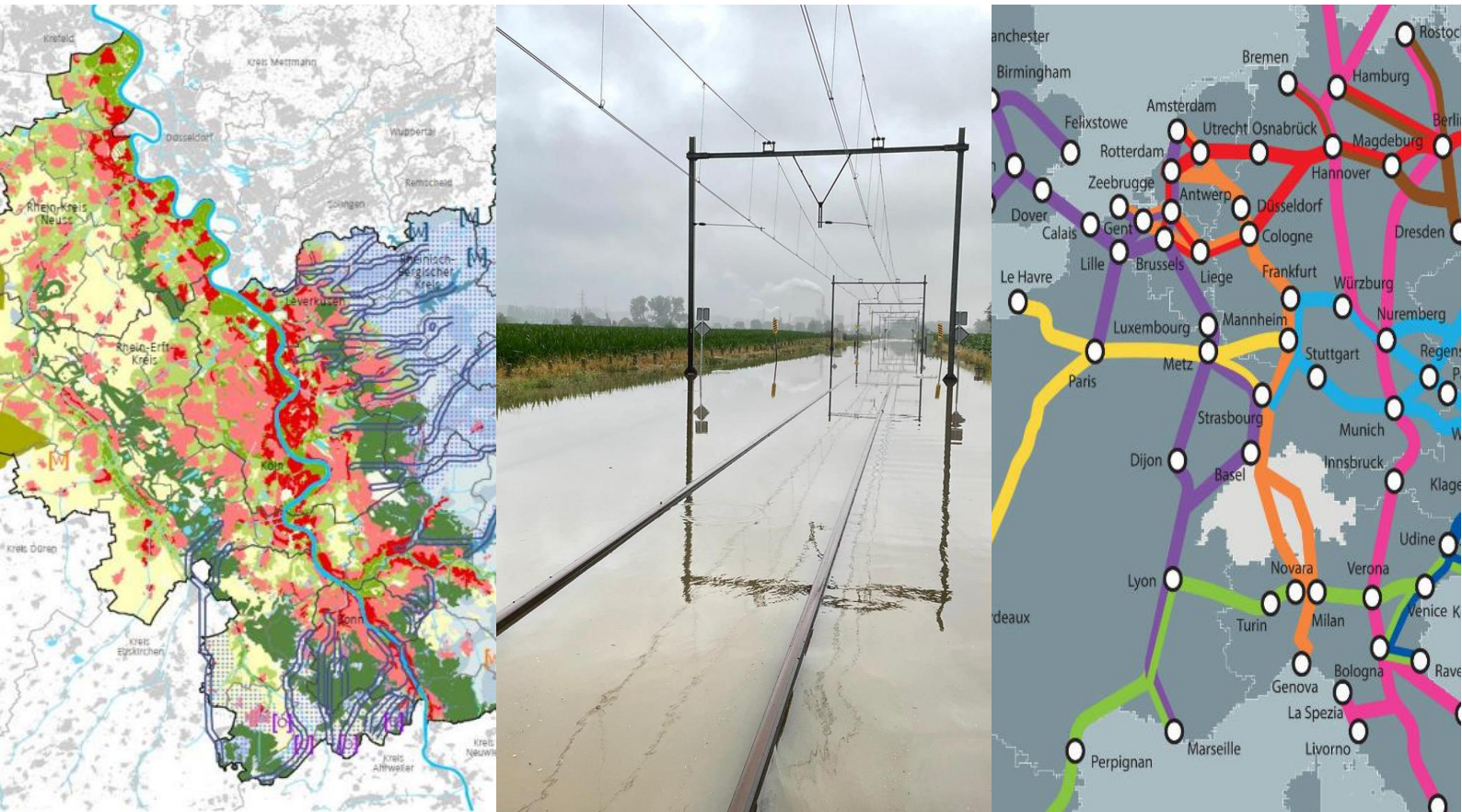


Enhancing the Climate Adaptiveness of International Rail Corridors

Applying Policy Translation as a Concept to Formulate a Transnational Strategy



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European Commission (2020). Trans-European Transport Network (TEN-T). Brussels: European Commission.

Preface

Dear reader,

Approximately six and a half years ago, I followed my first classes at the University of Groningen. I remember it well that in one of these first classes a lecturer mentioned that we, as first year students, would see the living environment around us substantially different once we were graduated. This master thesis marks the end of my student life. Now, I can tell that this lecturer was right. Over the years, both the bachelor of Spatial Planning and Design and the master program of Environmental and Infrastructure Planning taught me a way of critical thinking and reasoning that enables me to constructively work in today's complex spatial domain. Moreover, as in line with the motto of Faculty of Spatial Sciences, the studies provided me essential skills and insights that are needed to create better places.

I started writing this thesis from a personal interest in international, diplomatic processes on spatial topics. The concept of policy translation that focussed on how ideas and concepts change in such processes intrigued me. I knew I wanted to prominently include this concept in my thesis. The spatial topic that would be related with policy translation was decided on not much later. Climate adaptation has always sparked my interest during my studies. When I found out that there was significant potential for a establishing a transnational strategy on climate adaptation in relation to an international rail network, the Rhine-Alpine TEN-T rail corridor, I knew I had find my topic of research.

While writing this thesis, the primary focus gradually shifted from policy translation to climate adaptive rail networks. One of the many puzzles I needed to solve throughout my research process. Despite the fact that solving these puzzle was quite challenging at certain times, I enjoyed identifying relations within the empirical collected data, to conduct pleasant interviews with enthusiastic respondents, and to formulate guidelines in which twelve months of hard work came together. From contacting potential interviewees within the Norwegian Fjords to spending hours on writing the different chapters in the train, and from constructive discussions on the Zernike Campus to late night sessions finishing the thesis in my new home in Utrecht, it has been a very educational process. For that, I am grateful. And, humbly speaking, I am proud of this final version that lies in front of you.

First of all, I would like to thank all my interviewees for the valuable insights they shared with me. Their willingness to schedule an interview with me in their tight agendas was of vital importance to bringing this thesis to a good end. Second, I would like to thank my former colleagues at the international department of the Dutch ministry of Infrastructure and Water Management. Next to the pleasant internship I was lucky to follow at their office, they helped me in contacting potential interviewees and provided valuable information that helped me in my preparation of the empirical data collection process. Third, I would like to thank Dr. Stefan Verweij, my supervisor, for all the feedback he his given me the whole year long and the pleasant and constructive conversations we had with one another. Fourth, I would like to use this occasion to thank my parents for always supporting me and showing interest in what I do throughout my full six and half years of being a university student. Last, I would like to thank Sander and Nils (my best mates and (former) roommates), and my fellow former board members of Geo Promotion for all support.

I hope that this thesis will provide you valuable insights and I wish you an enjoyable read!

Damin Booiman

Utrecht, December 2022

Abstract

Changing climate conditions demand well-aligned policies and constructive exchanges of practices between nations to enhance the climate adaptiveness of international rail corridors. Yet, in practice, these exchanges and alignments are often lacking. This thesis aims to study how national practices on climate adaptive rail networks can be translated into a transnational strategy, by examining the Dutch and German parts of the Rhine-Alpine TEN-T rail corridor. To achieve this empirical objective, it was examined how the concept of policy translation can be applied to construct a transnational strategy. Policy translation emphasizes that ideas change when they travel and, as a consequence, are differently interpreted between actors. From this understanding, a research strategy is developed that argues for performing a discourse analysis within interpretative policy analysis to identify potential synergies and conflicts upfront of a translation process. Qualitative research using semi-structured interviews and a document analysis is conducted to apply the research strategy. In the collected data, a discourse is identified in which actors primarily understand a climate adaptive rail network from its physical components. This discourse contributed to the fragmentation between physical railways and other spatial functions in climate adaptation policies. Moreover, the planning cultures of the Netherlands, Germany, and the European Commission, in a path-dependent process, further shape this fragmentation. Based on the results, six guidelines are formulated for formulating the transnational strategy: I) make use of existing collaborations, II) address the interconnectedness of the spatial and rail domain, III) apply the tangibility of objects and visual representations, IV) establish a stress test along the whole corridor, V) ensure a sufficient level of vertical integration, VI) take perception fluidity as the premise. It is recommended for future research to further examine the role physical objects play in perception-making processes and to apply these insights on the climate adaptiveness of other transport infrastructure networks.

Keywords: climate adaptive rail networks, policy translation, interpretative policy analysis, discourse analysis, international transport corridors, transnational strategy

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Chapter 1 - Introduction

1.1 Towards a transnational strategy on climate adaptive infrastructure networks

Human-caused climate change increasingly affects infrastructure networks around the world. Pressing events, such as floods and landslides, severely damage infrastructural links and, subsequently, impact a transport network as a whole (Lindgren *et al.*, 2009; Markolf *et al.*, 2019). Unfortunately, climate change related events will only become more frequent in the future (IPCC, 2022). Even if humanity would be able to reduce the fossil emissions to zero percent tomorrow, the consequences are still unavoidable. Too much damage to the climate has already been done. Hence, it is why designing **climate adaptive infrastructure networks** is vital (European Commission 2021b; IPCC, 2022).

A climate adaptive infrastructure network is an infrastructure network that is both **flexible** and **agile** (Chester & Allenby, 2018). Flexible as the infrastructure network needs to be able to respond adequately to (rapid) changing demands and conditions. This implies that the network itself is also a subject to change. Agile in that its physical structure, policies, norms, and actors who operate it, are able to maintain their function in a non-stationary future. A future in which the extremes of our current climate conditions can no longer be considered as the outer limits of what future climate systems can exceed. If an infrastructure network contains these two competencies, it *has the capacity to perceive and respond to perturbations in such a way as to maintain fitness over time*” (Chester & Allenby, 2018, p. 9). Important to note is that this capacity is not limited to the physical infrastructure itself. Rather, on which will be elaborated later in this thesis, it also covers the institutional and spatial dimension of the infrastructure network (Chester & Allenby, 2018; Markolf *et al.*, 2019; Wang *et al.*, 2020).

Designing an infrastructure network to be climate adaptive significantly increases the reliability of the network (Lindgren *et al.*, 2009; Popa *et al.*, 2012). This reliability increases as the network is better enabled to maintain its function during or after disruptive events. Consequence, the convenience of travelling by this mode is increased, which, in turn, stimulates the attractiveness of travelling by this mode of transport (Geurs *et al.*, 2009; Popa *et al.*, 2012). Furthermore, enhancing the flexibility and agility of an infrastructure network also increases the traffic safety of the network (Popa *et al.*, 2012; Markolf *et al.*, 2019).

For infrastructure networks that cross national borders – **international transport corridors** – there is significant potential to exchange and align practices and policies on climate adaptation between the countries the corridor crosses. Practices in one country, namely, affect a corridor as a whole. When another country composes policies or executes practices that do not fully correspond with the regulations of other countries, misalignments can emerge between the practices of the involved countries (Chester & Allenby, 2018). To illustrate, country A, located in an upper stream area, composes measures that focus on fast water drainage in periods of high water in its rivers. As a consequence, authorities of country B, in the lower stream area of the same river, have to deal with higher peak levels of water in their part of the river. This increases the risk of flooding in country B. If an international transport corridor crosses both countries, including the vulnerable down stream areas of country B, the corridor as a whole is negatively affected by the practices of country A. To avoid such mismatches and to learn from one another, exchanging and aligning practices on climate adaptation in relation to infrastructure is crucial (Chester & Allenby, 2018; European Commission, 2021b).

Remarkably, despite the potential to exchange and align practices and policies on enhancing the climate adaptiveness of international transport corridors, climate adaptation policies on

infrastructure primarily have a national focus (Lindgren *et al.*, 2009; Markolf *et al.*, 2019; European Commission, 2021b). Moreover, studies on climate adaptive infrastructure also tend to apply a national scope in their research (e.g. see Lindgren *et al.*, 2009; Wang *et al.*, 2020). This thesis aims to fill in this knowledge gap by studying how national practices on climate adaptation in relation to infrastructure can be translated into a **transnational strategy**. This research will do so by investigating national practices on climate adaptive rail networks along the Rhine-Alpine rail corridor. A rail corridor that is part of the Trans-European Transportation Network (TEN-T). The following section will, therefore, introduce the TEN-T policy framework, as well as why there is need to develop a transnational strategy on climate adaptive rail networks along the Rhine-Alpine TEN-T rail corridor. Then attention shifts to the concept of policy translation. The theoretical concept that will be applied to study how national practices can be translated into a transnational strategy. The research question will be formulated in the last section of the introduction.

1.2 The Rhine-Alpine TEN-T rail corridor

In 2013, the European Parliament, European Council, and European Commission agreed upon the legislation that launched the first TEN-T policy (European Union, 2013). A policy framework that was revised and updated in 2021. TEN-T is a European-wide network of railway lines, roads, inland waterways, maritime shipping routes, ports, airports, and railroad terminals. The network serves two objectives. First, TEN-T aims to improve the quality and connectivity of the European infrastructure to strengthen social, economic, and territorial cohesion in the EU. By focusing on cross-border sections, implementing missing links, and solving bottlenecks, citizens should be better enabled to travel throughout the European continent. The TEN-T policy focuses primarily on enhancing the connectivity of existing infrastructure (European Union, 2013). The second objective is to reduce the environmental impact of transport. This might sound conflicting with the first objective as, indeed, the use of less sustainable transportation modes (e.g. travelling by car and airplane) is also supported by the increased connectivity (Geurs *et al.*, 2009). To overcome this contradiction, TEN-T policies prioritise travelling by train and strongly focus on a better integration of the European rail network (European Union, 2013). This makes the TEN-T policies crucial pillars to fulfil the zero-emission ambitions of the EU Green Deal (European Parliament, 2022).

The corridor that transports the greatest transport volume of the TEN-T network is the Rhine-Alpine TEN-T corridor, which trajectory can be found in Figure 1 (European Commission, 2020; Corridor Rhine-Alpine, 2022). The Rhine-Alpine TEN-T corridor connects Northern Italy in the South with multiple major cities in Belgium and the Netherlands in the North. The corridor crosses the Swiss Alps and runs almost parallel along the river Rhine in Germany and the Netherlands. Hence the name.

A significant share of the Rhine-Alpine corridor is located within the catchment area of the river Rhine or its sub-rivers. This makes the corridor particularly vulnerable to water-related disruptive events, such as floods (Rijkswaterstaat, 2019; European Commission, 2021b). This became painfully clear in the summer of 2021, when record amounts of rain fell within just a couple of hours in the border area between Germany, Belgium, and the Netherlands. The cloudburst resulted in extreme peak discharges of the Rhine, its sub-rivers, and the nearby river Maas. As a consequence, rivers flooded and more than 240 people in Germany and Belgium lost their lives (ENW, 2021). The water also severely affected the built environment and the infrastructural constructions in these areas. Even though this was an extreme event, it showed the vulnerability of the infrastructure in these areas to water-related threats. Threats that will only occur more frequent in the future due to climate change (Rijkswaterstaat 2019; European Commission, 2021a).



Figure 1: The Rhine-Alpine TEN-T corridor (Corridor Rhine-Alpine, 2022).

Luckily, the awareness that climate adaptation strategies need to be constructed for infrastructural networks is vividly present among authorities along the corridor (e.g., see Ministerie van Infrastructuur en Waterstaat, 2020; Ministerium für Umwelt, Landwirtschaft, Natur und Verbraucherschutz, 2022). Yet, the scope of these strategies is limited to national or regional borders. The European Commission, as the coordinator of the TEN-T corridors, aims to overcome this administrative fragmentation. That is why the European Commission presented its ‘Adaptation Strategy’ with guidelines for adaptive infrastructure that do cross national and regional borders (European Commission, 2021b). These guidelines, however, are non-binding and predominantly consist of technical prescriptions (European Commission, 2021d). The guidelines pay no attention to the institutional and spatial dimension of adaptive infrastructure networks (Markolf *et al.*, 2019). Moreover, these guidelines do only focus on infrastructure projects that will be build in the period 2021-2027. Lastly, the technical guidelines do not emphasize how the different countries a TEN-T corridor crosses can learn from one another their practices on adaptive rail networks. This is remarkable, since countries have potential to learn from one another their practices (Rose, 1991).

In particular the rail network of the Rhine-Alpine TEN-T corridor is vulnerable for the effects of water-related events, since the rail network is significantly less robust than, for example, a car network. Cars have relatively a lot of maneuverer options in comparison to trains. When one trajectory of a train network cannot be used due to a flooding, a substantial part of the rail network is negatively affected (Lindgren *et al.*, 2009; Popa *et al.*, 2012). Hence, it is why, combined with the abovementioned arguments, there is specifically need to design a coherent transnational strategy on **climate adaptive rail networks** for the Rhine-Alpine TEN-T corridor. This thesis will, therefore, focus on how national practices on climate adaptative rail networks can be translated into a transnational strategy for the Rhine-Alpine TEN-T rail corridor. More specifically, the Netherlands and Germany are chosen as the scope of research. The Netherlands, namely, is located in a delta, making the country specifically vulnerable for high levels of water. Constructive alignments and exchanges of adaptation practices with Germany, located upstream, is, therefore, essential for controlling high levels of water and to safeguard a coherent functioning of the Dutch part of the Rhine-Alpine TEN-T rail corridor (Rijkswaterstaat, 2019). This makes the Netherlands and Germany suitable as the geographical scope for this study.

1.3 A plea for policy translation

The exchange of ideas and practices is a topic that has gained increased attention in the contemporary planning profession. A development that has been sparked and fuelled by the ongoing globalization of the last centuries and the increased interdependency between nations (Mosse, 2008; Menon & Weatherill, 2008). In this respect, concepts such as lesson drawing (Rose, 1991; Dolowitz & Marsh, 1996), promoting best practices (Vettoretto, 2009; Stead, 2012), and mutual learning (Mukhtarov, 2014; Hasan *et al.*, 2019), are broadly being discussed in academic literature.

For years, both in academic debates and in policy documents, policy transfer was a dominant notion in the exchange of ideas and practices (Mukhtarov, 2014). **Policy transfer** is an incentive activity in which actors actively promote a specific policy or business abroad (Dolowitz & Marsh, 1996). Policy transfers are constructed by an instrumental rationale that looks for a 'best fit' between policy and context. Moreover, there was a strong assumption that 'what works here' to a large extent 'also works there'. Yet, in practice it became clear that this assumed linearity did not correspond with reality. As a result, the concept of transferability received increased critique for failing to capture the dynamic interplays of the contingent process of exchanging ideas and practices (Dolowitz & Marsh, 1996; Mukhtarov, 2014).

As a response, **policy translation** emerged as a concept that did emphasize the dynamic forces, interactions, and context-specificity that affect the journeys of ideas and practices. Policy translation is understood as: "*the process of modification of policy ideas and creation of new meanings and designs in the process of the cross-jurisdictional travel of policy ideas*" (Mukhtarov, 2014, p. 76). This process of modification is characterized by destabilisation and contingency; the change of meaning, scale, and context, both internal and external, during the travel of ideas and practices. This implies that ideas and practices are socially constructed, subject to a variety of perceptions, and that their meaning changes in the process of travel (Freeman, 2009; Mukhtarov, 2014).

So far, scholars that contributed to the work of policy translation tend to focus on identifying the characteristics of translation processes and how these play out in practice (e.g., Martson, 2000; Mukhtarov, 2014). By doing so, these studies predominantly apply policy translation as an analytical concept; examining past exchange processes of ideas and practices with the three principles of policy translation. Mukhtarov (2014), for example, uses the three principles to reflect on the process of formulating a water policy in South-Eastern Turkey. In this respect, policy translation offered "*an analytical framework to guide scholars in understanding how*

policy agents engage with the categories of meaning, scale, and contingency in the travel of ideas in order to advance their position in policy making” (p. 72).

However, what has received little attention in academic literature is how the understanding that actors engage with the principles of meaning, scale, and contingency in the travel of ideas and practices can be applied as a theoretical starting point for establishing transnational strategies. This is remarkable, since such an application of policy translation can reveal potential struggles or synergies in the processes of exchanging ideas and practices upfront of formulating a transnational strategy. In other words, if insights are gained in how the three principles are likely to unfold in the process of formulating a transnational strategy, actors who are involved in that process will be enabled to anticipate upfront on such struggles and synergies (Dolowitz & Marsh, 1996; Martson, 2000; Mukhtarov, 2014). That is why, next to the empirical objective, this thesis also aims to fill in this knowledge gap by studying how the concept of policy translation can be applied as a theoretical starting point for setting up a transnational strategy.

1.4 Research objectives and the research question

This research serves two objectives. The primarily, empirical aim of this thesis intends to improve planning practice by examining how national practices on climate adaptive rail networks can be translated into a transnational strategy for the Rhine-Alpine TEN-T rail corridor. The second objective is methodological and aims to contribute to the academic debate on policy translation by studying how the concept of policy translation can be applied for constructing a transnational strategy.

To fulfil the objectives of this study, the following research question has been formulated:

“How can national practices on climate adaptive rail networks within the Netherlands and Germany be translated into a transnational strategy on the Rhine-Alpine TEN-T rail corridor?”

To answer the main research question, the following secondary research questions will be examined:

1. How can the concept of policy translation be applied to construct a transnational strategy for international transport corridors?
2. Which discourse can be identified from the perceptions of actors, who are involved in the (international) rail and environmental domain of the Netherlands, Germany, and the European Commission, on the concept of ‘climate adaptive rail networks’?
3. How does the identified discourse affects the three dimensions that make up a climate adaptive rail network in climate adaptation policies on rail networks within the Netherlands, Germany, and the European Commission?
4. How do the factors that influence the flow of ideas and practices in international transport corridors further shape and strengthen the identified effects of the discourse on the three dimensions that make up a climate adaptive rail network?

1.5 Reading guide

Without knowing how the concept of policy translation can be applied to construct a transnational strategy, it is not possible to study how national practices on climate adaptive rail networks can be translated into a transnational strategy for the Rhine-Alpine TEN-T rail corridor. Hence, it is why fulfilling the methodological objective is a prerequisite for achieving

the primary, empirical aim of this research. The next, theoretical chapter, therefore, examines the origins and main principles of policy translation. Moreover, the factors that influence the flow of ideas and practices in international transport corridors will be studied. These factors will influence the translation process of national practices into a transnational on an international transport corridor. In the third chapter, it will be argued that a discourse analysis within interpretative policy analysis is a suitable research strategy for applying policy translation as a concept to construct a transnational strategy. Based on the research strategy, the second, third, and fourth sub-research questions are formulated. In the fourth, methodological chapter, climate adaptive rail network will be discussed as the case study. Moreover, this chapter will address the data collection and data analysis processes. In the results chapter, the identified discourse, its origins, the effects on the three dimensions that make up an infrastructure networks, and the role of the factors that influence the flow of ideas and practices in international corridors in shaping and strengthening the effects of the identified discourse will be examined. In the concluding chapter, six guidelines will be formulated on how national practices on climate adaptive rail networks can be translated into a transnational strategy for the Rhine-Alpine TEN-T rail corridor. These guidelines answer the main research question and serve the empirical objective of this study. The closing chapter ends with a discussion and recommendations for future research.

Chapter 2 – Theoretical Framework

2.1 Introduction

To study how the concept of policy translation can be applied to construct a transnational strategy, the methodological objective of this research, a thorough understanding of policy translation is required first. The first section of this chapter will, therefore, examine the origins of policy translation by discussing a broader shift in contemporary planning theory and practice. This so-called communicative turn will be positioned as the context in which the transition from policy transfer to policy translation should be placed. The third section will discuss the core principals of policy translation. Finally, attention will be paid to the factors that influence the flows of ideas and practices within transnational transport corridors. These factors are of particular relevance to take into account, as they will affect the translation process of national practices on climate adaptive rail networks to a transnational strategy on the Rhine-Alpine TEN-T corridor.

2.2 The communicative turn in planning theory and practice

The mid-twentieth century planning field was strongly influenced by the ‘positivist-modernist’ philosophical tradition (Mumby, 1997; Allmendinger, 2017). As Zuidema (2016) explains, this tradition is often associated with a “*strong confidence in technological development, science, and the possibility of discovering objective knowledge about the true nature of the world*” (p.3). This confidence is fuelled by the belief that our observations represent a reality that is out there and exists independently of human influences. In the positivist-modernist thought, rationality was used as the dominant instrument in predicting and explaining phenomena (Zuidema, 2016). **Rationality** here, refers to the ability to reason; conforming someone’s actions with the reasons to act (Allmendinger, 2017). The presence of multiple perspectives on one phenomenon was assumed to be caused by irrationalities, such as emotions.

For planning theory, the positivist-modernist tradition had serious implications. To cite Alexander (1984, in De Roo, 2006a) planning in the post-war planning era “*demand the systematic considerations and evaluation of alternative means in the light of the preferred ends they are to achieve*” (p. 63). In other words, criteria for success could be formulated in advance. The dominant planning approaches in this period and their application of rationality is extensively discussed in academic literature, with ‘technical rationality’ (Healey, 1983) and ‘procedural rationality’ (Faludi, 1987) being referred to the most (De Roo, 2006a; Allmendinger, 2017). Following this line of thought, ‘the planner’ in practice is a professional with technical knowledge to inform decision-making. Someone who can think strategically and independent of social influences. A person who is always capable of making the best choice out of alternatives (Faludi, 1987; Allmendinger, 2017). The planner was seen as a goal-oriented expert that acted in a world that is makeable and who’s real life interventions should be functional rather than process-oriented or aesthetic. As a result, a coordinative or even control model of governance was most vividly represented in both planning theory and practice in the 1950’s and 1960’s (Zuidema, 2016).

Unsurprisingly, the assumptions of universal truths and technical rationality did not correspond with reality. This became clear in the seventies, where a multitude of events placed the trust in controllable society under severe pressure. To name some prominent examples: the Middle East Oil Crisis, the rise of environmental movements, and the increased formation of interest groups (De Roo, 2006a). As a response, a shift away from modernism occurred in the philosophical landscape. In this shift, a variety of philosophical positions emerged, based on the work of philosophers such as Giddens, Foucault, and Habermas (Healey, 2013; Zuidema, 2016). **Post-modernism** functions as an umbrella for these new positions and is

concerned with the wider shifts in contemporary society away from modernism (Patomäki & Wight, 2000; Allmendinger, 2017). Central within post-modernity is the notion that reality is established by human actors, through interpretation, cultural beliefs, and by shared meaning making through language (Zuidema, 2016). It is a view that is related to Friederich Nietzsche's approach of 'perspectivism' and is explained by Small (1983, in Zuidema, 2016) as "*the world is always understood within the perspective of some point of view; all knowledge is thus an interpretation of reality in accordance with the set of assumptions that makes one perspective different from another*" (p. 99).

This philosophical repositioning that played out in the 80's and 90's of the previous century had major implications for the planning domain. Gradually, a wide variety of new conceptualizations in the planning profession emerged (De Roo, 2006a; Allmendinger, 2017). The aim of this study is not to discuss all these new approaches in detail. As Friedmann (1998) emphasizes, there are so many conceptualizations around, some overlapping and some even competing, that it is extreme challenging to get a grasp of them all. Zuidema (2016) refers to this multiplicity as a 'plural governance landscape'. What however is important, is the significant emphasis on communication, interactions, and cultural influences in these approaches. This shift is often described as the **communicative turn** in planning (see among others Innes, 1995; Healey, 1996; Mumby, 1997; Patomäki & Wight, 2000; Wolff, 2020).

In contrast with top-down and command and control planning approaches, communicative planning theory and practices emphasize participation processes and are actor-focused (Innes, 1995; Mumby, 1997). The planner is no longer a distant expert. Rather, planning became a profession in which the interests of stakeholders in processes of interactions, subjectivity, and consensus-building in socio-spatial environments are at the bedrock of the field (Healey, 1996; 2013). Consequently, the planning profession became both subject of and needed to respond to increased levels of complexity (Innes, 1995; De Roo, 2006a).

2.3 From policy transfer to policy translation

This brief overview of the shift between the two dominant, opposing views in contemporary planning marks a broader development in which the progress of theories and understandings on transnational flows of planning ideas and practices need to be positioned (Ward, 2010; Healey, 2013). To elaborate, in the mid-twentieth century the concept of linearity and an almost universal applicability of Western planning concepts were vividly applied in the transnational flow of planning concepts (Tait & Jensen, 2007; Ward, 2010). To illustrate, ideas such as land-use zoning, urban amenities, and high-rise buildings rapidly spread across the globe carried by "*the networks of colonial and postcolonial administration, by the alliances of cold-war global politics, and by the professional training and networks of different expert groups*" (Healey, 2013, p. 1512). It was not questioned whether these Western planning principles might change if they were to be applied in a new context. These linear principles of transferring planning ideas and practices make sense from a technical-rational planning perspective; assuming a makeable world in which a planner makes the best choice out of alternatives (Faludi, 1987; Allmendinger, 2017).

The concept that was used to describe this performance of transnational exchanges of planning ideas and practices was **policy transfer** (Dolowitz & Marsh, 1996; Healey, 2013). A linear incentivized activity which is defined as "*a process in which knowledge about policies, administrative arrangements, institutions etc. in one time and/or place is used in the development of policies, administrative arrangements and institutions in another time and/or place*" (Dolowitz & Marsh, 1996, p. 344). In policy transfer, policy entrepreneurs actively engage in and promote the transfer of a specific planning idea or policy. Important this engagement was the strong assumption of 'what works here' to a large extent 'also works there'.

Moreover, stability between and within governance scales and the immutability of ideas while they travel were supposed conditions as well (Evans, 2009; Freeman, 2009; Mukhtarov, 2014).

Alongside the rise of communicative planning approaches critique centred around the linear principles of policy transfer. It was argued that the principles did not take into account the diverse cultural and historical dynamics between territories (Watson, 2009). Rather, there came increased awareness for the socio-cultural environments in which ideas ‘land’. How do practitioners, theorists, and policy makers in the recipient country perceive and understand a planning concept? What are dominant power relations that influence governance landscapes? Such questions were increasingly addressed in the literature on transnational flows of planning ideas and practices, emphasizing the notion that our view is constructed in the flow of practical endeavour (Rotry, 1980, in Healey, 2013). It was increasingly emphasized that the meaning of concepts and ideas change in travelling from one place to another, contrasting the linear principles and the assumed immutability of ideas in policy transfer.

In this critique a multitude of alternative approaches emerged, of which lesson-drawing and policy mobility received significant attention (Mukhtarov, 2014). Lesson-drawing focusses on the conditions under which policies function and emphasizes the voluntary import of ideas (Rose, 1991). Policy mobility addresses the complex travel process of ideas and the role the agency of actors plays in these processes (Cook & Ward, 2012). These concepts already significantly broadened the scope of the literature on policy transfers. Lesson-drawing addresses that ideological and resource similarities are necessary preconditions to adopt lessons from a country (Dolowitz & Marsh, 1996). Ideas cannot just ‘land’ anywhere. Policy mobility, in turn, sees the travel of ideas as a function of structural forces (Mukhtarov, 2014). Yet, despite introducing ‘culture’ and ‘institutions’ as crucial elements within the travel of ideas and practices, these approaches do not move away from the concept of **transferability**. A term that is criticized by Mukhtarov (2014) as it “*assumes that it is the quality of a policy to be more or less amenable to transfer*” (p.76).

As a response, Mukhtarov (2014), inspired by the work of Dolowitz & Marsh (1996), Freeman (2009), and Lendvai & Stubbs (2009), offers **policy translation** as an actor-based alternative. Policy translation is defined as “*the process of modification of policy ideas and creation of new meanings and designs in the process of the cross-jurisdictional travel of policy ideas*” (p. 76). Complementary, Freeman (2009) mentions that “*translation’ indicates a closer attention to the problem of shared meaning and how it might be developed*” (p. 430). Rather than assuming that it is the quality of a policy to be transferable, policy translation argues that the travel of policy ideas is affected by complex interactions of multiple factors, making it hard to predict the outcomes of the travel process upfront. Therefore, transferability is not a quality of a policy, since this policy itself is subject to modification while it travels. Mukhtarov (2014) continues by explaining that policy translation centres around three principals, which inherently criticize the fundamentals of linear policy transfer:

- **Meaning destabilization** – Policy translation emphasizes the modification of meaning and the diverse interpretations a policy or concept might have in the context it ‘lands’ (Freeman, 2009). Discourses, ideologies, and linguistics all influence the transformation and interpretations of ideas.
- **Scale destabilization**– Mukhtarov (2014) draws on the work of Martson (2000) that addresses the social construction of scale. Rather than thinking in geographies of ‘local’, ‘regional’, ‘national’, and ‘global’, actors operate in social, political, and cultural constructions which are not fixed to a particular scale.
- **Increased contingency** – In essence, contingency theory rejects the *one size fits all* idea in the travel of policies (Zuidema, 2016). As ideas travel, they are affected by a wide

variety of factors and interactions, which increases the level of complexity along their journey. These factors are context-specific and to a large extent intersubjectively formed (Jasanoff, 1998, in Mukhtarov, 2014). This implies that certain concepts, a well-known example being 'sustainability', might trigger a chain of unintended events along their journey (Mukhtarov, 2014).

The arrows in Figure 3 reflect the process of how an idea changes while it travels. Important to note is that 'idea-travel' in the grey box is not intended as a single noun. 'Idea-travel' means the travelling *of* the idea. The more an idea travels, which does not equal travelling longer or further, the more it is subject to meaning destabilization, scale destabilization, and increased contingency. The more the 'environment' varies between where an idea was constructed as where it 'lands', the more different it gets interpreted. As ideologies and discourses, among others, might fundamentally differ, so does the meaning that is assigned by the receivers to the idea. The same is true for contingency and scale destabilisation. The more factors and interactions are of influence in the journey of an idea, the more complex the idea gets. Subsequently, the more the idea is influenced by constructions that are not bounded to a fixed geographical scale (Mukhtarov, 2014).

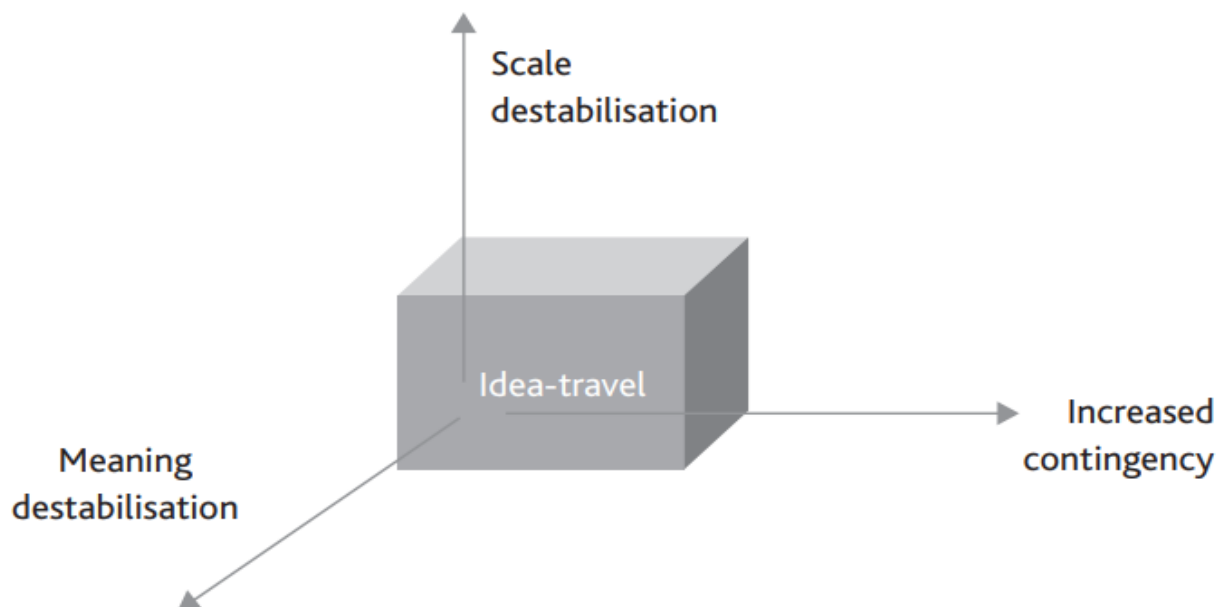


Figure 2: Policy translation and categories of meaning, scale, and contingency (Mukhtarov, 2014, p.79).

The three principals have significant implications for applying policy translation as a concept to construct a transnational strategy, rather than using it as an analytical concept as Mukhtarov (2014) does in his study. A research strategy needs to be formulated that can anticipate upfront on the fluidity of understandings and perspectives on concepts, on the potential influences from dynamic social, political, and cultural constructions, and on the growing complexity of ideas when they travel. This research strategy will be provided in the next chapter. Yet, attention first shifts to the flow of ideas and practices in international transport corridors. This will be done since this study aims to investigate how a transnational strategy can be formulated for an international transport corridor; the Rhine-Alpine TEN-T rail corridor. Factors that influence the flow of ideas and practices in international transport corridors will thus also be present in the process of formulating the transnational strategy. In other words, these factors will affect the contingent and meaning and scale destabilization processes that play out when national practices on climate adaptive rail networks are translated to a transnational strategy.

2.4 The flow of ideas and practices in international transport corridors

A definition of transport corridors is provided by Florkowski & Nilsson (2007, in Keser, 2015) who argue that **transport corridors** are “the transport infrastructure works that enable all modes of transport to be used in an integrated manner” (p. 4). The international element is added when the particular corridor crosses and connects two or more neighboring countries. Yet, as Keser (2015) argues, this is quite a broad definition of the concept. That is why Trip & Zonneveld (2003) emphasize the importance of the perspective from which international transport corridors are studied. In this line of thought, these scholars extensively discuss multiple perspectives on international transport corridors, of which two are of particular relevance for this study: the (I) transport dimension and the (II) institutional dimension.¹

The transport dimension is of relevance since this dimension is concerned with the factors that influence the flow of ideas and practices on how a well functioning physical infrastructure system can be established (Trip, 2003a; Eisenack *et al.*, 2012). These factors thus will also influence the process of how a physical climate adaptive rail network can be achieved. The institutional dimension includes, among others, the collaboration processes between actors, the construction and application of policies, power interplays, and the perceptions of actors (De Vries, 2003). These institutional elements will all be present when the transnational strategy on climate adaptive rail networks will be formulated, as a process of formulating a transnational strategy is a process that involves a multitude of actors and organisations (Mosse, 2008; Menon & Weatherill, 2008).

Transport dimension

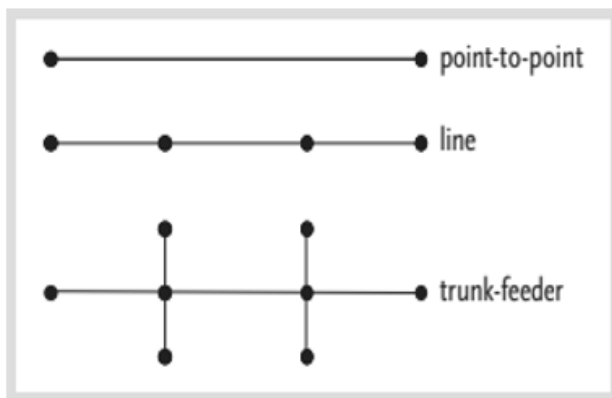


Figure 3: Morphologies of a corridor in terms of network types (Kreutzberger, 2002, in Trip, 2003a, p. 18).

morphologies, depending on the scale level from which is looked at the network (Trip, 2003a). As a result, transport flows, services, and modalities differ highly across a corridor. To illustrate, local and express trains may run over the same trajectory, but their impact on the corridor differs between scales. Moreover, the railway capacity in a dense urban area might be inadequate, but along the whole corridor it might be sufficient. As a consequence, **scale dynamics** might cause both conflicts as well as synergies in policy decisions on, among others, investments and intervention in the physical infrastructure (Trip, 2003a).

Kreutzberger (2002, in Trip, 2003a) identifies three different morphologies of a corridor: point-to-point, line, and trunk-feeder (Figure 4). To determine which morphology is applicable to the corridor under study, the scale level is a crucial determinant. On the international level, corridors are almost always a line network (Trip, 2003a). As can be seen in Figure 2, this is also true for the Rhine-Alpine TEN-T corridor. Yet, on a local or regional level, a line network mostly has bifurcations, making it a trunk-feeder. An infrastructure networks thus can have multiple

Figure 5 illustrates the variation between transport flows along a corridor and the influence of scale dynamics. The upper line presents a line corridor and the arrowed lines represent a variation in length of different transport flows along that same line corridor.

¹ Trip and Zonneveld (2003) also discuss the economic and urban dimension. In short, the economic dimension is concerned with the economic effects on and of an infrastructural connection. The urban dimension discusses the mutual relationship between urban development and transport corridors. The aim of this thesis is, however, not to study the economic and urban effects of transport corridors. Therefore, these dimensions are not being addressed in this research.

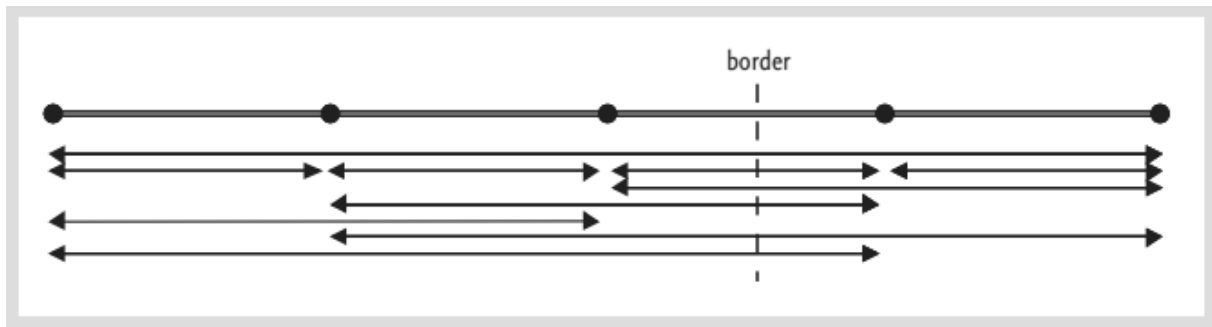


Figure 4: Variation in length of transport flows along an international corridor (the corridor is the upper, bolt line) (Trip, 2003, p. 21).

Second, a transport system is characterized by a strong **path dependency** (Pierson, 2000). Trip (2003a) argues that “the present development is strongly influenced by former investments reflecting the technical standards, perspectives, and aims prevailing at the moment the investment decision was taken” (p. 18). New infrastructure or infrastructural interventions, both can be the case for adaptive infrastructure (Chester & Allenby, 2018), have to fit into the existing network. This existing network thus, to a significant extent, determines the room to maneuver for policy decisions on physical infrastructure (Pierson, 2000).

Institutional dimension

The development of a transnational corridor is more than building and linking infrastructure. Rather, it is a long-term process in which actors collaborate closely and national practices should be carefully aligned. Moreover, transnational policies have to be established in which different interests of stakeholders carefully need to be aligned. To make it more complex, the involved actors have different perceptions and sources of power which frustrate collective action. This especially applies for transnational corridors due to fragmented jurisdictional and institutional landscapes between countries. Hence, creating institutional conditions alongside a transnational corridor is essential to find ground for collective action (De Vries, 2003).

These conditions are divided by De Vries (2003) into two groups: (I) **hard conditions** and (II) **soft conditions**. Hard conditions refer to legal procedures or programs that contain agreements or arrangements between the involved actors. For example a legally binding document containing agreements between two neighboring countries to implement an infrastructural link. Soft conditions refer to elements such as building mutual trust or using common vocabulary between the involved stakeholders. It are these soft conditions that enable actors to interact in a constructive way and where shared perspectives are build (De Vries, 2003). Healey (1996) argues that this process of creating shared perspectives contributes to capacity-building for decision-making. However, establishing soft conditions for constructive interactions is challenging in transnational corridors due to fragmented institutional landscapes between countries. As a result, policy makers in infrastructure tend to predominantly focus on hard conditions, while the inclusion of soft conditions is often lacking (De Vries, 2003).

De Vries (2003) concludes his chapter by discussing **planning culture** as an all-embracing factor of influence for the institutional landscapes within countries. Knieling & Othengrafen (2009) extensively elaborate on this topic in their study. These authors address that within territorial areas, such as regions or nations, planning practices and attitudes show significant similarities compared to other regions or nations. They continue by arguing that “each national or regional context is characterized by particularities of history, by attitudes, beliefs and values, political and legal traditions, different socio-economic patterns and concepts of justice, interpretations of planning tasks and responsibilities, and different structures of governance – in other terms: by its specific cultural characteristics” (Knieling & Othengrafen,

2009, p. 14). Planning cultures thus are, to a significant extent, territorial bounded and so are the perceptions and interpretations that make up the planning culture.

Resuming, Table 1 provides the **five factors of influence** on the flow of ideas and practices in transnational transport corridors.

Table 1: Factors of influence on the flow of ideas and practices in transnational transport corridors.

Factors of influence on the flow of ideas and practices in transnational transport corridors	
1.	Scale dynamics
2.	Path-dependency
3.	Hard conditions
4.	Soft conditions
5.	Planning culture

2.5 Conceptual model

Before the research strategy will be provided in the next chapter, the relationships between the most important concepts of the theoretical framework are visualized in the conceptual model, presented in Figure 6. As can be noticed, the five factors of influences affect the contingent and meaning and scale destabilization processes that play out when national practices on climate adaptive rail networks are translated to a transnational strategy.

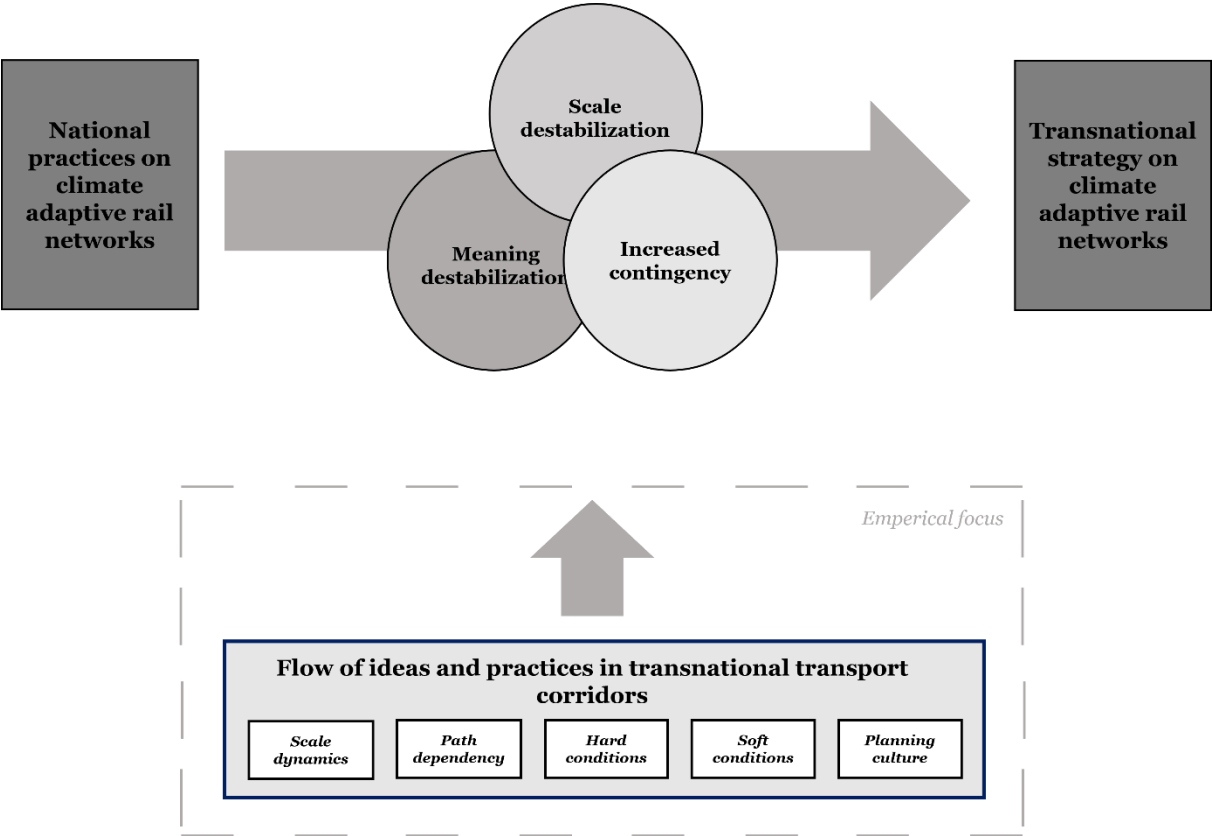


Figure 5: Conceptual model illustrating the relationships between the most important concepts of the theoretical framework.

Chapter 3 – Research Strategy

3.1 Introduction

This chapter will argue that interpretative policy analysis contains valuable insights on how to apply policy translation as a concept to construct a transnational strategy. In turn, interpretative policy analysis also has significant implications from which perspective and understanding the five factors of influence will be studied. Implications that will be examined in the third section. Finally, from the literature of interpretative policy analysis, it will be argued that a discourse analysis within interpretative policy analysis is a valid research strategy to apply policy translation as a concept to construct a transnational strategy. This research strategy fulfils the methodological objective of this study and answers the first sub-research question.

3.2 Towards interpretative policy analysis

In her paper, Healey (2013) studied the work of scholars who perform critical analysis on transnational flows of planning ideas and practices (e.g., see Mosse, 2008; Soulard *et al.*, 2018; Wolff, 2020). She first, extensively, discusses the philosophical shift and ‘modernization myth’ in theories on transnational flows of planning concepts. She emphasizes the importance of socio-environmental contexts in which ideas are giving meaning. In this line of thought, multiple theoretical strands are identified by her that are concerned with exploring the transnational flow of ideas and practices in the contemporary planning profession. The theoretical strand of interpretative policy analysis will be discussed below.²

There is a wide variety of scholars that contributed to the academic debate about **interpretive policy analysis (IPA)** (e.g. Jennings, 1983; Yanow, 2014; Arronna & Zabala-Iturriagagoitia, 2018). Even though as a strand it has multiple disciplines, IPA in general focusses “*on the construction and mobilization of ‘meaning’, producing ‘policy discourses’ that then become institutionalized into practices*” (Healey, 2013, p. 1517). To compare, Colebatch (2004) describes that IPA is “*concerned with the multiple ways in which people (official, politicians and the public) make sense of the world and apply ‘policy’ to it, and with making links between these discourses and finding ways of linking them*” (p. 1). As can be noticed in these definitions, IPA places meaning and discourse, and the role they play in understanding social realities, at the centre of inquiry (Jennings, 1983; Yanow, 2014). The discourse formation is a process of struggle in which ideas and arguments are fused and consolidated into ideologies or frameworks. Subsequently, the discourse develops structuring properties and becomes ‘institutionalized’ (Healey, 2013; Yanow, 2014). Actors operating in these institutional sites carry meanings and practices with them that evolve as these transformation processes play out. This implies that planning concepts, both internal and external, generate authority through processes of legitimization and validation within such discourse formations (Healey, 2013).

IPA is inspired by the academic work on actor-network theory (ANT), which emphasizes that all objects and things exhibit consciousness and interact heterogeneously in space (Allen, 2011;

² Besides IPA, Healey (2013) discusses the theoretical strands of actor-network theory (ANT) and circuits of knowledge. As argued for in section 3.2, ANT is shortly examined due to the close theoretical connection with IPA. Yet, as the objective of this research is not concerned with studying the agency that both human and nonhuman actors exhibit, ANT was classified as being of less relevance for this study. The same counts for circuits of knowledge, which are transnational flows of ideas, beliefs, and ideologies, for example neoliberalism, that carry a long history of travelling with them and affect planning practices worldwide (Healey, 2013). The interest in transnational flows plays out on a global scale and is concerned with the creation and dynamics of the circuits themselves. As this research is not interested in studying the dynamic interplay and history of global flows of knowledge, this theoretical strand is of less relevance for this study as well.

Healey, 2013; Sayes, 2014). This consciousness is referred to as agency; all actors, including objects, are given meaning through shared perspectives, views, and intersubjectivity (Allen, 2011; Viljanen, 2020). Moreover, agency “catches every entity that makes or promotes a difference in another entity or in a network” (Sayes, 2014, p. 141). The network, in turn, makes up the context in which actors act, are framed, and validated (Knorr-Cetina, 1999, in Healey, 2013). Where IPA, however, moves away from ANT in analysing transnational flows of planning ideas and practices, is the emphasis on the travel path of an idea and the factors that influence this path. As Healey (2013) formulates it: “while the emphasis of ANT on the materiality of the way findings, techniques, and ideas are formed and flow, and the methodological insistence to investigate rather than assume specific institutional dynamics, are valuable resources, the tools of ANT give less emphasis **to institutional dynamics, and the way the experience and creations of one time and place become embedded both in the moulding of travelling ideas and their travel experience and in what happens when they ‘land’**” (p. 1517). It is the latter, bold phrase that scholars in the field of IPA seek to study in their work.

The scope of IPA research has promising implications for how to anticipate upfront on the processes of meaning destabilization, scale destabilization, and increased contingency when policy translation is applied as a concept to construct a transnational strategy. Regarding increased contingency, IPA scholars seek to study how ideas change and become more complex in the travel process. Crucial in the moulding travel paths is the role of **discourses**. Discourses in this study are understood from a post-structuralist view, an ontological and epistemological position which is closely associated with post-modernism, that emphasizes that social, cultural, or psychological structures strongly constrain the possibilities of human action (Fox, 2014). A discourse, in this respect, refers to an intersubjectively formed, collective perception and constraint of knowledge among a group of actors that finds its expression in patterns of shared language and understandings (Gill, 2000). Post-structuralists are, in contrary to critical-linguistics ethno-methodologists, not interested in the very details of spoken and written texts. Rather they focus on the effects and the origins of discourses (Gill, 2000).

In each discourse, an idea may trigger another chain of unintended events. As in each discourse the idea at stake is understood or applied differently (Healey, 2013). In this respect, discourses construct social reality and, due to the presence of multiple discourses, meanings are differently formed among actors. (Howard, 2000). This illustrates that IPA acknowledges that meanings are fluid; touching upon the principal of meaning destabilization. Finally, discourses are not bound to a particular scale level. Rather, they construct social realities in which social, political, and cultural constraints play out (Gill, 2000; Howard, 2000). Actors, in turn, that operate in a specific discourse are influenced by these constraints, which is in line with the principal of scale destabilization.

Concludingly, IPA is a theoretical strand that emphasizes that ideas in their travel path are influenced by the three principles of policy translation. In turn, literature on IPA might thus include insights on how to apply policy translation as a concept to construct a transnational strategy. Yet, before examining literature on IPA, the connection between IPA with the factors that influence the flow of ideas and practices in international transport corridors, as identified in Table 1, will be addressed. This relationship will be examined since IPA also has significant implications from which perspective the factors of influence will be studied.

3.3 Interpretive policy analysis and international transport corridors

To illustrate the relation between IPA and scale dynamics, policy makers on a national scale might perceive a transport link between economic thriving areas vital for a nation’s economy, whereas actors on the local level along the corridor have livability concerns. Perceptions on a transport corridor thus vary between scale levels. IPA is particularly concerned with studying

how these perceptions differ and mutually affect one another between various scale levels, as discourses are made up by ideas and beliefs of various constraints that vary between scales (Howard, 2000; Healey, 2013). With regards to path-dependency, Trip (2003a) explains that present developments reflect former financial and technical decisions and the perspectives that influenced these decisions. This is strengthened by the study of Öberg *et al.* (2018) who examined governance structures within TEN-T corridor. These authors argue that existing infrastructure is influenced by previous/recent decisions on infrastructure or transport projects. Perspectives and perceptions, in turn, indicate the presence of a discourse (Howard, 2000). Hence, the perspectives and perceptions that influenced the decision-making processes of the existing infrastructure are of concern within IPA (Healey, 2013; Yanow, 2014).

The connection between IPA and hard conditions is not directly evident, as legal documents, for example, contain texts with clearly formulated rules and restrictions. One might question how clearly formulated rules can be interpreted differently. Yet, in practice, Trip (2003a) argues that the interpretation and the application of rules restrictions can significantly differ between actors. Moreover, these legal documents reflect former perceptions and priorities of the actors who established the regulations (Trip, 2003a). These aspects of interpretation and perception are of concern within IPA (Healey, 2003; Yanow, 2014). Last and not surprising, both soft conditions and planning cultures are connected to IPA. As soft conditions are concerned with creating constructive interactions, the issue of overcoming the diversity of interpretations to enhance shared perspectives is at stake within IPA (Healey, 2013). Planning cultures are closely related to discourses, as planning cultures reflect particular beliefs, values, and interpretations on planning issues (Knieling & Othengrafen, 2009). How these element interact one another and how the affect perception-making processes is of concern for IPA (Howard, 2000; Healey, 2013).

Table 2 provides an overview of the relationship between IPA with the five identified factors of influence.

Table 2: *The factors of influence compared with the characteristics of IPA.*

Identified factors	IPA perspective
1. Scale dynamics	Reflect the interplay of different perceptions and interests between actors of different scales.
2. Path-dependency	Reflect former decisions and perceptions that influenced that decisions.
3. Hard conditions	(Legal) documents reflect former decisions and perceptions that influenced those decisions and recall different interpretations among human actors.
4. Soft conditions	Concerned with mapping and overcoming a diversity of interpretations to create constructive connections.
5. Planning culture	Closely associated with discourses since planning cultures are made up by, among others, shared beliefs, values, ideologies, and legal documents.

3.4 Discourse analysis within interpretative policy analysis

In their work, Jennings (1983) and Yanow (2014), two prominent scholars in the field of IPA, examine how IPA research can be conducted. They ask themselves the following questions: who interpretate ideas, who give meaning to them, and between whom might perspectives fundamentally differ? Indeed, as both scholars argue, these questions apply to the actors involved in flow of ideas and practices. Hence, it is why in IPA actors are put at the centre of inquiry (Jennings, 1983; Healey, 2013; Yanow, 2014). These actors are not pure rationalists as

assumed in technical rational approaches, rather they give meaning to objects in intersubjective processes where discourses play a vital role (Gill, 2000; Healey, 2013; Yanow, 2014).

It is from this understanding that De Roo (2006b) discusses the actor-consulting approach. Even though this approach is introduced as a model to handle fuzziness in planning, it is concerned with addressing the variation of perceptions between actors and how they position themselves to one another. As De Roo (2006b) mentions: “*actor consulting creates the ability to structure a reality out of social processes that are almost always chaotic by character*” (p. 125). In this respect “*consultation is intended as a mechanism to work towards a well-defined mutual understanding and a common frame of reference between actors*” (De Roo, 2006b, p. 124).³

Then how can insights be gained in the construction of different meanings and interpretations among actors that come to the surface when applying an actor-consulting approach within IPA research? **Discourse analysis** here is essential (Gill, 2000; Howard, 2000; Yanow, 2014). By mapping discourses, an understanding can be gained in how certain ideas and practices are variously understood and which constraints influence the different meanings that are present (Yanow, 2014). Overall, Yanow (2014) explains that a discourse analysis is “*useful in trying to elicit understandings of what specific policies might mean to various issue-relevant publics as well as in exploring how those meanings are developed, communicated, and (potentially) variously understood*” (p. 141).

Concludingly, by unravelling the present discourses among actors, a sufficient understanding can be achieved about how and why meanings differ, why certain concepts are differently understood and interpreted in their travel process, and what the influences are of social and political constructions in the journey an idea travels. For the methodological objective of this study, this implies that by performing a discourse analysis within IPA research, potential struggles and synergies that might emerge from processes of meaning destabilization, scale destabilization, and increased contingency can be identified upfront of formulating a transnational strategy. This research strategy answers the first sub-research question and functions as the starting point for the methodology that will be provided in the next chapter.

³ It is true that actor-consulting to handle fuzziness presumes consensus on reaching a certain planning goal, but this has to do with the action-oriented objective in which De Roo (2006b) discusses the approach. For unravelling a potential diversity of perspectives, Yanow (2014) and Arronna & Zabala-Iturriagoitia,(2018) explain, consulting and deliberating actors is a useful approach in the context of IPA.

Chapter 4 – Methodology

4.1 Introduction

A methodology will be provided in this chapter based on the academic work on discourse analysis within IPA research. Johnson (2011) and Gee (2011) argue that a thorough understanding of the case that is being studied is required at the beginning of the data collection process, since the discourse that is wished to be analysed is concerned with the specific case. The first section of this chapter will, therefore, discuss the work of scholars on climate adaptive infrastructure networks to classify three dimensions that make up an infrastructure network; the technical, spatial, and institutional dimension. These three dimensions, combined with the competence of awareness, play a structuring role in the data collection and data analysis process (Johnson, 2011; Yanow, 2014).

Yet, as Yanow (2014) forcefully argues, the data collection process in IPA research is iterative. Hence, the identified dimensions function as a starting point. In the primary data collection process, that follows after, room for new insights is ensured. The data analysis that then will be discussed is concerned with how the presence of discourse can be identified. Furthermore, attention will be paid to the effects of the discourse and to the role of the factors of influence in shaping and strengthening the mapped effects. In the last section ethical considerations will be discussed.

4.2 Case study: climate adaptive rail networks

This thesis aims to improve planning practice by examining how policy translation can be used as a concept to construct a transnational strategy in practice. As argued for in the introductory chapter, this research will do so by examining **climate adaptive rail networks** as a case. A case study is particularly suitable for conducting in-depth research in natural settings to test hypotheses, or to illustrate how a certain theoretical understanding can be applied in practice (Taylor, 2016). What can be noticed is that this research is concerned with the latter. Eventually, by examining this case it will be studied how national practices on climate adaptive rail networks can be translated into a transnational strategy for the Rhine-Alpine TEN-T corridor. This fulfils the primary, empirical objective of this study.

In addition to the brief examination of climate adaptive rail networks in the introductory chapter, scholars argue for three, interdependent dimensions that make up an infrastructural network. Three dimensions that all should be included when a network is designed to be both flexible and agile:

- **Technical dimension:** The physical components of the infrastructural network. For this study, the physical rail roads themselves. Moreover, this dimension also refers to measures that are taken to enhance the physical adaptability of the network. To illustrate, technical implementations that limit the expansion range of railroads in periods of severe heat. These technical structures enhance the agility of the railroads to maintain their function in such challenging conditions. Another example is strengthening the foundation of a railroad to better withstand high levels of water when a river floods (Lindgren *et al.*, 2009; Chester & Allenby, 2018).
- **Spatial dimension:** The integration and cohesion of the infrastructure network with other spatial functions. When a local or regional policy in one area, for example, focusses on fast water drainage, areas downstream might experience disruptive effects of high-water peaks in periods of heavy rainfall. If a railway is situated in the downstream area, the network as a whole is negatively affected by upper stream spatial policies. A sufficient level of integration between the rail network with other spatial

functions is, therefore, needed to avoid such mismatches (Lindgren *et al.*, 2009; Markolf *et al.*, 2019; Wang *et al.*, 2020).

- **Institutional dimension:** The exchange processes between institutions tasked with operating, managing, and maintaining the infrastructure network. These exchange processes include collaborations and knowledge sharing. With regards to climate adaptation, this dimension refers to the preparedness and reactivity of and between the institutions to (disruptive) climate change related events. For example, the amount of knowledge sharing about practices on climate change adaptation between organisations. Or protocols that are being made about alternative routes when such a disruptive event within the network occurs (Chester & Allenby, 2018; Markolf *et al.*, 2019).

In addition, the **awareness** of the involved actors on the risks exposed to all the three dimensions is a crucial competence that interacts with them (Chester & Allenby, 2018; Markolf *et al.*, 2019; Wang *et al.*, 2020). With regards to this study, what do the involved actors perceive as threats, specifically coming from the river Rhine, for the Rhine-Alpine rail corridor? How do they perceive the current state of the rail network to cope with these threats? How do the actors understand the concept of climate adaptability? Knowledge and information here are crucial. Moreover, the three dimensions also affect awareness. To illustrate, the institutions tasked with designing and maintaining infrastructure in general tend to do so on standard practices. As Chester & Allenby explain “*in periods of rapid, non-incremental change, this disciplinary training produces barriers to the knowledge needed to understand and respond to stimuli, to perceive, to maintain fitness*” (2018, p. 10). As will be argued for in the fourth section of this chapter, the element of awareness is closely related to discourses.

Figure 7, which is based on the work of Lindgren *et al.* (2009), Markolf *et al.* (2019) and Wang *et al.* (2020), shows the three dimensions, their interdependence, and the interplay with the awareness of actors.

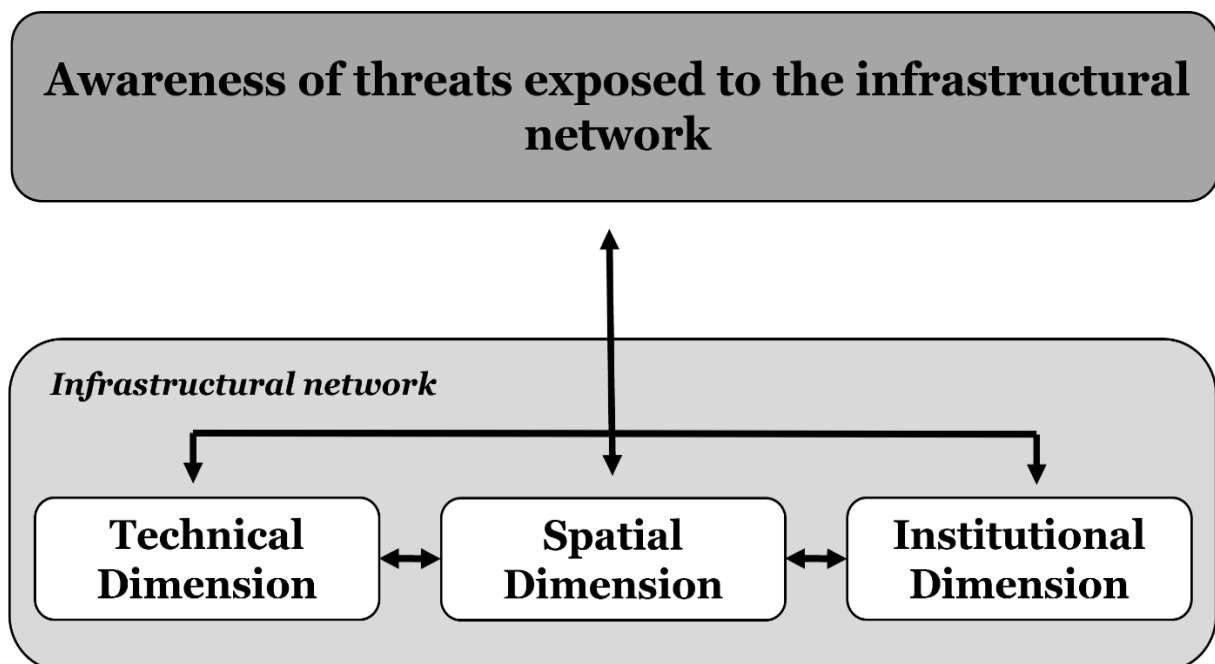


Figure 6: The three dimensions of an infrastructural network that should be included when designing an infrastructure network to be both agile and flexible.

4.3 Data collection process

Jonhson (2011) and Yanow (2014) argue that when performing IPA research, actors should be consulted and questioned to gain insights in how they perceive, communicate, and interpretate. Qualitative research uses, among other sources of data, human expression and written texts as data. Hence, it is why a qualitative research design is found to be applicable for this study (Cope & Kurtz, 2016).

What becomes clear from the work of academics on discourse analysis and interpretative research is that the process of identifying discourses is iterative (Johnson, 2011; Gee, 2011; Yanow, 2014). Learning is expected throughout the study. Discourses, namely, cannot be defined *a priori* performing research. On the contrary, it is expected that insights in discourses and their effects will be gained along the process of collecting data. Overall, Yanow (2014) mentions that *“interpretive researchers, by contrast, assume that learning will continue throughout their research. Rather than being front-loaded, taking place before and as the research design is being developed, learning is expected to unfold throughout the research process, in encounters during fieldwork with situated members, activities, documents, and so forth and continuing through deskwork (analysis) and text work (writing) phases”* (p. 17).

It is from this understanding that this thesis will apply a qualitative research design that is open and flexible to new insights that will be gained during the data collection process.

1. Pre-empirical data collection and literature review

Policy documents and news articles were selected in the early stage of this research to gain a first understanding about (I) climate adaptation measures for rail networks and (II) the division of tasks and responsibilities between different policy scales. This was done for the Netherlands, Germany, and the European Commission. Documents that discussed TEN-T policies, guidelines on adaptive infrastructure, and assessments regarding the state of railways to cope with climate related threats, listed in Table 3, were examined in this first step.

Table 3: Overview of the document analysis.

Document	Source
Technical guidance on climate proofing of infrastructure in the period 2021-2027	European Commission (2021)
Forging a climate-resilient Europe – the new EU Strategy on Adaptation to Climate Change	European Commission (2021)
Plan of action to improve cross-border and long distance passenger transport by rail	European Commission (2021)
Revision of the Regulation on the Trans-European Transport Network (TEN-T) / Before 2021.	European Parliament (2022)
Perspectief of klimaatbestendige netwerken in 2020 en 2050.	Ministerie van Infrastructuur en Waterstaat (2020)
NL comments & amendments concerning the proposed TEN-T regulation	Ministerie van Infrastructuur en Waterstaat (2021)
Verkenning naar infrastructuurprojecten met een grensoverschrijdende component tussen Nederland, België en Duitsland	TwynstraGudde (2021)
Adapting the German transport system to climate change and extreme weather events	BMVI (2018)
Schienengüterverkehrskorridore: Die Zukunft des Schienengüterverkehrs in Europa	BMDV (2020)

After the start of this thesis in November 2021, an internship by the author was followed at the international department of the Dutch national Ministry of Infrastructure and Water

Management. This internship was followed between February 15, 2022 and July 15, 2022. During this period, there was the opportunity to speak with colleagues that worked on TEN-T policies and colleagues who were concerned with adaptive infrastructure. With these colleagues and colleagues working at the permanent Dutch representation at the EU in Brussels and the Dutch embassy in Berlin, orienting interviews were scheduled. In total, seven orienting interviews were conducted with six interviewees listed in Table 4.

Table 4: Overview of the document analysis.

Respondent	Date	Location	Duration	Function
OI-1*	February 24, 2022 / June 22, 2022	Dutch national ministry of Infrastructure and Water Management	35 minutes / 20 minutes	TEN-T coordinator at the Dutch national ministry of Infrastructure and Water Management.
OI-2	March 22, 2022	Dutch national ministry of Infrastructure and Water Management	45 minutes	Coordinator adaptive infrastructure at the Dutch national ministry of Infrastructure and Water Management.
OI-3	March 30, 2022	Online	40 minutes	Policy advisor CEF (Connecting Europe Facility) and TEN-T at the national governmental agency for Dutch enterprises (RVO).
OI-4	June 29, 2022	Online	25 minutes	Policy officer at the Directorate General Move of the European Commission.
OI-5	July 5, 2022	Online	30 minutes	Coordinator international rail affairs at the Dutch national ministry of Infrastructure and Water Management.
OI-6	July 12, 2022	Online	35 minutes	Policy officer for the Dutch national ministry of Infrastructure and Water Management at the Dutch embassy in Berlin, Germany.

* Two orienting interviewees were conducted with OI-1.

The information and knowledge that was gathered in this pre-empirical data collection process significantly contributed to the author his understanding of climate adaptation practices in both countries, cross-border cooperations in the rail sector between the Netherlands and Germany, and legislations of the Rhine-Alpine TEN-T corridor. With this gained knowledge, the author was better enabled to specifically select and approach relevant respondents. Moreover, the insights contributed to well preparedness of the author for the interviews that followed in the second, empirical round of the data collection process.

2. Conducting semi-structured interviews

Primary data were collected via semi-structured interviews to gain direct knowledge from involved human actors about how they perceive, interpretate, and understand matters related to climate adaptive rail networks on the Rhine-Alpine TEN-T corridor. Semi-structured interviews consist of a scheme of predetermined questions, but with space for the interviewees to address issues they consider important as well. In this way, flexibility is offered to the interviewer to go more in depth into relevant new information that is addressed by the interviewee, while the interview remains structured to address all topics the interviewer wants to discuss (Longhurst, 2016). Semi-structured interviews thus fit in the flexible and open research design that IPA research requires. The potential interviewees were contacted between

June, 2022 and September, 2022. The decision was made to schedule the interviews throughout the complete month of September and the beginning of October, 2022, so that there was enough time to use insights from the first interviews and the first data analysis for the interviews that were scheduled later. By doing so, the interview guide was open to additions and adjustments throughout the primary data collection process. This also added to the open research design of this study. In total 12 interviews with 13 interviewees were conducted, listed in Table 5.

Table 5: List of conducted semi-structured interviews.

Interviewee	Date	Location	Duration	Function
The Netherlands				
I-1	September 6, 2022	Online	58 minutes	Senior policy advisor public transport and rail at the Dutch national ministry of Infrastructure and Water Management.
I-2	September 7, 2022	Online	79 minutes	Spatial policy advisor at ProRail; the executive Dutch agency for railways.
I-3	September 7, 2022	Online	53 minutes	Senior policy advisor climate and adaptation at Rijkswaterstaat; the executive Dutch agency for roads and waterways.
I-4	September 9, 2022	Online	53 minutes	Coordinator international rail affairs at the Dutch national ministry of Infrastructure and Water Management.
I-5	September 12, 2022	Online	34 minutes	Senior policy advisor climate adaptation at the province of Gelderland, the Netherlands.
I-6	September 14, 2022	Online	53 minutes	Policy advisor Water and Climate Adaptation at the municipality of Arnhem, the Netherlands.
Germany				
I-7	September 14, 2022	Online	59 minutes	Senior policy officer environmental affairs and railways at the German national ministry of Digitalization and Traffic.
I-8	September 30, 2022	Online	66 minutes	Project manager energy, climate, and progress at the region Cologne – Bonn.
I-9*	October 5, 2022	Online	42 minutes	Policy officer nature hazard management at DB Netze; the executive German agency for railways.
I-10*	October 5, 2022	Online	42 minutes	Policy officer rail operation at Deutsche Bahn; the German national train operator.
European Commission				
I-11	September 14, 2022	Online	34 minutes	Policy officer rail safety & interoperability at the Directorate General Move of the European Commission.
I-12	September 16, 2022	Online	50 minutes	Policy advisor to the coordinator of the Rhine-Alpine TEN-T corridor at the Directorate General Move of the European Commission.
I-13	September 21, 2022	Online	40 minutes	Seconded national expert climate adaptation at the Directorate General Clima of the European Commission.

* Respondents I-9 and I-10 were interviewed together.

The colleagues from the ministry in The Hague, the embassy in Berlin, and the permanent Dutch representation at the EU in Brussel, helped in contacting the interviewees and suggested potential respondents. The interviews with respondents from the Netherlands and respondent I-13 were conducted in Dutch. The other interviews in English. As in discourse analysis the

analysis of meaning is an important aspect, German interviewees could express themselves in German when they did not come up with the English translation of a certain word or phrase (Yanow, 2014). Moreover, the interview guide was also translated to German, so when a German respondent did not understand the question in English, the German translation could be used by the interviewer. By applying this research design, the risk of losing the original meaning of a word or phrase in the linguistic translation from German to English was minimized (Yanow, 2014).

An important precondition for the selection of interviewees was that the contacted policy officers were active on various scale levels, ranging from local municipalities, provinces, and 'Bundesländer' (Germany), to officers working at the national government of the Netherlands and Germany and the European Commission. By questioning officers from various scales how they position themselves to one another and about the tasks and obligations they assign to themselves and other scales, insights could be gained in scale dynamics of the Rhine-Alpine TEN-T corridor (De Vries, 2003). Hence, it is why Table 4 divides the respondents per country and the European Commission. Another criteria for selecting interviewees had to do with the function and tasks of the policy officers. The interviewees who were selected did not particular had to have both railroads and climate adaptation in their portfolio. On the contrary, and this will be further discussed in the results, it was found that tasks assigned to physical railroads, international cooperation on rail roads, and climate adaptation respectively, are rather siloed. Of importance was that the officers could provide valuable and reliable information, which will be further discussed in section 4.5, about the technical or spatial dimension and the collaboration processes between different policy scales, departments, and executive agencies. A third criteria for selecting interviewees was the geographical location of the local and regional scales. Respondents from these scales needed to work in municipalities, regions, provinces, and Bundesländer which the Rhine-Alpine rail corridor crosses. Preferably these local and regional territories were located close the border between the Netherlands and Germany. Since these administrative entities tend to interact more with one another, due to their geographical proximity, as compared to municipalities and provinces located further away from the national border. In turn, these cross-country interactions are also likely to be vividly present in setting up a transnational strategy (Healey, 2013).

In Appendix 1 to 3 the interview guides in English, Dutch, and German are attached. What can be noticed in the interview guides is that the three dimensions and the competence of awareness formed the structure for the semi-structured interviews. Moreover, specific questions were asked that focussed on the five factors of influence, as listed in Table 2. This was done to be enabled to study the role the five factors played in shaping and strengthening the effects of the discourse. On this latter point will be elaborated in the next section.

4.4 Data analysis

Throughout the data collection period the recordings of the interviews were being transcribed. This made it possible to process insights from earlier interviews in the interview guide for interviews that followed later. In both the English and Dutch interview guide these adjustments can be found. The adjustments indicate an iterative data analysis process, which fits the profile of IPA research (Yanow, 2014). The questions 7, 9, and 11, being crossed out, were removed from the interview guide and were replaced by question 12 which is being underlined. The reason for these adjustments had to do with the siloed nature of the three dimensions that was found in the primary data collection process. When the questions 7, 9, and 11 would have been asked separately, the risk of steering answers in a certain direction was present, since most respondents did not refer to or were involved in all three dimensions. If the respondents would have been explicitly asked about potential institutional, technical, or spatial measures, they might have come up with ideas that they would otherwise would not

have come up with. By asking about ideas or suggestions for a transnational strategy in general, this risk of steering was being limited.

The transcripts were coded by making use of software from ATLAS.ti. In Appendix 4 the code tree is provided. The codes were divided in five code groups: (I) awareness, (II) the technical dimension, (III) the spatial dimension, (IV) the institutional dimension, and (V) suggestions for the transnational strategy. Within the three dimensions, the factors of influence are classified. Important to note is that for most interviews the questions which are formulated under the institutional dimension were partly, to almost fully, discussed in the technical or spatial dimension. To illustrate, collaboration processes that purely focused on technical implementations on the rail network were coded under the technical dimension. Conversations about spatial adaptation strategies were labeled under the spatial dimension. Answers concerned with collaboration processes on railroads or climate adaptation more general were labelled under the institutional dimension. This method of classifying made it possible to directly link answers to the right dimension. The factors of 'planning cultures' and 'soft conditions' were only coded under the latter dimension. The reason for this was that answers concerned with 'planning cultures' or 'soft conditions' did not go into detail of either the technical or spatial dimension. Lastly, the code of '**internal dynamics**' was added to the identified five factors of influence. This was done since it was found that 'scale dynamics' are not only vividly present between organisations on the topic of climate adaptation in relation to railways, but also within organisations. From this moment onward there will, therefore, be talked about **six factors of influence**. This addition of a sixth factor of influence and the decision to code 'planning culture' and 'soft conditions' only in the institutional dimension also illustrate the iterative and open to learning character of the data analysis process.

After the coding process, the data analysis focused on the identification of a discourse within the collected data. In post-structuralist discourse analysis the presence of a discourse can be mapped by focusing on shared understandings and perceptions in the vocabulary of the respondents (Gill, 2000; Johnson, 2011; Yanow, 2014). Yet, as Gill (2000) emphasizes, the focus in post-structuralist discourse analysis is not on the detailed dissection of every single word. Instead, as Johnson (2011) and Yanow (2014) emphasize, it is about the identification of patterns in the understandings and perceptions of respondents by paying attention to:

- 1. Meaning:** The various understandings human actors may have about an idea or concept;
- 2. Priorities:** The value and importance human actors assign to a certain idea or concept;
- 3. Relation:** The positioning of human actors themselves to other human actors.

In the data analysis these three features were first studied in the answers to the questions that relate to the understanding of climate adaptive rail networks. These questions are primarily discussed under the header of awareness. Dominant patterns in the perceptions and understandings among the interviewees were identified as a discourse. These patterns were unraveled by comparing the three features among all respondents.

Second, the effects of the dominant understanding of climate adaptive rail networks on the three dimensions were studied. These effects were identified by carefully comparing the **focus** the respondents paid to the technical and spatial dimension. Did the respondents, for example, particularly discussed matters that were concerned with the technical dimension? Thereafter, the effects on the institutional dimension were studied, as it was found that the exchange and collaboration processes were strongly **interconnected** with the effects on the other two dimensions. Lastly, the effects and their interconnectedness were connected with the identified discourse by making use of academic literature.

Finally, the role of the factors of influence was studied. First, the **interplay** between the factors and the identified discourse was examined. Second, it was examined how the factors further **shaped or strengthened** the effects on the three dimensions (Gill, 2000). The role of a

factor of influence was classified as ‘shaping’ when the factor interacted with the discourse in forming the effects, ‘strengthening’ was used when a factor contributed to the ‘shaping process’. Third, the **interaction** between the factors was examined. These three examinations were executed by comparing the answers of the respondents to questions labeled with the same factor of influence, as can be seen in the interview guides, with the discourse, the identified effects, and with answers that were labeled under other factors. Thereafter, the identified relations were studied with literature to further explain the role of the factors of influence.

4.5 Ethical considerations

Avoiding biases and ensuring a confidential and anonymous processing of the empirical data was a high priority in this research. To prevent biases and an unevenly distributed selection of potential interviewees, there was critically looked at the function of the potential interviewees. As mentioned, scale-dynamics, being active in the rail or environmental domain, and geographical proximity to the national border were the three criteria to do so. A careful selection was of extra importance since some of the eventual respondents were recommended by colleagues of the author. The risk of a potential respondent bias was being avoided by applying the three, upfront formulated criteria.

The questions were openly formulated and the three dimensions were not mentioned by the interviewer during the interviews to avoid the risk of steering the answers. Especially when it was questioned how climate adaptive rail network were understood this was important, as the presence of a discourse was most likely to be identified in the answers to this question. By applying this method of interviewing it was ensured that the provided answers were authentic and could be used for the discourse analysis. Moreover, claims that were made by the interviewees were verified by comparing their statements with relevant policy documents. For example, investigating climate adaptation strategies and policies on rail operation measures. If these documents were sent by the interviewees themselves, other online sources were investigated that could support their claims. Lastly, to evenly compare the findings, the raw data were all coded by the same coding scheme in the same period when the data collection process was completed.

A confidential and anonymous processing of the data was ensured in multiple ways. When contacting the potential interviewees, they were informed about why they were contacted as well as how the author received their contact details. Before the interviews started, the respondents were informed about the goal of the interview, their rights – which can be found at the beginning of the interview guides –, and whether they approved the interview to be recorded. During the interview, the interviewees always had the opportunity to not answer a question or to withdraw from the interview. At the end of the interview the respondents were asked if they wanted to adjust any of their answers. After the interviews, the transcripts were sent for approval to the interviewees via email. In this email the respondents were, again, informed that their answers were processed anonymously.

Quotes that the author wished to use in the results were sent via email to the respondents for specific verification. If the respondents mentioned that they wanted a quote not to be used, this was adhered to. To guarantee the anonymity and confidentiality of the interviewees, only a general description of their job function and their organisation were provided in this thesis.

Chapter 5 – Results

5.1 Introduction

This chapter provides the results derived of the data analysis process. In the first section, the finding that climate adaptive rail networks are predominantly understood from their physical assets will be argued as the present discourse. Thereafter, as in line with post-structuralist discourse analysis, the origins of the discourse will be studied. The discourse affects the dimensions that make up an infrastructure network in three ways: I) there is a strong focus in climate adaptation rail policies and measures on the technical dimension, II) there is limited cohesion between the physical rail roads with other spatial functions in climate adaptation policies, III) institutional fragmentation is vividly present among and within organisations that are concerned with climate adaptation and railways. These three effects are, however, not solely the result of the dominance of the physical assets. On the contrary, they are also shaped and strengthened by the six factors of influence. It will be argued that the factors of ‘planning culture’ and ‘path-dependency’, as they play a significant role in the division of tasks and responsibilities between the executive agencies and other spatial authorities, interact with the discourse in shaping the three effects. Lastly, it will be examined how the other four factors and the interdependency of all six factors further strengthen the three effects.

5.2 Identifying the discourse: the dominance of the physical assets

A dominant pattern that was witnessed among the respondents when they spoke about infrastructure networks or rail corridors, was that they primarily talked about the physical components of the network. In other words, among most interviewees, in both countries and ranging from the local to European level, **a discourse was identified in which a climate adaptive rail network is predominantly understood and perceived solely from its physical assets.** This became most explicitly clear when the interviewees were asked how they would describe a climate adaptive rail network themselves and which **meaning** they assign to this concept. Respondent I-1, for example, mentioned that *“it is useful to design your railroads in such a way that they are robust. That they are resistant to future change, including changing weather and climate patterns.”* Robust in this respect referred to the physical robustness of the rail tracks. The aspect of resistance was used more often among the respondents when they described the climate adaptiveness of a rail network. Important to note is that resistance should not be understood as a synonym for adaptation, rather it is a characteristic of climate adaptation (Chester & Allenby, 2018). Resistance, namely, is closely related to agility as it refers to maintaining the function of an infrastructure network (Cooper & Pile, 2013). Yet, it lacks the competence of flexibility since resistance does not acknowledge that a network itself is also subject to change (Cooper & Pile, 2013; Chester & Allenby, 2018). To further illustrate the dominance of the physical assets, respondent I-12 mentioned that when designing an infrastructure network to be adaptive *“you have to think about how to improve the infrastructures. To adjust them to the more and more frequent, violent and unexpected weather events resulting from the climate change.”* In the same line, respondent I-13 emphasized that *“I tend to look at the direct impacts [on the railroads]. You could think of climate resistant rail tracks.”*

The dominance of the physical components was also found in the other two features on which post-structuralist discourse analysis focus in their work (Gill, 2000). With regards to **prioritizing**, the respondents that were concerned with enhancing the climate adaptiveness of the rail network mentioned that they prioritized measures that focused on the risks exposed

to the physical rail network. For the executive agencies in the Netherlands it is even mandatory to develop so-called 'stress tests' for their physical assets. German authorities and the executive agencies of Deutsche Bahn (DB) and DB Netze emphasized that they are currently gaining overviews of the risks and threats to which their physical networks are exposed. Yet, they are already significantly aware of the risks their physical infrastructure face, also in Western-Germany, they emphasized. And the exposed risks to the physical networks are broader than the risks of flooding coming from the Rhine alone. As respondent I-7 mentioned "*the kind of dangers are very heterogeneous. It is not just one point you should focus on.*"

The physical rail corridor varies in its current ability to cope with the heterogeneous climate related threats it was argued. However, there was consensus among all respondents who are involved in climate adaptation and rail roads that the Rhine-Alpine rail corridor, in its current state, is not able to cope with the climate conditions in 2050 and beyond. Hence, the interviewees argued that substantial progress is needed in enhancing the climate adaptiveness of the rail corridor. Yet, when the respondents were asked which organisation should take the lead in enhancing the climate adaptiveness, most of them mentioned that this should be the role of executive agencies. These agencies are primarily responsible for the physical railroads. What is witnessed here, is that in the **relation** between the actors most respondents argued that the organisations that primarily focus on the physical railroads should also be the primary responsible organisations to enhance the overall climate adaptiveness of the rail network.

The dominance of the physical assets in climate adaptation measures on infrastructure networks is something that is being discussed in the work of Lindgren *et al.* (2009) and Chester & Allenby (2018). These authors mention that when speaking about infrastructure, actors predominantly think of the physical infrastructure itself, on which they drive their cars or which a train crosses. Jennings (1983) and Yanow (2014), in their contributions on discourse analysis, declare this phenomenon by discussing the role of physical objects in shaping people their mutual perceptions. Objects are physically present in space and are tangible for people. This tangibility, in turn, strongly influences the perception and understanding of people (Yanow, 2014). Hence, people quickly associate infrastructure networks with the physical components of it.

5.3 Effects on the three dimensions

The dominance of the physical assets in the respondents their understanding of climate adaptive rail networks has significant effects for the technical, spatial, and institutional dimension that make up an infrastructure network. This section will discuss these effects and their interconnectedness.

1. Strong focus on the technical dimension

Unsurprisingly, the dominance of the physical assets in the respondents their understanding and perception of climate adaptive rail networks results in **a strong focus on the technical dimension**. Physical assets, namely, make up the technical dimension (Lindgren *et al.*, 2009; Chester & Allenby, 2018). Measures that focus on enhancing the climate adaptiveness of rail network thus primarily focussed on better equipping the physical assets. This was both argued by the respondents as well as witnessed in the conducted documents on climate adaptation in relation to rail networks. Think, for example, of strengthening the foundation of the rail tracks or designing rail roads that are able to withstand higher temperatures. The prominent position of the technical dimension also became clear when the interviewees were questioned about suggestions for the transnational strategy on climate adaptive rail networks. A significant share of these suggestions focussed on designing a stress test for the physical rail tracks along the whole corridor, so that measures to reduce these threats could be streamlined between regions and the two countries. As respondent I-7 formulates this: "*it will be about technical aspects. It*

will be on measures of the infrastructure itself, it will be on what is alongside the track. These will be the biggest challenges. To incorporate very different aspects.”

2. Limited spatial cohesion

Whereas the technical dimension was vividly present in measures that enhance the climate adaptiveness of the rail network, the **focus of the spatial dimension was limited**. That is not to say that there was not being thought of spatial adaptation plans. On the contrary, the respondents of the local and regional scales worked on a multitude of plans that aimed to enhance the adaptiveness of municipalities and regions. However, these local or regional strategies did not, to almost not, take into account the effects of adaptation measures on the physical railroads. Also the other way around, measures that did focus on enhancing the adaptiveness of the physical railroads did, in most cases, not go beyond the scope of pure the physical rail roads or its direct surroundings.

The spatial and technical dimensions are thus primarily being thought of as two separated domains, not two connected dimensions that both should be taken into account when a rail network is designed to be flexible and agile. As a result, there is limited spatial cohesion between adaptation measures on physical rail tracks with the surrounding environment. A phenomenon that is discussed earlier by Lindgren *et al.* (2009) and Markolf *et al.* (2019). These authors emphasize that measures which aim to enhance the climate adaptiveness of rail networks, generally speaking, do not tend to go beyond the direct environment of rail networks themselves. The influence of the physical objects in shaping people their perception plays a crucial role here, since actors primarily associate an infrastructure network with its physical components (Jennings, 1983; Yanow, 2014). Consequently, actors tend to focus less on aspects that are not part of these physical aspects.

Yet, early signs of integration were witnessed. Some local policy makers, both in Germany and in the Netherlands, mentioned that the cohesion between railways and other spatial functions is something that is increasingly being thought of in regional and local adaptation plans. Moreover, the respondent of ProRail mentioned that the executive agency increasingly looks broader than just the direct surroundings of rail tracks. To cite respondent I-2: *“with the province of Overijssel we are sitting around the table to examine how an area can be designed climate adaptively and with regards to infrastructure what can we do then do best? Integral, looking at the provincial level.”*

3. Institutional fragmentation

The discussed effects on the other two dimensions are **strongly interconnected** with the division of tasks and responsibilities between and within organisations and the identified discourse. Due to the fact that the executive agencies are the owners of the physical rail tracks, it is primarily their responsibility to design the physical network to be climate adaptive. The result of this division of responsibilities is twofold it was argued. On the one hand, municipalities and provinces of both countries rarely take the rail tracks into account in their spatial adaptation strategies, as they are not responsible for it. On the other hand, the executive agencies also tend to not look beyond the direct environment of the rail tracks, as the respondents of the executive agencies argued that they do not have legislative power in these areas. The finding that actors primarily understand climate adaptive rail networks from their physical assets strengthens this division of tasks and responsibilities, as actors do not directly link the spatial and technical dimension with one another.

On the European level, enhancing the climate adaptiveness of a rail network was also viewed as primarily being the responsibility of national ministries and the executive agencies, since these organisations own the physical rail networks. Internally, the departments that were concerned with the physical rail networks were mostly separated from departments that worked on climate adaptation. This separation of the physical infrastructure and climate

adaptation departments is something that was witnessed on all scale levels. Moreover, within the national ministries and on the European level, rail transport, TEN-T networks, and climate adaptation were all divided as separate domains among different directorates or departments.

National and other administrative borders also strongly influence the focus of the interviewed authorities. It was argued by the respondents of the organisations that operated nationally, that they did not collaborate with the other country on issue of enhancing the climate adaptiveness of rail networks. Not more than exchanging practices and knowledge on this topic. This is also **interconnected** with the effects on the other two dimensions. To elaborate, officers predominantly think of an infrastructure network from its physical assets. Risks that are exposed to these physical assets depend, among others, on the climate conditions the physical network faces as well as its geomorphological characteristics. In this respect, it might be expected that factors which increase or decrease the change of flooding, that also come from upper stream areas in other countries, are also being thought of in mitigating these risks. Yet, as there is little spatial cohesion with other functions, the officers that focus on enhancing the adaptiveness of the physical railroads do not tend to look at how river management affects their assets. Let alone how water management on the other side of the border influences their national rail network. As a result, actors have a **national focus** in enhancing the climate adaptiveness of the physical railroads.

Zelli & Van Asselt (2013) refer to this fragmented field of tasks and responsibilities between organisations and internal departments as **institutional fragmentation**. Here, tasks and responsibilities are divided among a multitude of actors, resulting in a highly distributed ownership on the issue at stake (Zelli & Van Asselt, 2013). Regarding the enhancement of the climate adaptiveness of the physical railroads, clear ownership was found among the executive agencies of ProRail and DB Netze and the associated ministries. However, regarding the adaptation of the whole rail network, little ownership was identified. This especially became clear when the respondents were asked which role their organisation could play in enhancing the adaptiveness of the whole rail corridor. Mostly heard were the answers of taking on a facilitating role or providing knowledge. Zelli & Van Asselt (2013) and Yanow (2014) explain this lack of ownership by arguing that due to institutional fragmentation people do not prioritize a certain topic or see it as their responsibility, rather they argue that others should fulfil a leading role.

5.4 The role of the factors of influence

The abovementioned effects are not solely the result of the identified discourse, rather they are also shaped and strengthened by the six factors of influence. Table 6 provides a schematic overview of the role the six factors played in each dimension. An important finding was that the factors of 'planning culture' and path-dependency' interact with the dominant understanding of climate adaptive rail networks in shaping the effects. Hence, these two factors will be discussed first. It will be argued that the other four factors and the interplay of all the six factors further strengthen the effects. To provide a structured overview of the role of the factors of influence, without getting lost in a multitude of interactions, each section will first examine the role of the discussed factor individually. Second, for the latter four factors, the interaction with the other factors and how this interaction strengthens the effects is studied. For all factors, academic literature is used to explain the role of the factors in shaping or strengthening the effects on the three dimensions.

Table 6: Schematic overview of the role of the factors of influence in the three dominant dimensions.

	Institutional dimension	Technical dimension	Spatial dimension
Planning culture	<ul style="list-style-type: none"> • Both countries are strongly influenced by neo-liberal ideas in the operation of their train systems. • The neoliberal ideas resulted in a privatization of public services, including the origination of the executive rail agencies . • In the Netherlands there is a relative flexible planning culture, actors talk easily about colleagues their expertise. • In Germany the planning culture is more rigid. Actors operate in separated competencies. • The European Commission its planning culture is a mixture of both. Rather rigid, but also relative open for new insights. 	<ul style="list-style-type: none"> • No findings on the planning culture in the technical dimension were found, as the role of the planning culture is strongly related with the division of tasks and responsibilities between the executive agencies and other authorities. This division is discussed in the institutional dimension. 	<ul style="list-style-type: none"> • No findings on the planning culture in the spatial dimension were found, as the role of the planning culture is strongly related with the division of tasks and responsibilities between the executive agencies and other authorities. This division is discussed in the institutional dimension.
Path-dependency	<ul style="list-style-type: none"> • Former policy decisions resulted in a clear distinction of responsibilities between the executive agencies and other authorities in managing the rail network. • Former policy decisions resulted in a dominant national focus in the policies and practices that are concerned with enhancing the climate adaptiveness of the rail networks. 	<ul style="list-style-type: none"> • The executive agencies are the owners of the physical railways and, since they primarily understand a rail network from its physical components, the focus on the technical dimension is strengthened. 	<ul style="list-style-type: none"> • As a result of political decisions and the technical understanding of climate adaptive rail networks, the environmental domain is mostly separated from the rail sector.
Scale dynamics	<ul style="list-style-type: none"> • Rail networks are predominantly operated on the national level, as a line network. • European Commission fulfils a facilitating role towards member states. On TEN-T corridors they have more legislative power. 	<ul style="list-style-type: none"> • The national ministries and the executive agencies are responsible for the climate adaptiveness of the physical railroads. • Limited contact between German and Dutch ministries and agencies of DB and ProRail on implementations that aim to 	<ul style="list-style-type: none"> • Whereas railways are operated on the national level as a line network, spatial adaptation strategies are primarily executed on the regional and local level.

	<ul style="list-style-type: none"> • Bilateral; frequent contact between ministries and executive agencies on international rail transport. • Regional and local authorities are included in rail transportation plans, this is limited in climate adaptation plans for rail networks.. 	<p>enhance technical adaptiveness of rail roads.</p> <ul style="list-style-type: none"> • Local and regional authorities in both countries are almost not included in enhancing the adaptiveness of the physical assets. 	<ul style="list-style-type: none"> • No cross-border cooperations on jointly formulating adaptation strategies were found. • As a result of scale asymmetry, there is limited tot no contact between executive agencies and local and regional authorities in establishing adaptation strategies.
Internal dynamics	<ul style="list-style-type: none"> • Within all organisations, a strong separation between departments that worked on either the technical or spatial domain was found. • The importance of embedding climate adaptation as a theme in internal processes and procedures was often addressed. 	<ul style="list-style-type: none"> • Within all organisations, specific departments were concerned with interoperability of the rail roads. 	<ul style="list-style-type: none"> • Within all organisations, specific departments were concerned with climate adaptation.
Hard conditions	<ul style="list-style-type: none"> • Documents, maps, and photo's that focus on climate adaptation to railways primarily address the physical aspects. • There is a strong separation of the topics of interoperability, TEN-T, and climate adaptation in legislation of the European Commission. 	<ul style="list-style-type: none"> • All organisations emphasized the importance of stress-tests to map the risks that are exposed to the physical assets. • European Technical Guidance on Climate Proofing focusses on enhancing the adaptiveness of the physical infrastructure. 	<ul style="list-style-type: none"> • It is mandatory for member states to establish national adaptation strategies. • In the Netherlands, regions and municipalities have developed regional and local adaptation strategies. • In Germany, most municipalities are in the start of developing local adaptation strategies. • Train tracks play a minor role in regional and local adaptation strategies
Soft conditions	<ul style="list-style-type: none"> • Pleasant contact between organisations, but rather siloed between actors of environmental and transport domain. • Awareness of climate adaptation in relation to infrastructure is rising. Substantial exchange of knowledge and practices between member states and with EU on this topic. Also regions are included. • Importance of dialogue in (cross-border) cooperations was often addressed. 	<ul style="list-style-type: none"> • No findings on soft conditions in the technical dimension were found. 	<ul style="list-style-type: none"> • No findings on soft conditions in the spatial dimension were found.

5.4.1 Planning culture

In the **interplay** with the dominant physical understanding of climate adaptative rail networks, the **planning culture** significantly **shapes** the effects in the institutional dimension. Yet, as argued in the previous section, this section is strongly interconnected with the other two dimensions. Hence, the planning culture affects all three dimensions. This primarily has to do with the division of tasks and responsibilities between the executive agencies and other spatial authorities in operating the rail network. To elaborate, both ProRail and DB Netze originated out of neo-liberal thoughts of how the transport domain could be governed best. In this neo-liberal thinking there was great faith that the market could regulate the transport domain more efficiently (Ilcan, 2009). In this line of thought, the decision in both the Netherlands and Germany was made to set up two state-owned companies which would become responsible for the rail network: ProRail and DB Netze. This phenomenon of privatizing public services is referred to as the neoliberal shift in the transport sector and still strongly characterizes the **planning culture** of the Netherlands and Germany (Ilcan, 2009).

A notable difference, however, that was addressed by respondents from the European Commission and by respondents from the two countries, is that the planning culture in Germany is more rigid as compared to its Dutch counterpart. It was argued that in the Netherlands there is a more flexible governance culture and that spatial topics are mostly treated as a shared responsibility of multiple actors. In Germany, in contrast, policy officers operate more out of separated competencies. There are stronger defined tasks and responsibilities between colleagues and German actors tend to be less likely to talk about the functions and competencies of colleagues as compared to the Netherlands. Respondent I-4 summarized this as: *“whereas from our side we would try much more to see how far we could get in the cooperation and involve other colleagues. So the culture of saying “it's not my competence, you need someone else for that”, is something I experience a little stronger there.”* This is something that was also experienced in the data collection process; Dutch respondents spoke more easily about the tasks and domains of colleagues as compared to the German interviewees. The working culture in the European Commission can be classified as being a mixture of the Dutch and German planning culture. This was argued by respondents who worked in multilateral fora that included representatives from the Dutch and German ministries and the European Commission. As compared to the Netherlands, the European Commission is more rigid and hierarchically managed. To illustrate, it was addressed that Dutch decision making processes are characterized by long procedures and a strong focus on consensus. In the European Commission, the higher management levels tend to operate more hierarchically with faster decision-making processes. Yet, actors spoke more easily about the competencies of colleagues as compared to Germany it was argued.

The stronger division of tasks and responsibilities in Germany its planning culture further **strengthens** the institutional fragmentation. This is a phenomenon earlier described in the work of Zelli & Van Asselt (2013), who argue that when there are more actors and more departments involved in a certain practice, that all work relatively siloed from another, the feeling of ownership decreases. Moreover, the separated competences also added to the lack of integration of physical railroads with other spatial functions. Lastly, this division of competences in Germany made it challenging to sometimes connect the topic of rail transport with other domains. This was argued by some Dutch respondents.

5.4.2 Path-dependency

A pattern of **path dependency** can be witnessed in the **interplay** between the discourse and the division of tasks and responsibilities between organisations that **further shapes** the three effects. To elaborate, the actors of the executive agencies primarily understand a train network

from its physical assets. Hence, the executive agencies, as the owners of the rail network, primarily focus their climate adaptation policies on the physical rail networks. This fuels the dominant position of the technical dimension. Moreover, this dominant position limits the perspective on the spatial dimension of the rail network. This narrowed perspective contributed to the limited cohesion with other spatial functions. In turn, tasks and responsibilities that relate to the technical and spatial dimension get more fragmented from another. This path-dependent pattern is being emphasized by Trip (2003) who addresses that present developments in infrastructure are strongly influenced by former perspectives and perceptions.

Moreover, it was found that administrative boundaries frustrate cross-border development. Respondents that are concerned with climate adaptation and rail networks, namely, argued that they only have a national focus. This national focus, which is the result of former political decisions, **strengthens** the institutional fragmentation. This phenomenon is something that is being discussed in the work of Djelic & Quack (2007). These authors emphasize that authorities work with different legislative systems which need to be streamlined for cross-border development. Including cooperations on rail transport and climate adaptation. As a result, cross-border cooperations need significant coordination of both authorities.

5.4.3 Scale dynamics

Scale dynamics significantly **strengthen** the institutional fragmentation and the separation of the technical and spatial dimension in climate adaptation policies on railways. The national scale plays a crucial role here, as the executive agencies and their associated ministries primarily operate the physical rail network on the national level. The national focus of these organisations affects both institutions that are active on the other scale levels as well as their selves.

With regards to the European level, respondents of the European Commission argued that the topic of climate adaptation in relation to railways is a national responsibility. The European Commission tries to stimulate and facilitate countries to develop strategies on this topic, as will be further elaborated on in soft conditions section, but in the end *“infrastructure building and maintenance is not directly our competence. First of all, it is the competence of the national government and the regional and local administration”* (respondent I-12). The respondents of the municipal, regional, and provincial level, of both countries, strongly emphasized that they did not take into account railways in their spatial adaptation plans and strategies. They exclude railways because these were the responsibility of the national administrations and the executive agencies and were operated on a different scale level. For Germany, this mismatch between local and regional adaptation plans and the physical railways is nicely summarized in the following citation of interviewee I-8, who mentioned that: *“municipalities are looking at the municipal level, that is what they are focussing on. While railways are looked at on the country level. That is the main problem why the municipalities are not interested in taking that into account. They can't change anything at that point in planning with respect to railways.”* What is witnessed here, returning to the morphologies of Trip (2003a) discussed in section 2.4, is that railways are operated as a line network on the national level, whereas spatial adaptation plans are primarily executed on the local level. There is thus a discrepancy between the level where physical rail networks are operated and where local and regional climate adaptation plans are developed.

The national ministries and the executive agencies also primarily considered themselves as the responsible authorities for enhancing the climate adaptiveness of the national rail networks. As mentioned, some cooperations between ProRail with municipalities and provinces on this topic were addressed. But in general, respondent I-1 mentioned that *“provinces and*

municipalities do not own railways. They do not interfere in this topic. In the Netherlands it is regulated as such that ProRail manages the railways. Next to ProRail there are no other railway infrastructure managers. I have never heard of a municipality who did certain things related to increasing the climate resistance of a rail track.”

With regards to the **interaction** with other the factors in strengthening the three effects, **scale dynamics** primarily interact with the **planning culture** and **path-dependency**. As can be noticed in the abovementioned sections, the scale asymmetries are primarily the result of the separation of the tasks and responsibilities between the executive agencies and the other organisations. With regards to path-dependency, the legislative power of nations is historically rooted within their administrative borders. The sovereignty of nation states in these territories results in limited power of the European Union. Moreover, due to the fact that authorities their power is historically limited to their territory, cross-border collaborations are sometimes frustrated. This is an important interaction in **strengthening** the institutional fragmentation between the Netherlands and Germany. Something that *“generally makes it difficult to make agreements on the international level in the rail domain”* (respondent I-2).

The fact that the scale dynamics strengthened institutional fragmentation is being declared by Zelli & Van Asselt (2013). These authors argue that scale asymmetries play a crucial role in decreasing the feeling of ownership. The local and regional authorities argued that they do not take into account the physical railways, next to the issue of ownership, since these are regulated on the national level. This is a different level that extends the administrative power of the regional and local authorities. This mismatch strengthens a decrease of the feeling of ownership that in turn strengthens the institutional fragmentation (Zelli & Van Asselt, 2013).

5.4.4 Internal dynamics

The separation of tasks and responsibilities was not only found between organisations, but also within organisations; referring to **internal dynamics**. Climate adaptation and railways were found to be two separated domains in all organisations. This can be seen in the overview of the interviewees in Table 5 as well. Most respondents were involved in either climate adaptation, in (international) rail transport, or interoperability. Only some interviewees were specifically involved in climate adaptation of railways. These internal dynamics further **strengthen** the institutional fragmented knowledge about climate adaptive rail networks within organisations (Zelli & Van Asselt, 2013). To illustrate, respondent I-11 answered to a reflection on the questions about adaptation by arguing that *“probably I am not in the best position to answer all of them. Because we are dealing with technical legislation and probably TEN-T and climate change adaptation people are in a better position.”* The internal separation of climate adaptation with the rail domain also **strengthens** the limited inclusion of climate adaptation in other spatial developments. It was addressed by multiple respondents that significant effort was needed, and sometimes still is, to really integrate the topic of climate adaptation in spatial decision-making. As interviewee 1-8 addressed: *“It wasn't respected in planning decisions and in subsidies it was not an aspect too. So we tried to mainstream climate adaptation in the region to get decision makers to the point that they really take measures.”*

For Germany, the **internal dynamics** strongly **interact** with its **planning culture**. This connection is present as Germany's planning culture is characterized by a relative strong division of spatial topics. This **strengthens** the separation of the rail transport and environmental domain within organisations. De Vries (2003) did not discuss internal dynamics as being a factor of influence explicitly in his work. Yet, he mentioned that the transport domain predominantly tends to be governed as a distinct domain within organisations. This is in line with the internal dynamics found in the empirical data.

5.4.5 Hard conditions

In the analysed (legal) documents, the **hard conditions**, the connection between climate adaptation and infrastructure is vividly present. The technical guidance on climate proofing (European Commission, 2021), the perspective on climate resistant networks in 2030 and 2050 (Ministerie van Infrastructuur en Waterstaat, 2020), and the adaptation the German transport system to climate change and extreme weather events (BMVI, 2018), even solely focus on these two topics. Yet, as already becomes clear in the title of the second mentioned document, the focus is predominantly on the technical dimension of an infrastructure network. The dominant position of the physical assets is something that was witnessed in all documents that were reviewed. This dominant position of the physical assets directly **strengthens** the discourse and, in turn, **strengthens** the three effects.



Figure 7: Global overview of the risks from climate change that are exposed to the Dutch physical rail network (KiM, 2021).

Translation: colour red = heat, colour light blue = water logging, colour dark green = storms, colour purple = floods, colour orange = drought.

Figure 8, illustrates the dominance on the physical assets in documents. This figure presents the risks that are exposed to the Dutch physical rail network, showing the focus on the technical dimension in climate adaptation policies on rail networks. What this figure also shows, on which will be elaborated down below, is the importance of visual representations. Visual maps make the risks tangible for decision-makers and help increasing the awareness among them (Yanow, 2014). It also helps in generating finances it was argued. It was emphasized by interviewee I-2 that visually mapping these risks at the beginning of a project is essential since otherwise “*climate adaptation ends up in the end of the line of a project, when the project is almost in its implementation phase. [...] You need to map it early.*”

The dominant position of the physical assets in documents was not being declared by the answers of the respondents. However, literature provides useful explanations. Hence, the literature will be discussed before studying the interplay with the other factors. Yanow (2014) emphasizes that texts are written from certain perspectives and understandings. In turn, these texts influence the meaning-making processes of the actors who read

it. Especially pictures significantly influence this process, since they make issues visible (Jennings, 1983; Yanow, 2014). Maps concerning stress-tests, as seen in Figure 8, also have this strong influence. Figure 9 also nicely visualizes the prominent position of the physical infrastructure in a presentation of the risks of climate change on the rail network. As these risks on the physical rail network are tangible, they strongly influence the perception of the

audience (Yanow, 2014). This explains and even further empowers the dominant position of the physical assets in climate adaptation debates. In turn, the dominant understanding of climate adaptive rail networks from its physical assets affects the three dimensions as discussed in section 5.3.

A remarkable finding that specifically **strengthens** the institutional fragmentation had to do with the familiarity of the technical guidance on climate proofing among the respondents of the national ministries and both executive agencies. These interviewees mentioned that they were not aware of the presence of the document, or even about European legislation on climate adaptation in relation to infrastructure in general. To cite respondent I-1: *“I have never heard of any guideline or ordinances on the theme of climate adaptation and railway infrastructure. Not to my knowledge.”* On the one hand this has to do with the non-bindingness of this document for member states. Respondent I-13, namely, mentioned that the document *“is an operational document to shape policy principles.”* On the other hand, the interviewees of the national ministries and the executive agencies mentioned that their colleagues of the international department were probably familiar with the document. Yet, the respondents themselves were not since they were not directly involved in the European affairs. Here, the **interplay** between **hard conditions** and the **internal dynamics** on the topics of climate adaptation on physical rail networks and international rail transport is witnessed. This interplay **strengthens** the institutional fragmentation as it contributes to a lack of familiarity of European legislation among the respondents involved in enhancing the climate adaptiveness of the physical rail networks.

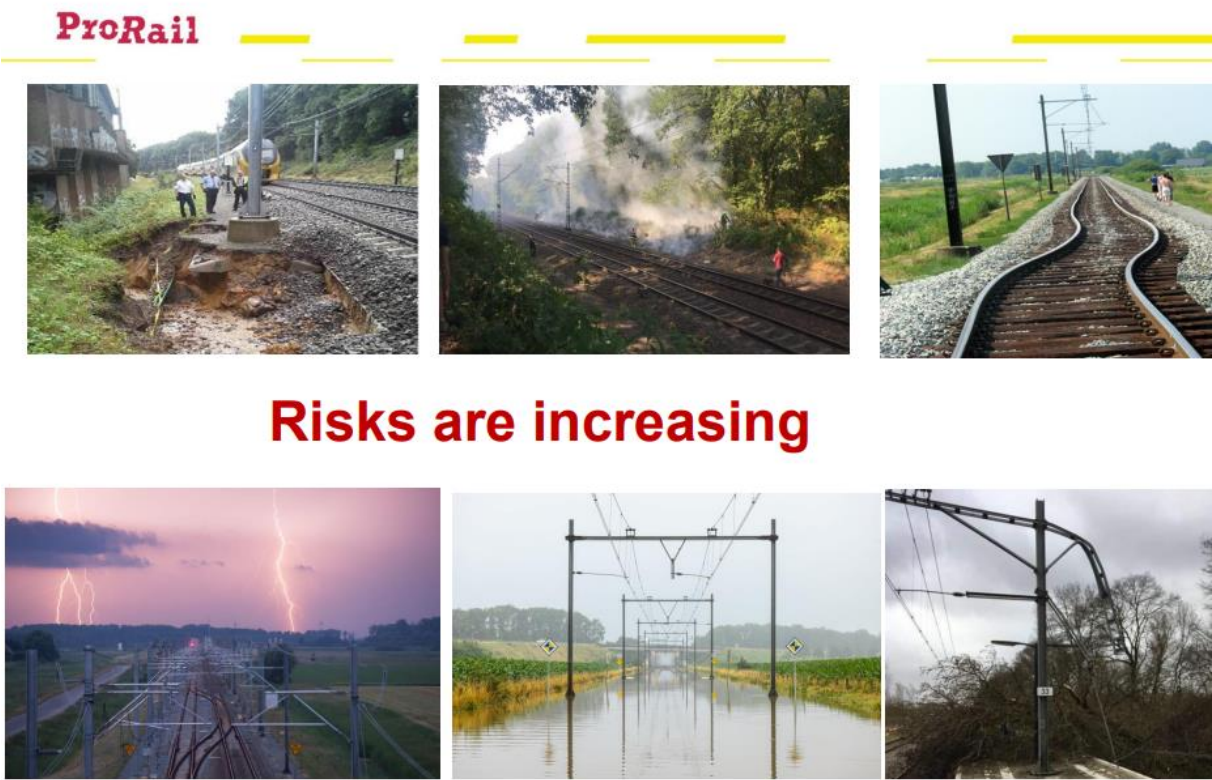


Figure 8: Slide of a presentation on enhancing the climate adaptiveness of the Dutch rail network (ProRail, 2022).

5.4.6 Soft conditions

Most respondents argued that the cooperations with other organisations and other departments were constructive and of added value. Moreover, it was often addressed that their

was mutual trust between the organisations in these collaborations and that the dialogues were constructive. However, and this will not come as a surprise, due to the separated responsibilities the cooperations between the organisations were rather siloed. Dutch respondents that worked on international rail transport in the ministries, for example, had most frequent contact with their German counterparts. Or with colleagues from the TEN-T department of the European Commission. From their side, respondents that worked on climate adaptation strategies had most interaction with actors of other climate adaptation departments. The siloed cooperation, in turn, **strengthens** the lack of integration of the physical rail roads with the climate adaptation domain and **strengthens** the institutional fragmentation. What can be noticed is that **planning culture**, due to the separation of tasks and responsibilities, also plays an important role in the siloed nature of the cooperations.

Yet, a gradual shift towards more interconnectedness of the two domains in the cooperations between organisations was found. Important drivers for this shift were some disruptive events, among which floods, on German rail tracks in the last five years that affected the European rail sector as a whole. In this period the Netherlands and Germany started to work together more intensively to develop plans for alternative routes and bypasses for future disruptive events. Between the European Commission and regional authorities some early signs of cooperation on the topic of climate adaptive rail networks were found as well. In the consultation groups of the European Commission, where stakeholders can provide input on proposals of the Commission, regional actors are represented in the so-called **European Grouping for Regional Cooperation**. In this group, where also national ministries and the executive agencies are present, the topic of climate adaptation in relation to railways is increasingly put on the agenda it was mentioned. Moreover, it was argued that this group was characterized by constructive and open dialogues to ensure that all organisations could have an equal say in the consultation processes. By doing so, regional institutions are well represented in these groups, as respondent I-12 addressed: *“in our case, there is no need to actually meet with the provinces individually because they are represented by the European Grouping for Regional Cooperation for the Rhine-Alpine corridor. The grouping represents the joint position of the regions located along the corridor on many aspects. It represents a stronger voice and it is of added value because they do the coordination work at the regional level. Nevertheless, if there is an interest, we are of course open to meeting with the corridor regions individually”*.

The topics of climate adaptation and rail transport thus slowly become more connected. Subsequently, this connection gets intensified by dialogues between actors and organisations on these topics. Most respondents argued that having dialogues are crucial to truly address topics, to exchange practices, and also to overcome discrepancies and different interests. This is in line with what De Vries (2003), Healey (2013), and Yanow (2014) argue in their work, that having a dialogue, being open to one another their point of view, and seeing another as an equal, mutual dependent partners are vital for reaching a predefined goal and to align perspectives. This is a promising direction for formulating guidelines on how national practices on climate adaptive rail networks can be translated into a transnational strategy. A transnational strategy in which the spatial and technical discourses become substantially interwoven with one another.

Chapter 6 – Conclusion

6.1 Formulating the guidelines

The primary, empirical aim of this thesis was to improve planning practice by examining how national practices on climate adaptive rail networks within the Netherlands and Germany can be translated into a transnational strategy for the Rhine-Alpine TEN-T rail corridor. A prerequisite for achieving this objective was studying how the concept of policy translation can be applied for constructing a transnational strategy; the methodological aim of this study. A research strategy, based on insights from the theoretical framework, was constructed to fulfil this methodological objective and to answer the first sub-research question. The research strategy argued that by performing a discourse analysis within interpretative policy analysis, potential struggles and synergies, that are likely to unfold in a translation process, can be identified upfront of formulating a transnational strategy.

A dominant pattern among the respondents was identified in the empirical collected data that indicated the presence of a discourse. It was found that climate adaptive rail networks are primarily understood from their physical assets. This identified discourse, that answered the second sub-research question, was being declared by the role the tangibility of physical objects play in shaping people their perceptions. The dominant understanding of climate adaptive rail networks affect the three dimensions of an infrastructure network in the following ways: I) there is a strong focus on the technical dimension in climate adaptation measures on railways, II) there is limited cohesion between physical rail roads and other spatial functions in climate adaptation strategies on railways, III) the collaboration processes and exchange of practices on climate adaptation in relation to railways is characterized by strong institutional fragmentation. These mapped effects answer the third sub-research question. Yet, these effects are not solely the result of the identified discourse. Instead, they are also shaped by the interplay of the discourse with the factors of ‘planning culture’ and ‘path-dependency’. The other four factors of influence and the interactions between all the six factors further strengthen the effects, hereby answering the fourth sub-research question. Figure 9 provides a schematic overview of the answers to the sub-research questions. For the sake of readability, a larger representation of this figure is provided in Appendix 5.

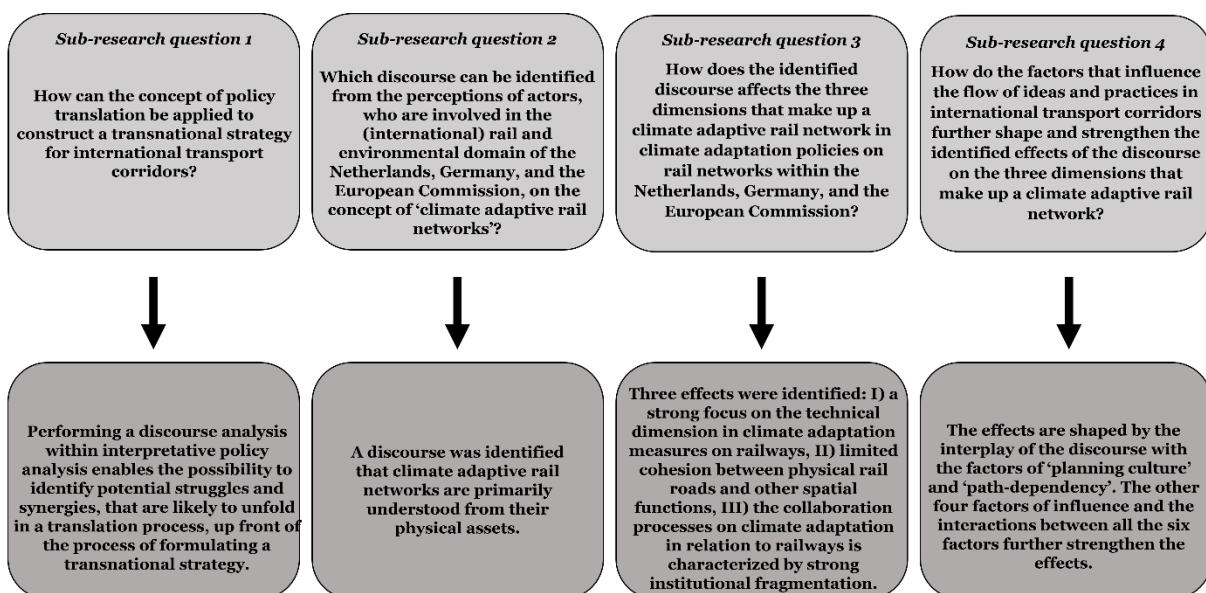


Figure 9: Schematic overview of the answers to the sub-research questions.

The main research question was formulated as follows: “*how can national practices on climate adaptive rail networks within the Netherlands and Germany be translated into a transnational strategy on the Rhine-Alpine TEN-T rail corridor?*”. Based on the provided answers to the sub-research questions and the findings discussed in the results, six guidelines, that build upon each other, are formulated. These guidelines are provided in Figure 10.

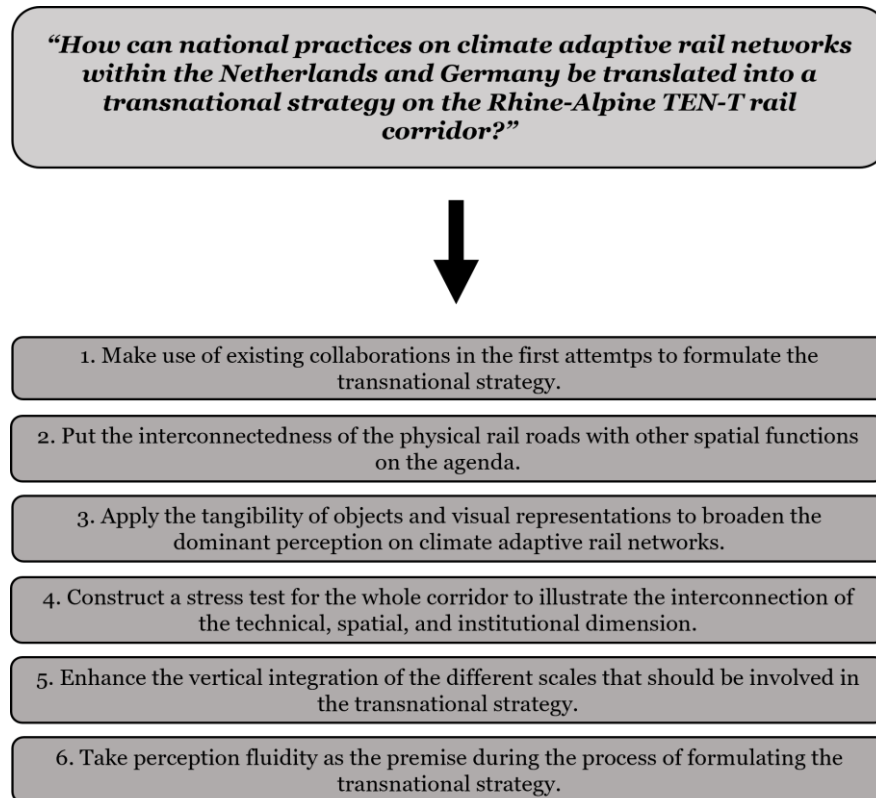


Figure 10: Overview of the formulated guidelines.

1. Make use of existing collaborations – What was discussed in the results on the factor of ‘soft conditions’ is that current collaborations between organisations on the topic of climate adaptation and between organisations on the topic of (international) rail transports were perceived as pleasant and of added value. The mutual trust and the constructive dialogues that were argued to be present in these collaborations is something that can be used to start the process of formulating the transnational strategy. Literature on soft conditions argues that it is more efficient, and in most cases also more effective, to continue on present, well-functioning collaborations than setting up a complete new network (Healey, 1996; De Vries, 2003). In other words, the first attempts to construct the transnational strategy on the Rhine-Alpine TEN-T rail corridor should be made in existing collaborations or networks, rather than establishing a new organisation for this task.

The European Grouping for Regional Cooperation that is organised by the TEN-T department of the European Commission, as introduced in the last section of the results chapter, has a crucial role to play in the first steps of formulating the transnational strategy. This is because this forum already represents a significant amount of the stakeholders that should be involved in the translation processes, including national ministries, the executive agencies, and regional authorities. Moreover, when one organisation, being the TEN-T department, takes on a leading role in formulating the strategy, the feeling of ownership over this process by this organisation will be strengthened. A feeling of ownership, in turn, stimulates the specific organisation to successfully guide the process till its end (Zelli & Van Asselt, 2013).

Yet, as also addressed in the results on ‘soft conditions’, organisations that work on climate adaptation strategies and organisations that are active in the rail domain operate rather siloed from one another. This fragmentation of the technical and spatial dimension is something that the transnational strategy should aim to overcome, in order to truly enhance the climate adaptiveness of all the three dimensions of the Rhine-Alpine TEN-T corridor.

- 2. Put the interconnectedness of the technical and spatial dimension on the agenda** –As discussed in the results on the effects of the discourse, it was found that the understanding that both the technical and spatial domain should be involved in climate adaptation policies on railways was rather absent among the respondents. By putting the interconnectedness of these two dimensions on the agenda of the meetings of the European Grouping for Regional Cooperation, the awareness that both dimensions are relevant to take into account in the transnational strategy increases.

It is crucial that both representatives of the rail and environmental domain, in which spatial adaptation strategies are developed, are present in the meetings of the European Grouping for Regional Cooperation. The representatives of the environmental domain can be motivated to join by illustrating that the spatial adaptation strategies they work on affect the climate adaptiveness of the physical rail roads. How this illustrating can be done effectively will be addressed in the next guideline. By ensuring that representatives of both domains are present in the meetings, these actors can discuss how the interconnectedness of the two dimensions can be embedded in the transnational strategy. It is, however, important to operate with cultural sensitivity in the forum when representatives of both domains are present. This is important since it was found, as discussed in the results on ‘planning culture’, that officers in Germany tend to work out of separate competencies. Working with culture sensitivity implies carefully paying attention to the cultural aspects of other actors or groups. These aspects are, however, relatively difficult to identify upfront, as they tend to come to the surface during collaboration processes. Yet, by gaining insights on these aspects by consulting actors who already have substantial experience in cross border cooperations, certain cultural aspects can be identified and, in turn, anticipated on upfront of cross border cooperations (Yanow, 2014).

- 3. Apply the tangibility of objects and visual representations** – An important finding that was discussed in the results on the identified discourse and the ‘hard conditions’, was that objects, due to their tangibility, play a crucial in shaping people their perceptions (Yanow, 2014). Hence, it is why the physical rail roads were found to be dominant in the understandings of the respondents of what makes up a climate adaptive rail network. Yet, this finding can be used to change this identified discourse as well. When it is made visual in the European Grouping on Regional Cooperation that a climate adaptive rail network also exists of the institutional and spatial dimension, the dominant technical perception has significant potential to be broadened. Think, for example, of pictures or maps that illustrate that practices in the other two dimensions affect the climate adaptiveness of the corridor. Such images make the other two dimensions tangible as well. This is vital to overcome the dominance of the physical assets when the transnational strategy is established.
- 4. Construct a stress test for the whole Rhine-Alpine TEN-T rail corridor** – What was discussed in the results on ‘hard conditions’, was that the importance of mapping the exposed risks to the physical network was repeatedly argued by the respondents. A so-called stress test. Following these arguments, a stress test should be constructed for the Rhine-Alpine TEN-T corridor as a whole, rather than stopping at the national boundaries of the two countries. However, this stress test should not solely focus on the risks that are exposed to the physical rail roads as argued by the respondents. The spatial dimension should be included as well. Especially regarding floods, it is important to study how measures and policies in upper-stream areas affect down-stream areas where the rail corridor is located. Moreover, also other spatial factors, that carefully need to be selected by experts, need to be included in this map. By doing so, the cohesion of physical rail roads with other spatial

functions is made visible and tangible to the policy makers. This continues on the former guideline that images are crucial in shaping people their perceptions (Yanow, 2014). Subsequently, this tangibility strengthens the awareness that the spatial and technical dimension should be treated as interconnected in the transnational strategy.

For the institutional dimension, the stress test makes it visible which organisations and local and regional authorities should be taken included in the process of establishing the transnational strategy. This becomes apparent as it will be shown that spatial activities in the territories of the relevant local and regional authorities affect the whole rail corridor. This overview of which organisations and authorities, of both the environmental and rail domain, are relevant to include in the process of formulating the transnational strategy is crucial for reducing the institutional fragmentation that was found.

- 5. Enhance the vertical integration** – Due to capacity and efficiency issues not every identified organisation or authority can be individually present in the meetings of the European Grouping for Regional Cooperation. Hence, it is why the regional authorities needed to be represented by actors in this forum. As explained in the results on ‘soft conditions’, certain regions are already being represented in the meetings of European Grouping for Regional Cooperation. It should be aimed that all regions which their spatial activities affect the rail corridor, as identified in the stress test, are represented in these meetings. The regional authorities, in turn, can represent the interests of the local authorities, so that the local scale is also well-represented.

A potential concern is a lack of willingness from local authorities to be represented by regional actors in the European Grouping on Regional Cooperation, as it was found that the local authorities had the idea that they could not affect policies on the national railway systems. As discussed in the effect on the institutional dimension, this idea is an outcome of the division of tasks and responsibilities between the executive agencies and other spatial organisations. Moreover, scale asymmetries strengthen this idea. A solution to this potential lack of willingness is provided in the two former guidelines. This solution is in line with what was discussed in the second guideline on how officers from the environmental domain could be stimulated to join in the meeting of the European Grouping on Regional Cooperation. The stress tests of the former guideline will illustrate that the spatial design of areas in the relevant local or regional territories affects the physical rail network. Subsequently, the important role the local and regional authorities should play in the transnational strategy becomes clear to these same authorities. Yanow (2014) argues that by illustrating the important role an organisation has to play in a process in which it thought not to be relevant in, strengthens the willingness to participate in this process significantly.

It will not come as a surprise that the abovementioned process of including the regional and local organisations will be time consuming. Establishing new relations takes time (De Vries, 2003). The TEN-T department can foster this process. What was discussed in the results on ‘scale dynamics’, is that the TEN-T department, due to the granted subsidies, has substantial legislative power over the corridors. Hence, the TEN-T department could require the inclusion of local and regional authorities in future climate adaptation measures on the corridor as a prerequisite for future subsidies. By doing so, the inclusion of local and regional authorities is already being stimulated in the early attempts of formulating the transnational strategy. Altogether, this process of including regional and local authorities is an important step to reducing the institutional fragmentation. Yet, as also argued for in the second guideline, it is important to operate with cultural sensitivity in this process of vertical integration, concerning the finding that cooperations between scale levels in Germany are rather rigid. Hence, the method of working with cultural sensitivity, as discussed in the second guideline, is also relevant for the process of vertical integration.

6. Take perception fluidity as the premise – Despite the abovementioned guidelines, perception asymmetry will remain present in the process of formulating the transnational strategy. This is a finding that was not directly derived from the empirical data, but is a crucial element of translation processes that is being discussed in the work of Dolowitz & Marsh (1996), Martson (2000), and Mukhtarov (2014). Uniformity in understandings among a wide variety of actors is, simply, just an illusion (Johnson, 2011; Yanow, 2014). Especially when cultural factors play such a prominent role in cross-border cooperations as was found in the empirical data analysis (Zelli & Van Asselt, 2013; Healey, 2013; Yanow, 2014). Moreover, uniformity in understandings should also not be desired, since a variety of understandings breeds creativity and innovation (Johnson, 2011; Zelli & Van Asselt, 2013; Yanow, 2014). The insight that different perspectives will always be present can be used throughout the process of formulating the transnational strategy. To elaborate, in the process of formulating, and even in implementing the transnational strategy, take perception fluidity for granted. Discuss the understandings of concepts on a regular basis within the meetings of the European Grouping on Regional Cooperation and in the process of vertical integration. This makes it possible to not only identify potential conflicts and synergies at the start of the process, as this thesis did, but also throughout the process.

Next to answering the research question, these six guidelines fulfil the primary, empirical objective of this thesis, as they show how national practices in the Netherlands and Germany can be translated into a transnational strategy for the Rhine-Alpine TEN-T rail corridor. Moreover, the six guidelines aim to coherently embed all the three dimensions that make up a rail network in the transnational strategy, rather than solely focussing on the technical dimension as is primarily done in current practices and policies on climate adaptive rail networks. This will substantially enhance the agility and flexibility of the Rhine-Alpine TEN-T corridor to meet future, severe climate conditions.

6.2 Discussion and recommendations for future research

6.2.1 Theory and research strategy

This research added to and broadened the theoretical debate on the application of policy translation. It did so by investigating how policy translation can be used to construct a transnational strategy, rather than applying policy translation as an analytical concept which was primarily done in former studies. Moreover, by carefully examining the role of the six factors of influence, a thorough understanding could be derived of how the factors that influence the flow of ideas and practices in transnational corridors shaped and further strengthened the effects of the discourse. This examination of the role of the factors of influence strengthened the explanatory capacity of the identified effects. Furthermore, the empirical collected data were constantly compared with insights from literature in the data analysis process. This continuing confrontation in the data analysis process significantly strengthened the connection of the provided results with academic theories.

When performing IPA research, it is inescapable that the researcher's personal perceptions and understandings also play a role in the data collection process and analysis. As Yanow (2014) quotes it: *“central to interpretivist methodologies is the role that meanings – values, beliefs, and feelings (sentiments) – play in the understanding of social realities. Such an approach argues in favour of thickly contextualized renderings of social realities and of recognizing the inescapable subjectivity of the researcher as well as of the researched, along with the intersubjective making of situated meaning”* (p. 5). This issue of personal subjectivity also applies for this study, since this research was executed by only one researcher. Even though this study aimed to minimize the issue of subjectivity by a careful comparison of the results with academic literature, personal subjectivity in this thesis. It is, therefore,

recommended that similar future research is executed by two or more academics, as analysing the data by multiple researchers decreases the issue of personal subjectivity (Yanow, 2014).

This thesis combined policy translation with IPA research in its research strategy. The theoretical scope of this study could, however, been broadened by including Actor-Network Theory (ANT) in the research strategy. It was found in the results that objects played a vital role in declaring the presence of the identified discourse. ANT primarily focusses on the role objects play in shaping people their perceptions and positions in a network. In these positioning processes, objects exhibit agency, which, in turn, affect the meaning-making processes of actors (Allen, 2011; Sayes, 2014; Viljanen, 2020). By including ANT in the research strategy, a potential more thorough understanding of the role of objects in shaping the discourse could have been developed in thesis. Hence, it is why it is recommended that future research studies the interplay between policy translation and ANT for a desired translation process. A potential research question could be then formulated as follows: *“how can the agency that objects exhibit be applied to influence the elements of meaning stabilization, scale destabilization and increased contingency that play out when a desired translation process is to be constructed?”*. The desired translation process depends on the case that is being studied. In line with the former recommendation, this research should be carried out by two or more researchers.

6.2.2 Methodology and data

A crucial prerequisite for the empirical data collection process was gaining insights in current practices on climate adaptation in relation to railways in both the Netherlands and Germany as within the European Commission. Moreover, the rail governance structures of both countries and cross-border cooperations on international rail transport were studied before conducting the semi-structured interviews. The insights derived from the pre-empirical data collection process enhanced the preparedness of the author for the interviews and contributed to a more adequate selection process of potential interviewees. This strengthened the validity of the collected data in the semi-structured interviews.

Almost all respondents that were desired for the interviews agreed on scheduling the interview. Most of them did with a lot of enthusiasm. Unfortunately, despite a multitude of attempts to schedule an interview, two desired interviews did not take place. These interviews otherwise would have been with a policy officer of the international rail department of the German national ministry and an environmental officer of the Bundeslander Nord Rhein-Westphalen. As a consequence, the ratio between respondents from the Netherlands and Germany was a bit uneven. Despite the fact that policy officers of these two organisations still provided useful information via email, it would have been beneficial for the completeness of the data if the two desired interviews would have taken place. This would have been beneficial since the data analysis primarily focused on identifying a discourse in the spoken words of the respondents. It is, therefore, recommended for researchers that wish to apply the same research design as this study, that they ensure a balanced list of respondents from the relevant countries, to avoid potential issues of an uneven representation of respondents.

This thesis applied a post-structuralist method of discourse analysis. An advantage of the post-structuralist method is that this approach is concerned with studying the origins and the effects of a discourse. This made it possible to conclude that the tangibility of objects play a vital role in the dominant perception of the respondents on climate adaptive rail networks and to study the role of the six factors. Yet, as mentioned in the data analysis section, post-structuralist discourse analysts are not interested in the details of words. Critical-linguistics ethno-methodologists, in contrast, are. These details are likely to contain valuable insights on how a discourse is being expressed and communicated (Gill, 2000). Moreover, by studying these

details, potential layers within a discourse or the presence of, so-called, smaller discourses can be identified (Gill, 2000; Johson, 2011). It would have been interesting for this study to apply a critical-linguistic ethno-methodology on the empirical collected data as well, to compare the outcomes of the two methodologies. By comparing the outcomes, a potential more thorough understanding of the discourse, its effects, and how it is communicated could have been achieved. It is, therefore, recommended for future researchers that connect policy translation with discourse analysis to apply both a pre-structuralist and a critical-linguistic ethno-methodology.

Due to capacity issues, the decision was made to focus on the Dutch and German trajectories of the Rhine-Alpine TEN-T rail corridor. The Swiss and Italian trajectories were not included. As a consequence, it is not possible to say if a different discourse is present in these countries and how that would have affected the guidelines that are established in this thesis. It is, therefore, recommended that future studies focus on all the countries a corridor crosses to construct valid guidelines for a transport corridor as a whole. A potential research question could then be formulated as follows: *“how can national practices on a case that is being studied within all countries a corridor crosses be translated into a transnational strategy for that same corridor?”*. The case and the geographical scope that are being studied should be carefully selected by the researchers. In line with the other two recommendations made in this section, this research should aim to ensure a well balanced representation of respondents of all countries and scale levels and could apply both a pre-structuralist and a critical-linguistic ethno-methodology.

6.2.3 Results

The validity of the results derived from the data collection process were, as argued, significantly strengthened by the comparison of the empirical collected data with insights from academic literature in the data analysis process. This constant confrontation in the data analysis provided the results a substantial theoretical foundation.

In the data analysis, attention was paid to the interplay between the discourse, its effects, and the six factors of influence. The six factors of influence were found to mutually affect one another in shaping and strengthening the effects of the discourse. As a consequence, a lot of interactions were identified. This made it challenging at certain times to bring a coherent focus to the results chapter, since this research wished to study the role of all the six factors. To strengthen the focus of the results chapter in future research, it is, therefore, recommended to make a selection of the factors that will be studied, rather than focussing on all factors. Yet, it is important, then, to forcefully argue why certain factors were or were not included, since it was found that the factors of influence interact with one another.

Lastly, the results of this thesis showed that perceptions play a vital role in the field of climate adaptation and rail management. It was found that the dominant understanding of climate adaptive rail networks resulted in an almost solely focus on the technical dimension of infrastructure networks in climate adaptation policies and practices. The other two dimensions, in contrast, were not well embedded in these policies and practices. This is an important finding for other studies as well. It is recommended for future research to carefully pay attention to present perceptions and understandings, to study how the three dimensions are embedded in in climate adaptation policies of other transport networks. A potential research question could be formulated as follows: *“How can the three dimensions that make up an infrastructure network be coherently embedded in policies and practices on a specific transport infrastructure network?”*. If this infrastructure network happens to be an international corridor, the role of the six factors of influence can also be investigated. Yet, as in line with the former recommendation, carefully think about which factors to focus on.

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Appendices

Appendix 1: Interview guide English

Thanking the interviewee for planning the interview. Brief introduction about myself, my master Environmental and Infrastructure Planning, and the internship at the ministry of Infrastructure and Water Management. Also a reflection on the previous contact we had in arranging this meeting.

Informing interviewee about:

- *Length of the interview and permission to record the interview*
- *Possibility to check and verify the transcript*
- *Results will be processed anonymously*

Introduction

1. Could you maybe shortly introduce the main tasks and responsibilities of your function?

Short introduction of the main objectives of my thesis and which insights I hope to gain during the interview.

Awareness

2. How would you describe the concept of adaptive rail networks?
 - a. Which thoughts do come to your mind?
3. What do you consider the most important threats to the functioning of the Rhine-Alpine rail corridor or rail networks between the Netherlands and Germany in general?
 - a. Coming from the river Rhine?
 - b. Do you think the Rhine-Alpine rail corridor/ the rail network in Eastern Netherlands or Western Germany is currently well-designed to cope with these threats?

Institutional dimension

4. [*Scale dynamics, soft conditions, path-dependency*] With which other institutions/agencies/departments and policy levels do you often collaborate in your work?
 - a. How would describe these collaboration processes?
 - b. Do you encounter differences in priorities and perceptions between different institutions/agencies/departments and policy levels?
 - i. If so, how do you cope with these differences?
5. [*Hard conditions*] Which legal documents do lie at the foundation of/are important for the collaboration of your institution/agency/department with the other just mentioned institution/agency/department?
 - a. Why are these documents particular relevant?

The following question will be asked depending on whether the respondent works with colleagues from the other/two countries or European Commission.

6. [*Planning culture, soft conditions, path-dependency*] What are, according to you, important differences and similarities in the working/planning cultures between the Netherlands/Germany/EU?
 - a. Where do you think these similarities and differences come from?

- b. How do you cope with these similarities and differences?

If the interviewee asks for a clarification of working/planning culture, the elaboration will be made that she/he could think about political differences, interpretations of tasks and responsibilities, different structures of governance, and forms of interaction.

- ~~7. What are, according to you, important institutional aspects that need to be taken into account for establishing a transnational strategy on adaptive rail networks?~~

The technical and spatial dimension will be discussed depending on the function of the interviewee.

Technical dimension

8. What are potential technical implementations that your institution/agency/department considers in order to enhance the technical adaptability of a rail network?
 - a. What are criteria in the decision-making process to implement a certain technical implementation?
 - b. What is the role of existing physical infrastructure in this decision-making process?
- ~~9. What are, according to you, important technical aspects that need to be taken into account for establishing a transnational strategy on adaptive rail networks?~~

Spatial dimension

10. What are criteria in the establishment of adaptation strategies of your institution/agency/department to threats from the river Rhine?
 - a. To what extent are railways taken into account in the establishment of spatial adaptation strategies?
- ~~11. What are, according to you, important spatial aspects that need to be taken into account for establishing a transnational strategy on adaptive rail networks?~~

Concluding

12. What are, according to you, important aspects that need to be taken into account for establishing a transnational strategy on adaptive rail networks?
13. Did I so far not ask a question you expected I would ask prior to this interview?
 - a. Why yes/why not?
14. Do you have any further remarks or questions?

Repeating agreements:

- *Permission to record the interview*
- *Possibility to check and verify the transcript*
- *Results will be processed anonymously*

Appendix 2: Interview guide Dutch

Bedanken voor het inplannen van het interview. Korte introductie over mezelf, mijn master Environmental and Infrastructure Planning en de stage die ik bij het ministerie van Infrastructuur en Waterstaat heb gevolgd. Ook een korte reflectie op het contact dat we hebben gehad voor het plannen van deze afspraak.

Informeren respondent over:

- *Lengte van het interview en toestemming voor het maken van een opname*
- *Mogelijkheden om achterhand het transcript te checken en verifiëren*
- *De resultaten worden anoniem verwerkt*

Introductie

1. Zou u misschien kort de belangrijkste taken en verantwoordelijkheden van uw functie kunnen omschrijven?

Korte introductie van de belangrijkste doelstellingen van mijn scriptie en welke inzichten ik hoop te verwerven tijdens het interview.

Bewustzijn

2. Hoe zou u het concept van adaptieve spoornetwerken omschrijven?
 - a. Welke gedachten komen bij u op?
3. Wat zijn volgens u de belangrijkste bedreigingen voor het functioneren van de Rhine-Alpine spoorcorridor of spoornetwerken tussen Nederland en Duitsland in het algemeen?
 - a. Welke risico's komen van de rivier de Rijn?
 - b. Bent u van mening dat de Rhine-Alpine spoorcorridor/de spoornetwerken in Oost-Nederland of West-Duitsland op dit moment voldoende in staat zijn om met deze bedreigingen om te gaan?

Institutionele dimensie

4. [*Scale dynamics, soft conditions, path-dependency*] Met welke andere instituties/uitvoeringsorganisaties/ afdelingen en beleidsniveaus werkt u veel samen in uw werk?
 - a. Hoe zou u deze samenwerkingsprocessen omschrijven?
 - b. Komt u verschillen in prioriteiten en percepties tussen verschillende instituties/uitvoeringsorganisaties/afdelingen en schaalniveaus tegen?
 - i. Zo ja, hoe gaat u hiermee om?
5. [*Hard conditions*] Welke beleidsdocumenten liggen ten grondslag/zijn van belang voor de samenwerking tussen uw organisatie en de eerdergenoemde instituties/uitvoeringsorganisaties /afdelingen?
 - a. Waarom zijn deze documenten specifiek van belang?

De volgende vraag wordt gesteld afhankelijk van of de respondent samenwerkt met collega's van het andere land/de twee landen of de Europese Commissie.

6. [*Planning culture, soft conditions, path-dependency*] Wat zijn, volgens u, belangrijke verschillen en overeenkomsten in de werk/planningcultuur tussen Nederland, Duitsland en de EU?

- a. Waar komen deze overeenkomsten en verschillen volgens u vandaan?
- b. Hoe gaat u om met deze overeenkomsten en verschillen?

Als de respondent vraagt om een toelichting van het concept werk/planningcultuur dan wordt de verduidelijking gegeven dat zij/hij kan denken aan politieke verschillen, interpretaties van taken en verantwoordelijkheden, verschillen in governance structuur en omgangsnormen.

- ~~7. Wat zijn, volgens u, belangrijke institutionele aspecten die meegenomen dienen te worden in het formuleren van een transnationale strategie voor adaptieve spoornetwerken?~~

De technische en ruimtelijke dimensie worden afhankelijk van de functie van de respondent wel of niet behandeld.

Technische dimensie

8. Wat zijn potentiële technische implementaties die uw institutie/uitvoeringsorganisatie/afdeling tot haar beschikking heeft om de technische adaptiviteit van een spoornetwerk te vergroten?
 - a. Wat zijn criteria in het besluitvormingsproces om over te gaan tot de implementatie van een zekere technische implementatie?
 - b. Wat is de rol van bestaande fysieke infrastructuur in dit besluitvormingsproces?
- ~~9. Wat zijn, volgens u, belangrijke technische aspecten die meegenomen dienen te worden in de formulering van een transnationale strategie voor adaptieve spoornetwerken?~~

Ruimtelijke dimensie

10. Wat zijn criteria die uw institutie/uitvoeringsorganisatie/afdeling hanteert in het opstellen van adaptiestrategieën voor de rivier de Rijn?
 - a. In hoeverre worden spoorwegen meegenomen in de opstelling van deze adaptiestrategieën?
- ~~11. Wat zijn, volgens u, belangrijke ruimtelijke aspecten die meegenomen dienen te worden in de formulering van een transnationale strategie op adaptieve spoornetwerken?~~

Afsluitend

12. Wat zijn, volgens u, belangrijke aspecten die meegenomen dienen te worden in de formulering van een transnationale strategie op adaptieve spoornetwerken?
13. Heb ik op dit moment nog niet een vraag gesteld waarvan u voor aanvang van dit interview wel had verwacht dat ik die zou gaan stellen?
 - a. Waarom wel/waarom niet?
14. Heeft u verdere vragen of opmerkingen?

Herhalen van de gemaakte afspraken:

- *Toestemming voor het opnemen van het interview*
- *Mogelijkheid om transcript te checken en verifiëren*
- *Resultaten worden anoniem verwerkt*

Appendix 3: Interview guide German

Einführung

1. Könnten Sie kurz die wichtigsten Aufgaben und Verantwortlichkeiten Ihrer Funktion beschreiben?
2. Wie würden Sie das Konzept der klimaadaptiven Eisenbahnnetze beschreiben?
 - a. Welche Gedanken kommen Ihnen in den Sinn?

Bewusstseinsbildung

3. Was sind Ihrer Meinung die größten Bedrohungen für das Funktionieren des Rhein-Alpen-Schienenkorridors oder der Schienennetze in West-Deutschland im Allgemeinen?
 - a. Welche Risiken gehen vom Rhein aus?
 - b. Sind Sie der Meinung, dass der Rhein-Alpen-Schienenkorridor/die Schienennetze in West-Deutschland derzeit ausreichend in der Lage sind, diese Bedrohungen zu bewältigen?

Institutionelle Dimension

4. Mit welchen anderen Abteilungen, anderen staatlichen Organisationen und externen Parteien kooperiert Ihrer Abteilung auf das Thema Klimaanpassung und Schiene?
 - a. Wie würden Sie diese Prozesse der Zusammenarbeit beschreiben und welche Rolle spielt Ihre Organisation dabei?
 - b. Gibt es Unterschiede in den Prioritäten und Vorstellungen zwischen Ihrem Organisation und den oben erwähnten anderen Ministerien/Regierungen/Parteien in dem Thema Klimaanpassung und Schiene?
 - i. Wenn ja, wie gehen Sie damit um?
5. Arbeitet Ihre Organisation mit niederländischen Regierungen/Organisationen auf das Thema Klimaanpassung und Schienenverkehr zusammen?
 - a. Wenn ja, wie würden Sie diese Kooperationsprozesse beschreiben?
 - b. Wenn ja, was sind Ihrer Meinung die wichtigsten Unterschiede und Gemeinsamkeiten in der Arbeitskultur zwischen Deutschland und den Niederlanden?
6. Arbeitet Ihr Ministerium mit andere Behörden/Organisationen in Wasserfragen zusammen, die vom Rhein ausgehen?
 - a. Wenn ja, wie würden Sie diese Kooperationsprozesse beschreiben?
 - b. Wenn ja, gibt es Synergien zwischen der Zusammenarbeit zum Thema Klimaanpassung und Schienenverkehr und der Zusammenarbeit zum Thema der Wasserproblematik des Rheins?
7. Welche Dokumente sind für Ihre Organisation in Bezug auf die Klimaanpassung bei Schienenverkehr führend?

Technische Dimension

8. Welche potenziellen physischen Maßnahmen zieht Ihre Organisation in Betracht, um die physische Klimaanpassung des Schienennetzes zu verbessern?

- a. Was sind die Kriterien für die Entscheidung über die Durchführung einer bestimmten materiellen Maßnahme?

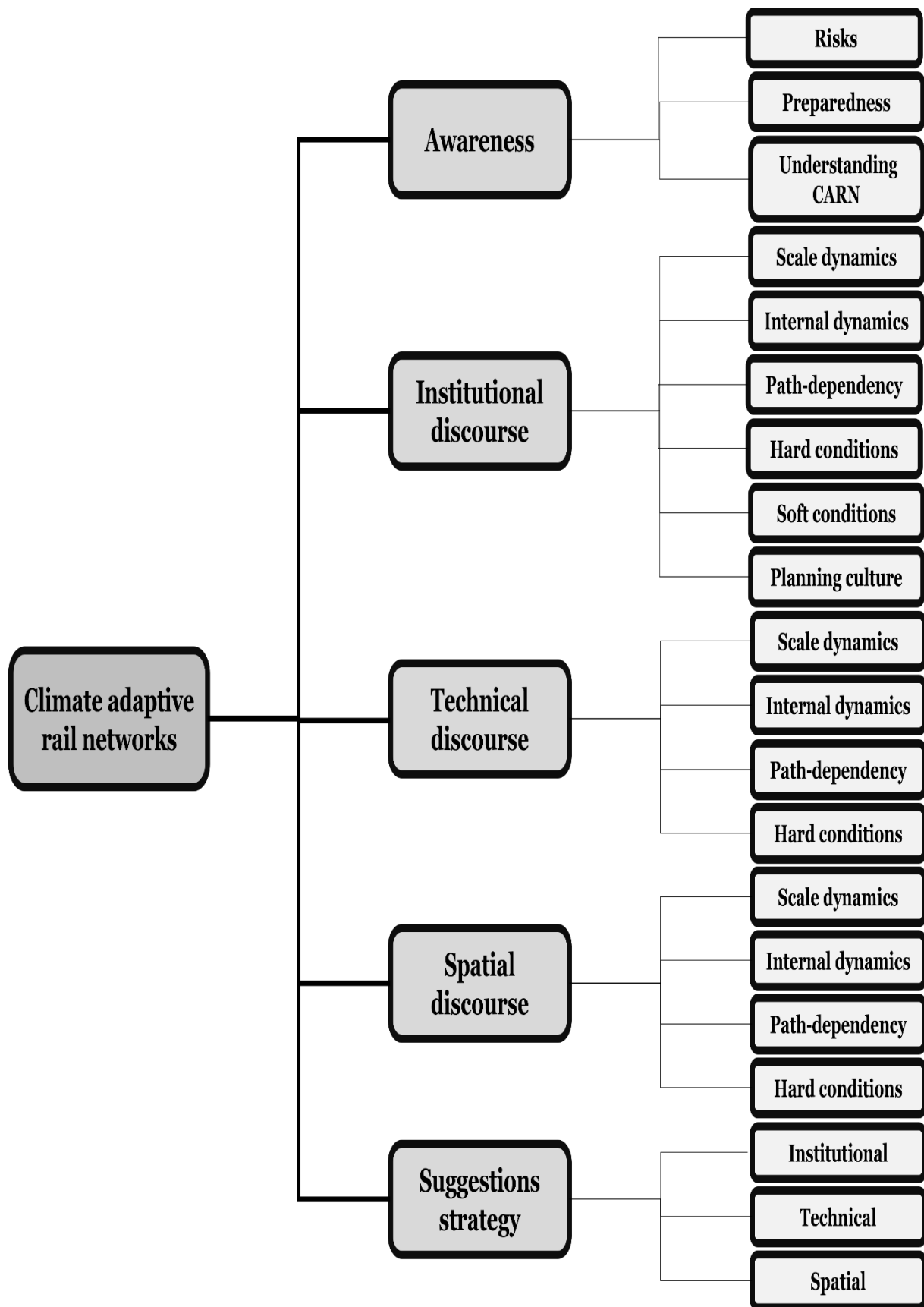
Räumliche Dimension

9. Wie werden die Schienennetze in die Erstellung von räumlichen Anpassungsplänen für die Wasserproblematik des Rheins einbezogen?
 - a. Inwieweit werden die Eisenbahnen bei der Erstellung von räumlichen Anpassungsstrategien berücksichtigt?

Abschluss

10. Was sind Ihrer Meinung wichtige Aspekte, die ich bei der Formulierung von Leitlinien für eine transnationale Strategie für klimaangepasste Eisenbahnnetze berücksichtigen sollte?
11. Gibt es Fragen, die ich in diesem Interview nicht gestellt habe, von denen Sie aber gedacht hätten, dass ich sie stellen würde?
 - a. Wenn ja, welche sind das und warum haben Sie erwartet, dass ich sie fragen würde?
12. Haben Sie weitere Fragen oder Anmerkungen?

Appendix 4: Code tree



CARN = Climate Adaptive Rail Networks.

Appendix 5: Overview of the answers to the sub-research questions

