline of projects.
4.2	That makes it more specific. They are very well capable of doing the initial calculation on profitability and risks of projects.
4.3	It is good if you are more specific on these capabilities.
4.4	It is something that pension funds in generally not do, so they should be nudged into doing this.
4.5	Actually, they should be the one to go to the national government and to say go act on these projects, because in the end it is the governments mobility problem.

#### *Solution 5: innovative models for financing*

Nr.	Statement
5.1	This mezzanine capital is good because you saw these problems with the Coentunnel, where ING took all the profit while the government took all the risks.
5.2	New forms of financing and risks distribution could actually lower the cost of the project.
5.3	You should be more specific on which political complexities you are going to guarantee with a new financing model.
5.4	I see the same things with wind mill parks in the North Sea. The government is tendering them out without subsidies, and then the investors will count in a lot of risks, making it hugely expensive.
5.5	This is good because with new projects, the investors will count in so many risks that it will get really expensive. And then there is a large chance that they will not even materialize in the end, which makes sure that the government is paying way too much. So, this might be a good idea.
5.6	And then you can always shift a little between the division of those risks.

#### *Solution 6: consider different funding models*

Nr.	Statement
6.1	This value capturing is in line with what we came up with as well, but it does require a change of thinking.
6.2	There is something to the raising of the public revenue part, because we see now that there is a moment, where the alternative to public transport will be more expensive or more time consuming, and then you will consider a shift eventually anyway. However, it does depend on the context of the mobility program.
6.3	It is good because in participation meetings of inhabitants at the A2 between Deil and Vught, you see that people are increasingly leaning towards less asphalt and better other ways of transport.
6.4	I think raising ticket revenue is a good idea on line like Schiphol to Amsterdam. On these lines, the travellers are also willing to pay more for their tickets.
6.5	Raising ticket price is also done for example at the HSL.