

Vital, vulnerable and decentralized?

A research into the approach of the coordination of climate adaptation of Vital & Vulnerable functions by the province of North-Holland



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A research into the approach of the coordination of climate adaptation of
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Foreword

I am hereby presenting my Master's thesis for the Spatial Planning course at the Radboud University Nijmegen. During my bachelor's degree in Environmental and Social Sciences, my interest in sustainability in the built environment was sparked, and I focussed on the governance aspects of related topics. Last year, during my Master's degree, I was able to further deepen these interests and specialize in the planning aspects of sustainability and climate change. I am glad that I was able to take these lessons with me and to use them in the research and writing processes for this Master's thesis.

Writing a Master's thesis is already a challenge in itself, but writing a Master's thesis during an international pandemic is an even more special experience. Fortunately, apart from having to conduct interviews over the phone, I didn't have to make many adjustments to my original plan. I also did an internship with the Province of Noord-Holland from February until the end of June, and wrote my research in commission of the Province. After working in the office for 1.5 months, we were sent home, where I continued working in my student room in Utrecht for the last 3.5 months. Fortunately, there was still regular contact with my colleagues and I have always felt connected with them and the Province! This makes that in spite of the changed circumstances, the writing process has gone relatively smoothly and I am proud of the final result.

Finally, I would like to take this opportunity to thank some people without whom this end product would not have been here. First of all Nirul Ramkisor, my supervisor at the Province of North-Holland. Next to our weekly contact moments, he was always available for questions and thought along whenever I encountered any problems. I would also like to thank my other colleagues at the Province for their input and contributions, their enthusiasm and the warm welcome in the team. Next I would like to thank Peter Ache, my supervisor from the Radboud University, who was always available for questions and feedback. Finally, I would like to thank all respondents for their time and effort. Thanks to their response, I got the data I needed and was able to complete my research.

Sterre Westenbrink,
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Abstract: Climate change can lead to more extreme weather situations such as floodings, water nuisance, heat and drought. When so-called Vital & Vulnerable functions fail or are disrupted because of these effects, they can pose a threat to national security, people, the environment or the economy. The national ministries are responsible for the protection of V&K functions, but due to knowledge gaps and other complexities these responsibilities will partly be decentralized to the provincial level through *kernteams*. The Province of North-Holland has offered to coordinate the *kernteam* of Brzo functions (V&K functions oil and chemistry). However, the Province is unsure of the role it should take because of uncertainties regarding the involved stakeholders and the division of responsibilities and obligations. In addition, they want to improve stakeholder participation of Brzo companies. Therefore, the aim of this research was to gain insight in the role the Province should take in the coordination of the *kernteam* for Brzo functions. This has led to the following main research question: *In what way can the province of North-Holland coordinate the kernteam for Brzo functions in the second round of knowing-wanting-working, so that all relevant parties are involved, Brzo companies participate and most value is added to their needs?* This question has been divided into three subquestions:

1. How is the protection of Brzo functions from the effects of climate change arranged now, what parties are involved and what are their responsibilities and obligations?
2. In what way can the *kernteam* improve stakeholder participation of Brzo functions in the protection of these functions from the effects of climate change?
3. In what way could the *kernteam*, coordinated by NH, add value to the wishes of the Brzo functions?

To answer the first subquestion, theory on policy arrangement and stakeholder analysis has been applied. For the second subquestion, best principles for stakeholder participation were used. The last subquestion was answered by using an integrative framework of leadership functions for climate adaptation. The research has been conducted through desk research and semi-structured interviews. The combination of the results has led to the following conclusions and recommendations for the Province of North-Holland:

- The Province should let the *kernteam* focus on gaining trust of the Brzo companies;
- the *kernteam* should focus on cooperation with Brzo companies in the creation and enforcement of rules and regulations;
- the *kernteam* should aim to improve representation of smaller and larger companies early on in participation processes;
- the *kernteam* could have an important role as an impartial, central point or facilitator where stakeholders can turn to with questions or issues concerning the interpretation or implementation of measures, or when problems arise with other stakeholders;
- the *kernteam* could organise returning meetings where stakeholders can meet, discuss topics, be updated on developments and possibly find ways to cooperate;
- and the *kernteam* could help with the development of more concrete guidelines concerning climate adaptation measures for Brzo companies to follow.

Keywords: Climate adaptation, Vital & Vulnerable functions, policy arrangement, stakeholder participation, leadership

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Cover illustration: <https://www.europoortkringen.nl/brzo-2015/>

Table of used terms and abbreviations

Dutch term / Abbreviation	Translation / Meaning
Brzo [Besluit Risico's Zware Ongevallen 2015]	Major Accidents Decree 2015
Deltaprogramma	Delta Programme
Deltabeslissing Ruimtelijke Adaptatie	Delta Decision for Spatial Adaptation
DPRA [Deltaplan Ruimtelijke Adaptatie]	Delta Plan for Spatial Adaptation
EZK [Ministerie van Economische Zaken en Klimaat]	Ministry of Economic Affairs and Climate Policy
HSEQ [Health, Safety, Environment and Quality]	Health, Safety, Environment and Quality
IenW [Ministerie van Infrastructuur & Waterstaat]	Ministry of Infrastructure and Water Management
Inspectie SZW [Sociale Zaken en Werkgelegenheid]	Inspectorate of Social Affairs and Employment
IPCC	Intergovernmental Panel on Climate Change
IPO [Interprovinciaal Overleg]	Interprovincial consultation
Kernteam	Core team
MRA [Metropoolregio Amsterdam]	Amsterdam Metropolitan Area
NAS [Nationale Klimaatadaptatie Strategie]	National Climate Adaptation Strategy
NH	(the) Province of North-Holland
Omgevingsdienst	Environmental Services
Omgevingsvisie en –verordening	Environmental Vision and the Environmental Ordinance Regulation
Omgevingswet	Environment and Planning Act
Rijkswaterstaat	Directorate-General for Public Works and Water Management

RIVM [Rijksinstituut voor Volksgezondheid en Milieuhygiëne]	National Institute for Public Health and the Environment
SGRA [Stuurgroep Ruimtelijke Adaptatie]	National Steering Group for Spatial Adaptation
SPI [Safety Performance Indicator]	Safety Performance Indicator
V&K [Vitaal & Kwetsbaar]	Vital & Vulnerable
VKAM [Veiligheid, Kwaliteit, Arbo veiligheid en Milieu]	Safety, Quality, Occupational safety and Environment
Wabo [Wet algemene bepalingen omgevingsrecht]	General Environmental Law Act

1. Introduction

Climate change in the Netherlands

The climate is changing in many ways, causing extreme weather situations to occur more frequently in the future (Minnen et al., 2012). In the coming decades, The Netherlands will for example have to deal with a gradual increase in the sea level, rising temperatures, more extreme warm periods, more frequent peak showers and (hail) storms and possibly more frequent droughts (Rijksoverheid, 2020). On top of that, the Netherlands are extra vulnerable for the effects of climate change because of the high population density, high-value economic activities and the fact that most of the delta region is located below sea level (Termeer et al., 2011). The effects of climate change in the Netherlands create risks for the economy (in the form of damage), for nature and environment (based on the irreversibility of many effects) and for people (in the form of death, illnesses and nuisance). The extent of economic damage caused by climate change is difficult to calculate, but potentially high: The mentioned amounts run into billions (Rijksoverheid, 2020).

One of the ways in which governments can cope with the effects of climate change is by altering the built environment and making adjustments in their spatial planning (Adger et al., 2005; Van Buuren et al., 2010), for example by implementing climate adaptation measures (Timmermans et al., 2012). The IPCC describes climate adaptation in human systems as the process of adapting to the effects of the actual or expected climate in order to limit damage or take advantage of opportunities (IPCC, 2012). Doing so, vulnerability is reduced and resilience is increased (IPCC, 2007). Adger et al. (2005) add a social dimension to the concept of adaptation; they state that adaptation consists of the actions in society from individuals, groups and governments. Adaptation can be initiated for the benefit of individuals or groups, or by governments and other public bodies to protect their citizens (Adger et al., 2005). In fact, most citizens even expect to be protected from the effects of climate change by their government (Termeer et al., 2011).

Political response

Because of the threats it imposes, climate change has had a high place on the Dutch political and administrative agenda for many years now (Van Buuren et al., 2010). As a response, the national *Deltaprogramma* was established in 2010. In the *Deltaprogramma*, the national government cooperates with other, lower level governments to protect the Netherlands against the effects of climate change (Rijksoverheid, 2020). The *Deltaprogramma* works with three steps: knowing - wanting - working. Through these steps, the responsible governments must map the impacts of climate change in their area (knowing), set ambitions (either to prevent, to deal with the effects in another way or to do nothing) (wanting) and are able to work out their strategy (working). The 'first round' of this approach is currently nearing completion (TwynstraGudde & ORG-ID, 2019). The *deltabeslissing Ruimtelijke Adaptatie* followed from the *Deltaprogramma*, stating that all levels of government agree that the Netherlands must be climate-proof and water-robust by 2050. In 2017, it was decided to accelerate the approach in the form of the *Deltaplan Ruimtelijke Adaptatie* [DPRA]. The recalibration of the *deltabeslissing Ruimtelijke Adaptatie 2021* is largely based on the DPRA but also includes new elements, such as a description of the terms climate-proof and water-robust, new interim targets and developments for the approach to vital and vulnerable functions (Staf Deltacommissaris, 2020).

V&K functions

As mentioned, the recalibration of the *deltabeslissing Ruimtelijke Adaptatie 2021* devotes extra attention to vital and vulnerable [V&K] functions. These functions are characterized by the fact that their failure or disruption leads to serious social disturbance and poses a threat to national security, people, the environment or the economy (Kennisportaal Ruimtelijke Adaptatie, n.d.; Rijksoverheid, 2020). Furthermore, these functions can be necessary for a rapid recovery after floodings have taken place (Schumacher, 2020). Functions are considered vital when one or more of the following criteria occur due to failure or damage: When the economic impact is more than 5 billion euro damage or a 1% decrease in real income, when the physical consequences include over 1000 casualties, seriously injured or chronically ill and/or when more than 100.000 people experience emotional problems or serious social survival problems. Functions are identified as vulnerable by the DPRA when they are sensitive to flooding (Schumacher, 2020). Extreme precipitation, drought or a major storm can (temporarily) disrupt vital and vulnerable functions. This also applies in the case of drought, for example when industrial facilities do not have access to enough cooling water (Rijksoverheid, 2020). In total, 13 V&K functions are distinguished (Kennisportaal Ruimtelijke Adaptatie, n.d.). See table 1.

Vital & Vulnerable functions
<i>Energy:</i> (a) electricity; (b) gas, (c) oil
<i>Telecom/ICT:</i> (a) basic facilities for communication for flood response (b) public network
<i>Water chain:</i> (a) drinking water; (b) waste water
<i>Health</i>
<i>Turning and managing surface water:</i> pumping stations
<i>Transport:</i> main infrastructure
<i>Chemical and Nuclear:</i> (a) Chemistry; (b) Nuclear; (c) Infectious substances / Genetically Modified Organisms (GMOs)

Table 1: Overview of national V&K functions in accordance with the Deltaprogramma (based on Kennisportaal Ruimtelijke Adaptatie, n.d.)

The national government is responsible for the optimal functioning of the national infrastructure for V&K functions (TwynstraGudde & ORG-ID, 2019; Rijksoverheid, 2020; Van Hal, 2020). The subject V&K within the DPRA has therefore been managed and coordinated on a national level by various ministries. These ministries have set ambitions on a national scale and are considering whether national laws and regulations are sufficient to realise these ambitions (TwynstraGudde, 2019). The central government ensures that the right preconditions are in place, for example through legislation, regulation and by setting standards for electricity supply or storage capacity. This does not mean that the implementation is also regulated by the national government, since other parties are often much better equipped for this (Rijksoverheid, 2020). However, the translation of the ambitions on regional and local scale is insufficient (TwynstraGudde, 2019).

Regional authorities are needed if the national climate adaptation approach is to succeed. These authorities provide the framework and implementation processes for spatial planning (such as environmental visions and land-use plans) and for permitting and enforcing sectoral legislation. However, national and regional networks remain interlinked and interdependent (Van Hal, 2020).

Decentralization

At this moment, insufficient information is available for many V&K functions, making it impossible to create national policies that efficiently protect the function from the effects of climate change (TwynstraGudde & ORG-ID, 2019). This missing information concerns the chain effects on regional level, the division of responsibilities between governments and other involved parties of V&K functions, and how the collaboration between these actors should be shaped (TwynstraGudde, 2019; TwynstraGudde & ORG-ID, 2019). This is why a second round of knowing-wanting-working is needed for the V&K functions. In January 2019, the national steering group for spatial adaptation [SGRA] suggested that this second round could be facilitated and coordinated by the provinces instead of the national government. This would have multiple benefits, such as the fact that cooperation and information between safety regions and DPRA working regions is exchanged on the provincial level, provinces can safeguard spatial measures in their *Omgevingsvisie* and *-verordening*, they have a statutory role in crisis management and network managers of functions prefer working with a more central actor instead of separate municipalities, water authorities and DPRA working regions (TwynstraGudde & ORG-ID, 2019). The IPO has indicated that the provinces can carry out the second round of knowing- wanting-working for the V&K functions of oil, chemistry, infrastructure and drinking water (Schumacher, 2020; Van Hal, 2020). This round will provide insight into the possible climate consequences for the function in question (Kennisportaal Ruimtelijke Adaptatie, n.d.). Based on 'knowing', a regional ambition ('wanting') will then have to be determined in the risk dialogue, where a link can also be made with ambitions that have been or will be determined by the ministries. Then, a 'working' approach can be set into action (Van Hal, 2020).

This second round is likely to take place in a different way than the first one: It has been proposed by the national government to form *kernteams* to organise the interactive information exchange between government authorities and V&K companies. Each function will have its own team. Ministries responsible for policy are available for consultation on the bottlenecks identified in the regional processes ('knowing'), determine further ambitions ('wanting') on the basis of their national responsibility, and contribute to possible solutions ('working') by means of possible amendments to laws and regulations. Theoretically, *kernteams* ensure that municipalities, provinces and water boards are provided with the necessary information about possible failure of V&K functions in their area due to climate change. They also provide sector organisations and managers of V&K functions with information on the national approach of V&K and their associated tasks. Consequently, managers of V&K functions can actively participate in climate stress tests and risk dialogues on request and in full knowledge of the facts, or at least make the relevant information available for this purpose. *Kernteams* also enable the sharing of relevant information, knowledge and questions with other governments and partners (Schumacher, 2020). An important nuance is that the party who coordinates a *kernteam* does not have the final responsibility for a more water-robust and climate-resistant V&K function. The final responsibility

for the national vital and vulnerable functions will remain with the national government (Van Hal, 2020).

Brzo functions

Based on the indication of the IPO, NH has offered to coordinate a *kernteam* in the second round for the V&K functions of oil and chemistry (Van Hal, 2020). This decision has to do with the fact that NH is committed to climate-proof Brzo facilities. These are companies that have or work with large-scale chemical and/or oil storages, and fall under the V&K functions oil and chemistry in table 1. Such companies are often found in ports or are port-related industries, such as petrochemicals or oil refineries. These functions are vulnerable to rising sea levels in the long term, because they are often located in areas that are not protected by dikes. Due to their capital-intensive character and the mutual supply relationships (semi-finished products, waste flows, heat, steam, CO₂), relocation is also very complex (Rijksoverheid, 2020). In addition to the high safety risks, damage of Brzo companies due to climate change can lead to enormous financial, social and environmental disruptions. It is therefore important that these companies are aware of the risks and act accordingly through climate adaptation measures. However, national legislation (following European guidelines) currently only requires the heaviest category of Brzo facilities to include a flood risk aspect in their risk assessment (Van Hal, 2020).

NH is the competent authority for the environmental permit and employs the *Omgevingsdienst*, which supervises and enforces Brzo facilities in the province. Additionally, NH is the driving force behind the *climate-proof vital and vulnerable functions programme* of the MRA, to which Brzo facilities belong. Over the past year, NH has carried out work for this programme regarding stakeholder awareness, knowledge and the follow-up trajectory. This has led to the conclusion that most stakeholders lack active commitment, interest and/or capacity regarding climate adaptation. The Brzo companies themselves also appear to be reluctant to provide insight into their business processes to properly assess any risks, and there is too little knowledge about the themes of heat, drought and water nuisance in relation to industry (Van Hal, 2020).

1.1 Research problem statement

The research problem statement can be divided in three aspects. Officially, the national government is responsible for the optimal functioning of the national infrastructure of V&K functions, but the implementation and execution of measures is not necessarily arranged by the national government because other parties are often better equipped for this. However, it is often unclear which party is responsible for which part or process (Rijksoverheid, 2020). The advisory report by TwynstraGudde & ORG-ID (2019) also mentions that missing information concerning the division of responsibilities between governments and other involved parties contributed to the decentralization of the coordination of climate adaptation of V&K functions. Other knowledge gaps concern missing information on regional chain effects and how collaboration between all involved actors should take place (TwynstraGudde & ORG-ID, 2019). Secondly, the experiences of NH in the MRA programme show that the stakeholders involved in Brzo functions lack commitment, interest and/or capacity to effectively deal with the threats of climate change and that there still is a lack of knowledge about the threats of climate change for the industry (Van Hal, 2020). And

thirdly, since NH has taken a proactive role by offering to coordinate the *kernteam* in the second round of knowing-wanting-working for Brzo functions, they want to know how the *kernteam* can add value to the already existing stakeholders and the wishes of the companies.

1.2 Research aim and research questions

Based on the mentioned knowledge gaps and the problem statements, the aim of this research is to give insight into the role that the province should take in order to coordinate the *kernteam* for oil & chemistry (Brzo functions) in the second round of knowing-wanting-working. This means identifying the involved stakeholders and their responsibilities and obligations, optimizing participation of Brzo companies in climate adaptation processes and finding a way of coordinating for NH so that the *kernteam* can add value to the existing parties and arrangements and the wishes of the Brzo functions.

The research aim lead to the following main research question:

In what way can the province of North-Holland coordinate the kernteam for Brzo functions in the second round of knowing-wanting-working, so that all relevant parties are involved, Brzo companies participate and most value is added to their needs?

In order to answer this main question, four sub-questions have been drawn up:

1. How is the protection of Brzo functions from the effects of climate change arranged now, what parties are involved and what are their responsibilities and obligations?
2. In what way can the *kernteam* improve stakeholder participation of Brzo functions in the protection of these functions from the effects of climate change?
3. In what way could the *kernteam*, coordinated by NH, add value to the wishes of the Brzo functions?

1.3 Scientific and societal relevance of the research

Scientific relevance

The governance of climate adaptation on a provincial level has not been researched often, despite the fact that calls for improved policy integration have been rising (Termeer et al., 2011). Termeer et al. (2011) also state that the development of adaptation as a relatively new policy domain forms an important challenge due to the lack of knowledge. This research will help gain insight in the regional governance of adaptation processes, filling some currently existing knowledge gaps. Research is also needed to further understand and prioritise drivers for stakeholder participation (Reed, 2008). This research will contribute to this call, since it can be used to compare the drivers for participatory processes in different socio-cultural and physical contexts and using different methods. Lastly, Meijerink & Stiller (2013) conclude that future research is needed to investigate and specify leadership functions for climate adaptation in different political-institutional settings and interorganizational networks. This research will address exactly this, and will therefore contribute to the body of knowledge on leadership functions for climate adaptation.

Societal relevance

Preliminary research showed that NH is searching for its role in the coordination of climate-proofing Brzo functions. This role is not self-evident due to complexities and knowledge gaps. By looking into the wishes and expectations of the involved stakeholders, recommendations can be made to NH to help shape its role and contribute to future climate adaptation policy. This is important, since such policy protects society from many negative effects of climate change, both material as immaterial. As mentioned, the Netherlands are extra vulnerable to these negative effects. On top of that, the sensitivity and importance of V&K functions adds to the need to prevent these functions from failing or disrupting due to climate change. Well-protected and functioning Brzo functions are in the interest of the entire society.

1.4 Reading guide

In the next chapter, the theoretical concepts relevant to the research questions are discussed. In chapter 3, the research strategy, methods and data collection and -analysis are explained. Chapter 4 sketches the policy context of Brzo functions in the Netherlands, based on desk research. In the Results chapter, chapter 5, the outcomes of the interviews are discussed. These results will be discussed further in chapter 6. In the last chapter, based on the results and discussion, conclusions have been drawn, followed by recommendations to the province of North-Holland.

2. Theoretical framework

In this chapter, the theoretical concepts relevant to the research questions are discussed. The first challenge for NH lies with the identification of the involved parties, their responsibilities and obligations and of the way climate adaptation of Brzo functions is arranged now. The second challenge is to involve Brzo functions so they can participate in their own climate adaptation processes. The third challenge is what role NH should take to coordinate the *kernteam* in the second knowing-working-wanting round. In this chapter, relevant concepts for each challenge are discussed.

2.1 Identification of involved parties, their responsibilities and obligations

Policy arrangement theory

According to Dente (2014), a fundamental feature of any policy process in a contemporary society is complexity. This complexity exists because of the numerous actors that are involved, their different viewing points and criteria on which their decisions are based (Dente, 2014). To capture this complexity in a policy domain, policy arrangement theory can be applied (Arts et al., 2006). Policy arrangements are defined as *“the temporary stabilisation of the content and organisation of a policy domain”* (Van Tatenhove et al., 2000: 54). The content and organisation of policy arrangements are constantly being shaped and organised (Arts et al., 2006). With help of the policy arrangements approach, these changes in day-to-day policy practices can be linked to broader, structural changes in society (Lieverink, 2006). Policy arrangement can help analyse and understand both change and stability in a policy domain. To do so, the policy issue at stake should be defined, the actors taking part in the policy making and implementation should be identified and the (un)written rules guiding their behaviour must be clear (Lieverink, 2006).

The environmental policy domain, in which climate adaptation governance takes place, has four dimensions that together form its policy arrangement (Arts et al., 2006). The first dimension is that of the actors and their associations in the policy domain. The second dimension involves the division of power and influence between these actors. Power is here defined as the organisation and distribution of resources, and influence refers to how and by whom policy outcomes are determined. The third element includes the rules of the game that are currently in force. These are for example formal procedures for policy-making and decision-making, and rules for political interaction. The last dimension is that of the prevailing policy discourses and programmes in the policy domain. Discourse refers to the norms, values, problem definitions and solution approaches of the involved actors. Programme refers to policy documents and measures and their specific content (Arts et al., 2006). The first three dimensions deal with the organisational aspects of policy arrangements, the last one includes the essence or core of an arrangement (Lieverink, 2006).

The dimensions are all connected to each other; a change in one dimension always results in a change in the other dimension (Arts et al., 2006; Lieverink, 2006). Changes can be caused by the arrival of new actors or market parties and changing coalitions, where existing coalitions are broken up or adjusted in composition. When such events occur, the power relations between the dimensions change. On the other hand, a dimension itself can also cause a change in dynamics,

for example by adding external resources such as knowledge, money or skills (Arts et al., 2006). This relationship between the four dimensions is illustrated in figure 1, in which each corner represents a dimension.

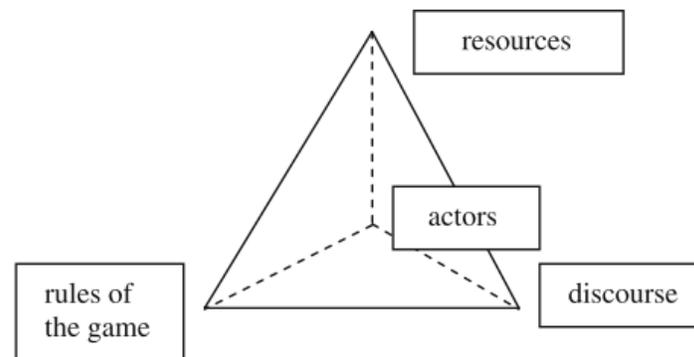


Figure 1: The tetrahedron illustrating the connections between the dimensions of a policy arrangement (Arts et al., 2006)

By analysing the dynamic processes in the policy arrangements from the perspective of these four different dimensions and the connections between them, opportunities for improving policy can arise. For instance by generating a variety of possible interventions and the probability of success of these measures (Arts et al., 2006). Van Tatenhove et al. (2000) state that policy arrangements allow environmental policy making to be understood as a combination between social change and interaction (agency). By studying this duality of structure, two different but complementary methods for analysis are possible. The first way; that of structural social change, focuses on changing relations between civil society, market and state, and the policy arrangements that result from these changes. At this level, the origin of the instrumentation, content and organisation in a broader political and societal context is emphasised. The second level of analysis; the interaction level, accentuates the actors involved. It includes their norms and values, arguments, problem definitions, social and political responsibilities and their view on the relationship between society and nature. The focus therefore lies on the effect of cultural dimensions on interactions, the development and (re)construction of policy arrangements and the way that these arrangements are ingrained in institutions (Van Tatenhove et al., 2000). Analysing a policy arrangement only makes sense when all dimensions are interdependent. This makes it possible to capture the dynamics of change within a policy arrangement; how the dimensions are affected by change in one of them (Lieverink, 2006). It also gives insight in the way arrangements are (re)produced in day-to-day policy making and the way the environmental policy domain is affected by the broader, marco-political processes of change (Van Tatenhove et al., 2000). Lastly, the four-dimensional analysis also creates different analytical views on one policy arrangement. These perspectives focus on multiple and distinctive aspects of the arrangement (Lieverink, 2006).

Stakeholder analysis

The first two parts of a policy arrangement concern the involved actors, or stakeholders (Arts et al., 2006; Liefferink, 2006). In public participation literature, multiple definitions of stakeholders can be found (Pomeroy & Douvere, 2008). Often, stakeholders are defined as actors who have a

specific interest in a decision (process) by affecting or being affected by its conclusions (Gardner et al., 2009; Dente, 2014). Stakeholders can therefore include many groups, which sometimes can hold significant economic and/or political influence over a resource. They will have different positions because of their different history of use, social organization and values (Pomeroy & Douvere, 2008). Identifying the involved stakeholders is important, because that way each stakeholder (or representative) can be invited to participate in the processes of problem- and objective identifying and decision-making (Ferretti, 2016). Dente (2014) adds that it is also important to analyse the resources each stakeholder has available and the category in which they belong in order to truly understand the dynamics of and between the stakeholders.

A stakeholder analysis will help gain insight in the actors involved in a policy domain and the division of their power and influence. The analysis includes the stakeholders, the level on which they operate, the category to which they belong and their resources. This information can be displayed in a power-interest matrix based on Mendelow (1981), giving an overview of the human and institutional landscape, the relationships between them and their main objectives and interests (Ferretti, 2016). An example of a power-interest matrix is shown in figure 2.

ID	Stakeholders	Level	Type	Resources
1	Alberobello municipality	Local	Political	Political/economic
2	Local residents	Local	Special interests	Economic
3	Tourists	National	Special interests	Economic
4	Cultural associations	National	General interests	Cognitive
5	Tourist operators	National	General interests	Economic
6	Commercial associations	Local	Special interests	Economic
7	Local practitioners	Local/provincial	Special interests	Cognitive
8	Local entrepreneurs	Local/provincial	Special interests	Economic
9	Surrounding municipalities	Regional	Political	Political
10	Planners	Local/provincial	General interests	Cognitive
11	Disable people associations	Local	General interests	Cognitive
12	Environmental associations	Local/provincial	Bureaucratic	Cognitive/political
13	Provincial government	Provincial	Political	Political/legal
14	Environmental experts (universities, research institutes)	Local/provincial	Experts	Cognitive

Figure 2: Example of power-interest matrix from Ferretti (2016).

Figure 2 shows four columns: Stakeholders, level, type and resources. The stakeholder column lists the identified stakeholders. The level column shows the governmental level on which the stakeholder operates; namely local, regional, provincial, national or international (Ferretti, 2016). The type is based on Dente (2014), who states that actors can be divided into five categories: experts, special interests, general interests, political actors and bureaucratic actors. Experts have the knowledge that is needed to structure the problem and/or to find the best solution for it. They have the expertise to make judgements, which is why they should be involved in decision-making processes. The special interest type consists of actors whose claim of intervention is based on the fact that they experience the costs and/or benefits of the final decision among the possible choices because they influence their interests directly. Examples of the special interest category are individuals, organisations, firms or residents of a specific area. General interests are actors who involve themselves in decision-making processes because they represent subjects or interests that are not able to act or defend themselves, for example organisations for animal rights

or environmental protection. Political actors represent citizens, which gives them a significant claim in decision-making processes. Lastly, bureaucratic actors have a claim on intervention based on legal rules that give them a certain responsibility; they have formal powers to intervene in decisional procedures. The (lack of) actions of bureaucratic actors will therefore always be justified by an interpretation of the law (Dente, 2014). The last column, that of resources, shows the resources that each stakeholder has available: political, economic, cognitive or legal (Ferretti, 2016).

2.2 Participation of stakeholders

Stakeholder participation in environmental policy making is claimed to have many benefits (Reed, 2008), such as the fact that it facilitates clear communication, improves effectiveness of decision-making processes, strengthens the resources of stakeholders and increases stability in a complex environment (Gardner et al., 2009; Pomeroy & Douvere, 2008).

Collaboration between stakeholders can vary from one-time information sharing to more long-term connections between participants (Gardner et al., 2009). The specific nature of the required engagement depends on the goals that are being pursued. For example contentious, high risk issues require more interactive and deliberative processes, while more simple issues might only require a one-time meeting with involved parties (Gardner et al., 2009). Involving stakeholders in policy- and decision-making processes can take multiple forms (see figure 3) (Pomeroy & Douvere, 2008).

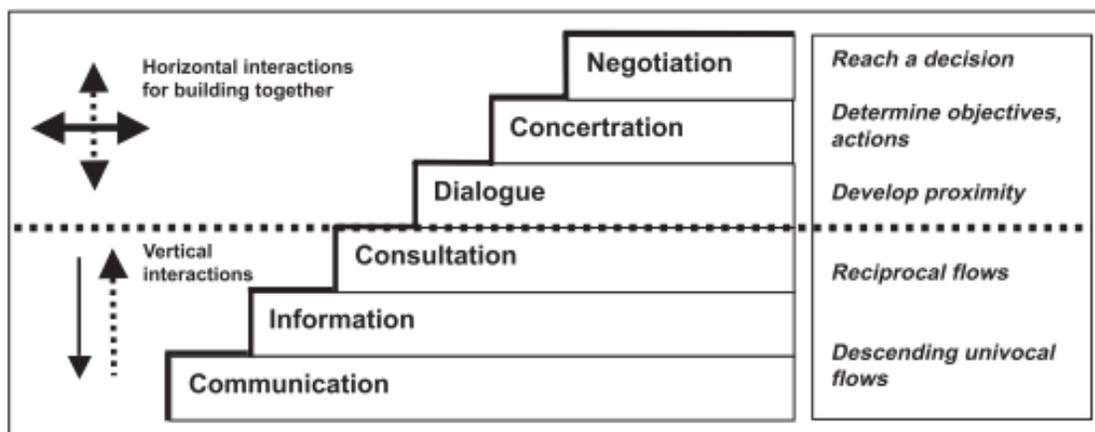


Figure 3: Possible types of stakeholder participation (Pomeroy & Douvere, 2008).

Pomeroy & Douvere (2008) also state that these different types of participation should be advocated in different stages of the decision making processes. In such processes, four key phases have been identified (figure 4). The first phase is the planning phase, in which stakeholders should contribute to the priorities and objectives of the plan or project. The output of this round should be shared with and verified by the stakeholders. The second phase is for evaluation, where stakeholders should be informed on the different options, their consequences and the final choice. To be able to focus on such strategies, all stakeholders should clearly know

the goal and objectives. In the third phase, implementation, the stakeholders are more likely to comply with the new rules and regulations, when they were part of their formulation. The last phase is that of post-implementation, where a deeper analysis of the outcomes is performed and where it is determined whether or not the objectives are met. This post-evaluation should include all stakeholders (Pomeroy & Douvere, 2008).



Figure 4: Flowchart of stages in the decision-making process (based on Pomeroy & Douvere, 2008)

Principles for stakeholder participation

Lastly, Reed (2008) researched the best practices for stakeholder participation, based on which eight recommendations have been identified. The first best practice is basing stakeholder participation on a philosophy that emphasizes empowerment, trust and equity. Here, participation is considered a process that emphasises the need for flexibility and adapting to changing circumstances. A strong philosophy is needed to guide the processes because of the many available process designs and tools, and the need to respond fast to dynamic developments. This philosophy should empower participants through participation by making sure they can influence the decision and that they have the technical capability to engage with the decision. Next, it should also consider power inequalities within stakeholder groups and should enable two-way learning between participants. The second best practice is to consider stakeholder participation as early as possible and throughout the process, since this is considered essential for high quality and durable outcomes of participatory processes. Stakeholders oftentimes only become involved at the implementation phase of a project, and not at the earlier processes, which may demotivate stakeholders to engage with later decision-making processes. Reed's (2008) third recommendation is to systematically analyse and represent relevant stakeholders. This can be done by categorising methods used for the identification of stakeholders, differentiating between and classifying stakeholders, and inspecting the relationship between them. However, due to time constraints, researchers rarely use all three methods. For identification, the social and ecological system in which the research takes place must have clear boundaries. It is often impossible to include all stakeholders, so a line must be drawn somewhere based on predetermined decision criteria. Categorisation and classification tends to follow either a top-down or bottom-up approach, where stakeholders are either classified by researchers based on their observations or where the stakeholders themselves define the parameters of the analysis. To investigate the relationship between the identified stakeholders, two methods are often applied: Social Network Analysis (gives insights into communication patterns in social networks) and Knowledge Mapping (analyses information flows between actors). Fourthly, clear objectives that are agreed upon by all stakeholders should be created from the start. This is necessary to make sure the goal does not shift away from reaching a quality decision to simply reaching an agreeable one, due to the fact that different stakeholders may have conflicting priorities and objectives. Developing the goals through dialogues has multiple benefits: the stakeholders are more likely to build partnerships

and to take ownership, and the outcomes are more likely to be relevant, which motivates their engagement. The fifth best practice is the selection of methods specifically for each decision-making context, considering the objectives, types of participants and appropriate engagement level. Different methods exist to communicate (for example disseminate information via public meetings, media, newsletters), consult (for example through surveys, opinion polls or consultation documents) or participate (for example by task forces or public meetings with voting). Additionally, the chosen methods should be altered to specific contexts, such as socio-cultural or environmental factors. Lastly, when selecting methods, the stage of the process should also be considered. The sixth recommendation is to provide highly skilled facilitation. This is needed to deal with possible conflicts between stakeholders. A facilitator should have technical expertise, but should above all be able to be impartial, approachable and capable of dealing with group dynamics. Techniques that can be used for this facilitation are the establishment of ground rules, planning and using feedback to improve the participatory process. The seventh best practice is to integrate scientific and local knowledge to inform stakeholders. When combined, local and scientific knowledge can contribute to a more exhaustive comprehension of complex systems and processes. Decisions or solutions based on such information are often more robust. Recently, a shift is taking place towards collaborative approaches of knowledge generation and sharing between researchers and stakeholders. Lastly, Reed (2008) recommends to institutionalise participation, since this can influence the long-term success of participatory processes. The embedment of participation in policy depends on the institutional and organisational structures of the organisation (Reed, 2008).

2.3 Organisation and coordination of climate adaptation

Climate adaptation

Dutch climate policy has focused mainly on mitigating measures. These counteract climate change as far as possible, for example by limiting greenhouse gas emissions. However, some consequences of climate change are inevitable, making adaptive measures necessary (Driessen et al., 2010). Adaptation is framed by Van den Berg and Coenen (2012) as the adaptation of the physical living environment based on expected consequences. Adaptive measures therefore influence the way in which public space is designed and used (Driessen et al., 2010; Staf Deltacommissaris, 2018). As mentioned in the introduction, climate adaptation in human systems reduces the vulnerability of society, and increases its resilience (IPCC, 2007). Climate adaptation is not a policy area in itself: It is a task that cuts across many other policy areas (Rijksoverheid, 2020).

As stated by the *deltabeslissing Ruimtelijke Adaptatie*, climate adaptation in the Netherlands aims for a climate-proof and water-robust society by the year 2050. The term climate-proof does not have one clear definition, but can be explained by three characteristics: adaptability, resilience and resistance (Alterra Centrum Landschap, 2006; Driessen et al., 2010; Leusink & Zanting, 2009). Resistance here is the ability to undergo extreme pressure without reaction of the system or major negative consequences for the environment (Leusink & Zanting, 2009). Resilience is the ability to give in, but also to quickly correct when pressure drops (Alterra Centrum Landschap, 2006). Adaptability is the potential of a system to respond to rapidly changing circumstances. This

is necessary because of the uncertainty about the precise effects of climate change and the pace at which they occur (Leusink & Zanting, 2009). A climate-proof system therefore has the capacity to continue to function normally in a changing climate (Alterra Centrum Landschap, 2006). Water-robust design is about organising urban areas to make them more resistant to the extreme effects of climate change, such as water surpluses and shortages. This applies not only to the design of buildings, but also to infrastructure and public spaces (Van de Ven, 2009). A water-robust design, for example, makes it possible to quickly restore facilities after a flooding. Water-robust residential areas can also continue to function up to the flood level for which they were designed (Ruitenbeek, 2012).

Organisation of climate adaptation

Climate adaptation is still a relatively new task in policy domains, and it has therefore not yet been embedded in existing policy fields (Termeer, Meijerink & Nootboom, 2009). However, it is clear climate adaptation requires commitment from political leadership at all governmental levels. For example, national governments can increase the political commitment on local and regional levels by including requirements for risk-evaluations into subsidy applications or investment plans (Carmin et al. 2013). Regional governments can facilitate information exchanges, the division of resources and provide technical assistance to local authorities (Shi et al., 2015). Since local and regional conditions and climate effects differ from each other, regional actors especially have an important role in climate adaptation processes (Termeer, et al., 2011).

The planning of climate adaptation measures requires the identification of specific climate impacts, possible responses and the mobilization of the resources that are needed to implement the developed ideas (Shi et al., 2015). This requires cooperation between public and private actors such as provinces, municipalities, water boards and housing corporations (Driessen & Spit, 2010; Termeer et al., 2011; Runhaar et al., 2012). Within such cooperation, governments are often tasked with the translation of scientific predictions into tangible responses and measures, based on risk assessments and long time-frames (Shi et al., 2015).

According to Meijerink & Stiller (2013), climate adaptation takes place in networks in which knowledge is being shared between the involved stakeholders. A network describes a structural condition in which various factors are related to each other through intersecting connections. It comes into play when multiple people and/or organizations are linked to each other (Barney, 2004). In order to get the necessary parties of a network around the table for consultation, decision-making and implementation processes, leadership is essential (Emerson & Gerlak, 2014). Network leadership focuses on the division of power between different organizations within a network. In order to achieve the desired goals of the network, a network leader should have multiple characteristics. For example, they need a long-term perspective, focus on cooperation, are able to see the common interests of all involved parties and that they do not have a hidden agenda (Meijerink et al., 2014). When collaboration is taking place in networks with both governments and non-governmental organisations, the concept of collaborative governance is often applied. This concept refers to a government arrangement where one or more public organisations are involved in a formal, deliberative decision-making process that is aimed at formulating and/or implementing public policy (Ansell & Gash, 2007). However, again, a leader is crucial in order to bring the involved parties to the table and to guide them through the process.

Ansell & Gash (2007) have formulated several leadership tasks for collaborative governance. The first task is to set the rules of the process, followed by trust building between the parties. Then, dialogues have to be facilitated and joint opportunities are to be explored. Lastly, a leader in a collaborative governance setting is expected to represent the stakeholders that cannot exercise as much influence as others (Ansell & Gash, 2007).

Leadership functions for climate adaptation

According to Shi et al. (2015), a lack of leadership is considered an important barrier for adaptation planning. Shi et al. (2015) also state that especially local leadership is important for the planning of adaptation measures, the identification of the fiscal capacity and to create an effective communication strategy. Additionally, leadership is important for building trust, bringing actors together, dealing with conflict, gathering and generating knowledge, setting up collaboration and the communication of visions for change (Emerson & Gerlak, 2014). And, leadership plays an important role in accomplishing Reed's (2008) principles for stakeholder participation.

To promote these positive effects of leadership and to overcome the barrier to adaptation planning by lacking leadership, specific leadership functions for climate adaptation have been created by Meijerink & Stiller (2013). They have developed an integrative framework (figure 5) based on leadership functions that are needed for climate adaptation.

The first function in this framework (Meijerink & Stiller, 2013) is the political-administrative one, which involves decision making, communication and the allocation of resources that are needed to realize climate adaptation. It is not only about vision building and planning within organizations, but is also directed at the political context in which the policy is made. This function can only be fulfilled by positional leaders; those that have management positions or are elected politicians in interorganizational networks. Function-specific leadership tasks are to decide on, communicate and monitor the realization of a shared climate adaptation vision. Another task is to generate resources for climate adaptation and to divide them among stakeholders. The second, adaptive function is about the creation of innovations and new ideas that may not directly fit in the organizational routines and objectives. It is however crucial to be able to adapt to changing circumstances, which is why this is considered an important function. It develops through interactions in adaptive networks. Therefore, no specific leadership tasks can be assigned to this function. Thirdly, the enabling function focuses on creating the optimal circumstances for the adaptive function in the network. Positional leaders are key individuals such as sponsors and policy entrepreneurs. They can support the enabling function by allowing new approaches, promoting interaction or creating a sense of urgency. Their leadership tasks include supporting cooperation, adaptation strategies and setting deadlines. The fourth function is called the dissemination function. This entails the dissemination, or scattering, of the newly developed, innovative ideas from the adaptive function. Key individuals such as policy entrepreneurs form the positional leaders, who have the leadership tasks to insert newly developed ideas into the network of other positional leaders. The last function of leadership is the connective one. It contains the leadership activities that focus on connections between different governmental levels, policy sectors and other actors. It has the same key individuals such as sponsors and policy entrepreneurs who need to fulfil several leadership tasks. The first task is to promote problems and mobilize actors in search of solutions. Next, they need to bring people together and

agree on collaborative strategies. Cooperation, trust building and legitimacy must always be kept in mind. Lastly, agreements must be constructed and strategies are to be implemented. Leadership needs to be able to connect and integrate the actions of multiple actors within a network, supporting the four other leadership functions. This is why this function has been assigned a central role in the integrative framework (Meijerink & Stiller, 2013).

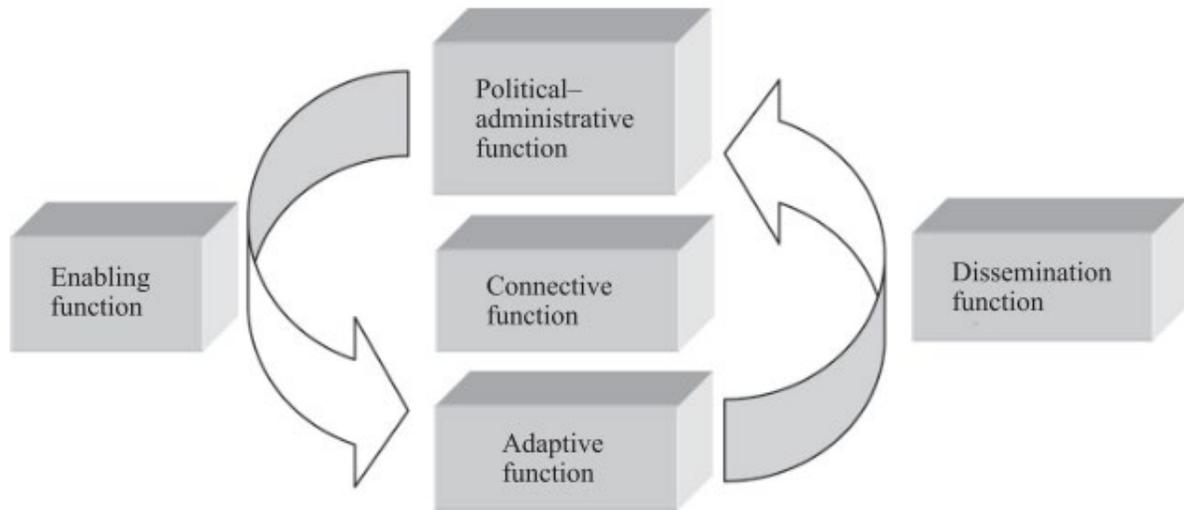


Figure 5: Leadership functions for climate adaptation (Meijerink & Stiller, 2013).

3. Methodology

3.1 Research strategy

This research is practice-oriented and has a 'design' aim, meaning that the research will result in a suggested solution to a practical problem or with recommendations on how to improve a certain situation (Van Thiel, 2014). This is why the main research question starts with 'In what way...' (Van Thiel, 2014). When drawing up the research question, Van Thiel 's (2014) criteria for formulating a good research question have been kept in mind: the question is relevant, precise, purposeful, congruous with theory and methodology and internally logical and consistent. As Van Thiel (2014) also recommends, sub-questions have been formulated that apply to a particular part of the research in order to answer the main question.

The research approach is decided by the use of a deductive or an inductive method. In an inductive research approach, empirical data are collected, on the basis of which a theory is formed. In a deductive research approach, hypotheses are drawn up with which an existing theory is tested (Saunders et al., 2011). In this research, the role of NH in climate adaptation processes is investigated based on scientific theories regarding policy arrangement, stakeholder analysis and participation, and leadership for climate adaptation. The theoretical concepts will be tested through empirical research, after which the theories can be confirmed, denied or adapted or supplemented. Therefore, in this study a deductive approach is applied.

Lastly, multiple methods have been used in order to answer the different subquestions. Another way to describe this approach is as 'mixed-method'. Mixed-method approaches are helpful to gain insight in multi-dimensional and -actor systems and to investigate alternative options (Ferretti, 2016).

3.2 Research methods, data collection and data analysis

Different methods can be used for different purposes in a study. For example, interviews can be used in an exploratory stage to get an idea of important points, before using a questionnaire or in-depth interviews to collect descriptive and explanatory data. This allows the researcher to be more confident that the most relevant subjects are actually being researched (Saunders et al., 2011). This is why this research also consists of two parts: The first, exploratory part and the second, more in-depth part. In the exploratory phase, literature research and interviews have generated insight into the policy arrangement of climate adaptation of Brzo functions. In the in-depth phase, findings from the exploratory phase have been used in in-depth interviews with employees from Brzo companies to generate insight into their participation in climate adaptation processes and their wishes or needs regarding a governmental leadership role.

Exploratory phase

Exploratory research is useful to better understand a problem. The information provided by such research is often of a qualitative nature and provides starting points for further research (Saunders et al., 2011). Through desk research on scientific studies and policy documents, insight in the

policy arrangement of Brzo functions has been gained. Additional data and more information on specific climate adaptation aspects was collected by conducting three expert interviews. In research, interviews are used to collect data and knowledge from individuals (Doody & Noonan, 2013). Using a personal interview as a method for data collection has multiple advantages. For example, problems with no-response or poor response rates of a questionnaire survey are not in order. Secondly, it is well suited to explore beliefs, motives, attitudes and values of interviewees. And, the researchers can ensure that all questions are answered by every interviewee, which increases comparability of the results (Barriball & While, 1994). There are three types of interviews: structured, semi-structured and unstructured. The choice of type depends on the objectives of the researcher (Doody & Noonan, 2013). The interviews conducted for this research were semi-structured, since this allowed questions to be skipped, added or changed in order based on the conversation (Doody & Noonan, 2013; Saunders et al., 2011). Using a semi-structured interview also has the advantage that the perceptions and opinions of the interviewee can be thoroughly explored, and unclear answers can directly be elaborated on or clarified if the researcher believes this to be necessary (Barriball & While, 1994).

The theory on policy arrangement has served as a structuring framework in the desk research and the questions asked in the exploratory interviews. The categories and levels used to classify the stakeholders in the stakeholder analysis are based on Dente (2014). The interviews have been conducted through telephone, since it was not possible to meet in person. They have been recorded, transcribed and coded, after which they could be analysed. The transcripts of the interviews can be found in appendix I. Table 2 shows the interviewees, their organization, function and the date of the interview.

Name	Organization	Function	Date interview
Janneke Lauwerijssen	IenW	Senior policy advisor - Climate Adaptation	10-4-2020
Maurik van Hal	NH	Policy advisor - Healthy Living Environment and Climate Adaptation	14-4-2020
Harold Pijnenburg	Econos / Omgevingsdienst Noordzeekanaal-gebied	Advisor	15-4-2020

Table 2: Interviewees explorative phase

In-depth phase

In the exploratory phase, the policy arrangement of Brzo functions has been mapped. In the in-depth phase, the current way of stakeholder participation of the Brzo functions in climate adaptation was investigated. Additionally, the leadership roles to coordinate climate adaptation processes have been researched. In other words, it has been investigated what the Brzo functions

think of their current way of participation in climate adaptation processes, what changes or additions to this way of working they would want, and which leadership role or roles can help to meet those wishes. The *kernteams*, coordinated by NH, could then aim to fill in gaps and try to fulfill some of the desired leadership roles.

In order to obtain the desired information, interviews have been held with people who work at Brzo companies that are situated in the Netherlands (see table 3). Again, these interviews were semi-structured. The operationalised principles of stakeholder participation and leadership for climate adaptation have been the guiding principles for this interview. These operationalisations can be found in the next paragraph. Equal to the exploratory phase, the interviews have been conducted through telephone, recorded, transcribed and coded in order to analyse them. The transcripts of these interviews can be found in appendix II.

Name	Organisation	Category	Function	Date interview
Roelant Rosman	SACHEM Europe B.V.	High-threshold	HSEQ manager	19-5-2020
Annemieke Böhm	CZAV [Coöperatieve Zuidelijke Aanden Verkoopvereniging]	Low-threshold	Manager VKAM	2-6-2020
Anonymous	-	High-threshold	General Manager	8-6-2020
Monique Commeren	Risk Consultancy Commeren for multiple Brzo companies in the Netherlands	Both	Safety and Environment manager	9-6-2020

Table 3: Interviewees in-depth phase

Summary

In table 4 below, the subquestions and the theories and methods used to answer them are summarized.

Subquestion	Theory	Method	
<u>Explorative phase</u>			
1.	How is the protection from the effects of climate change of Brzo functions arranged now, what parties are involved and what are their responsibilities and obligations?	Policy arrangement theory: - Involved actors - Division of power/influence between actors - Rules of the game - Policy discourses and programmes	Stakeholder analysis: desk research + expert interviews
<u>In-depth phase</u>			
2.	In what way can the <i>kernteam</i> improve stakeholder participation of Brzo functions in the protection of these functions from the effects of climate change?	Best practices stakeholder participation (Reed, 2008)	Interviews Brzo companies
3.	In what way could the <i>kernteam</i> , coordinated by NH, add value to the wishes of the Brzo functions?	Leadership roles for climate adaptation (Meijerink & Stiller, 2013)	Interviews Brzo companies

Table 4: Summary of research methods and data collection.

3.3 Conceptual model

As described above, the three challenges for NH are all associated with different theoretical concepts and frameworks. Their connections can also be displayed in a conceptual model: Figure 6.

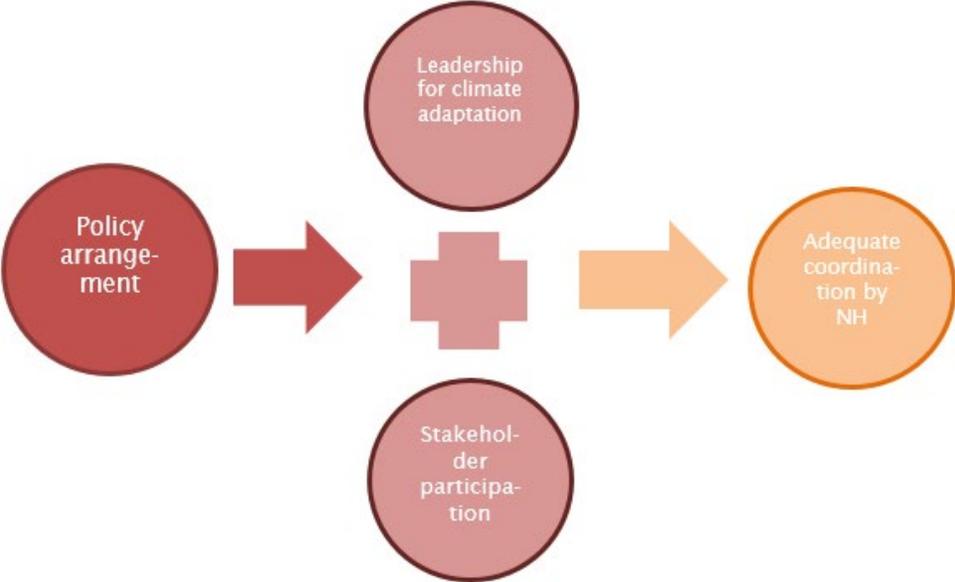


Figure 6: Conceptual model

3.4 Operationalisation of theoretical concepts

Stakeholder participation

The concept of stakeholder participation has been operationalised in table 5 based on Reed (2008). Under best practice, the principles for stakeholder participation are mentioned, and the indicators make the theoretical concept measurable. The column interview question shows the specific question for each distinguished indicator.

Best practice	Indicator	Interview question
Basing stakeholder participation on a philosophy that emphasizes empowerment, trust and equity	<ul style="list-style-type: none"> - Empower participants through participation by making sure they can influence the decision and that they have the technical capability to engage with the decision - Stakeholders should participate on a level playing field - Two-way learning possibilities between all stakeholders 	<ul style="list-style-type: none"> - To what extent do you feel you can influence decisions? - To what extent is the playing field level between all stakeholders? - To what extent are there two-way learning possibilities between all stakeholders?
Consider stakeholder participation as early as possible and throughout the process	Involve stakeholders in project identification and preparation phases, next to implementation phase.	To what extent are you involved in the identification and preparation phases of projects?
Systematically analyse and represent relevant stakeholders	Identify relevant stakeholders, categorise them and make sure they are represented	To what extent do you feel like relevant stakeholders are identified and represented?
Create clear objectives that are agreed upon by all stakeholders from the start	<ul style="list-style-type: none"> - Use deliberative approaches focusing on communication and argumentation rather than negotiation - Developing goals through dialogue 	<ul style="list-style-type: none"> - To what extent do you feel like deliberations revolve around communication and argumentation rather than negotiation? - To what extent do you feel like goals are being developed through dialogue?
Select methods specifically for each decision-making context, considering the objectives, types of participants and appropriate engagement level	Methods for communication, consultation and participation are adapted to decision-making context and the stage of the process	To what extent do you feel that the specific context of a case and the stage of the process are taken into account when choosing methods of communication, consultation and participation?

Provide highly skilled facilitation	<ul style="list-style-type: none"> - Impartial, approachable facilitator that is capable of dealing with group dynamics - Use ground rules, planning and feedback loops 	<ul style="list-style-type: none"> - To what extent do you feel like there is an impartial, approachable facilitator to deal with the dynamics between stakeholders? - To what extent are ground rules, planning and feedback loops used?
Integrate scientific and local knowledge	<ul style="list-style-type: none"> - Combine 'know-why' scientific knowledge with 'know-how' practical, local knowledge - Different forms of expertise (such as from researchers and stakeholders) have equal value when producing knowledge 	<ul style="list-style-type: none"> - To what extent do you feel like scientific knowledge is being combined with practical, local knowledge? - To what extent have the scientific and stakeholder knowledge equal value?
Institutionalise participation	The institutional and organisational structures of an organisation enable participation	To what extent do you feel like the institutions and organisation of climate adaptation enables your participation in it?

Table 5: Operationalisation of best practices for stakeholder participation based on Reed (2008).

Leadership

By operationalising the leadership functions from Meijerink & Stiller (2013) combined with the theory on collaborative governance and network leadership, it becomes possible to uncover which role or function the involved stakeholders would want from NH in the climate adaptation processes of Brzo functions. The operationalisation is displayed in tables 6 through 10 below. Under tasks, the distinguished leadership tasks are stated, and the indicators make the theoretical concept measurable. For each function, multiple indicators have been identified. These indicators have been combined in one question for each function. Indicators that could not be included in the question still remain relevant. Since the questions have an open nature, the respondents could still mention an indicator in their answer. Extra attention has been paid to this in the analysis of the transcripts.

<u>Political-administrative function</u>		
Tasks	Indicator	Interview question
Set the rules of the process	Setting rules that other stakeholders have to comply with.	Would you want a governmental party to decide on and enforce rules and visions around climate adaptation? If so, in what way?
Generate and assign the necessary climate adaptation resources	Release an allocation of budget for research, process and implementation for the benefit of climate adaptation.	
Vision building and planning within organisations	Help organisations create a vision and a planning to achieve this vision.	
Decide on, communicate and monitor the realization of a shared climate adaptation vision	Decide on, communicate and monitor the realization of a shared climate adaptation vision.	
Provide a clear division of roles and tasks	Provide a clear division of roles and tasks	

Table 6: Operationalisation of the political-administrative function

<u>Adaptive function</u>	
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Tasks	Indicator	Interview question
Stimulate adoption of technical innovations	Emphasise benefits and added value of technical innovations	Would you want a governmental party to stimulate innovations and cooperation between Brzo companies? If so, in what way?
Provide means and space to try out new ideas and directions	Provide means and space to try out new ideas and directions	
Stimulate adapting to changing circumstances	Stimulate adapting to changing circumstances	
Stimulate willingness to cooperate in networks in order to innovate	Stimulate willingness to cooperate in networks in order to innovate	

Table 7: Operationalisation of the adaptive function

Enabling function		
Tasks	Indicator	Interview question
Allow and stimulate a variety of (new) adaptation strategies and options	<ul style="list-style-type: none"> - Gather and inform about various adaptation strategies - Stimulate exchange of adaptation strategies by stakeholders. - Reducing rules to allow new adaptation strategies and options. - Allocate subsidies for experimental approaches 	Would you want a governmental party to allocate (financial) means to stimulate innovations, a sense of urgency and representation of all relevant parties? If so, in what way?
Create a sense of urgency	<ul style="list-style-type: none"> - Put climate adaptation on the agenda. - Setting deadlines - Informing about risks and consequences of neglecting climate adaptation 	
Stimulate interaction, dialogue and trust building	<ul style="list-style-type: none"> - Organising joint meetings and sessions - Explore joint opportunities 	
Represent less influential parties	<ul style="list-style-type: none"> - Ensure that all relevant parties are involved - Emphasise the importance of stakeholders who are able to exert less influence than other stakeholders 	

Table 8: Operationalisation of the enabling function

<u>Dissemination function</u>		
Tasks	Indicator	Interview question
Dissemination of newly developed innovations among network of positional leaders	Inform network of positional leaders about innovations	Would you want a governmental party to spread and promote new ideas and innovations among positional leaders?
Lobby newly developed innovations among network of positional leaders	Lobby innovations and new ideas among positional leaders	

Table 9: Operationalisation of the dissemination function

<u>Connective function</u>		
Tasks	Indicator	Interview question
Coordination of tasks of different management layers	- Ensuring coordination between involved governmental actors - Ensure coordination between involved governmental actors and the other stakeholders?	Would you want a governmental party to bring together stakeholders and other governments to look for solutions and ensure mutual trust? If so, in what way?
Promote existing problems and mobilize actors to look for solutions	Inform on/emphasize problems and collect parties and encourage them to go to search for solutions	
Bring people together and agree on collaborative strategies	Organising joint meetings in order to agree on a collaborative strategy	
Build trust and legitimacy	Communicate in a transparent way about the actions of all parties	

Table 10: Operationalisation of the connective function

3.5 Validity and reliability of the research

In qualitative research, validity and reliability are not spoken of in a strict sense, but they are measured in other ways. For example by using terms as transferability and comprehensibility (Van Thiel, 2014). In order to be considered reliable, an analysis must be repeatable and comprehensible. In this study, semi-structured interviews are used as a way of collecting data. The validity and reliability of the results is then determined by whether or not words of equal meaning are used in the other research. This is because it is not likely that the same answer, using the same words, will be repeated exactly in another study (Barriball & While, 1994). The validity of a research can also be formed by using multiple sources of evidence or information (Yin, 2015). By combining the results from desk-research with information collected through interviews, so-called triangulation takes place. This creates a lot of information and enhances the reliability of the research as well (Van Thiel, 2014). Doody & Noonan (2013) also state that the addition of data used for the analysis can increase the validity of the research. They add that the open nature of the questions used in semi-structured interviews even stimulates more in-depth views and helps new aspects to come into light (Doody & Noonan, 2013).

In order to have external validity, results must be generalized and transferred. In this research, external validity is secured through the use of document analyses from the desk research, which provides for analytic generalizations (Yin, 2015).

One aspect of conducting interviews should be kept in mind. The conclusions that are drawn based on the obtained information will always be implicated by the interviewee's willingness to be a 'good' informant, which impacts the validity of the data (Barriball & While, 1994).

As a researcher, you can try to secure the validity and reliability of your data by trying to plan the circumstances under which an interview takes place, and by being friendly and polite while approaching interviewees (Barriball & While, 1994). In this study, the researcher aimed to politely approach interviewees, have a friendly and open attitude and to plan the interviews ahead.

Ethical considerations

A scientific researcher always has to follow certain research ethics (Van Thiel, 2014). Since in this research interviewees and respondents are involved, it is even more important to take those ethical considerations in mind. Therefore, Van Thiel's (2014) ethical rules for scientific research will be applied. For example, the privacy of the interviewees will be protected as well as possible, and the participants will be told about how the information will be used. The participants will also always have the right to refuse participation or to withhold information. Lastly, the research aim is positive; meaning it does not have the intention to harm.

4. Policy context of Brzo functions in the Netherlands

In this chapter, the policy context of Brzo functions in the Netherlands is explained based on desk research. In the next chapter, chapter 5, the results of the expert interviews are described.

4.1 Legislation

Companies handling large quantities of dangerous substances have to comply with specific rules to prevent major accidents with major consequences for people and the environment (Sol et al., 2015). When there are certain risks to people inside and outside the company, as well as to the environment, a company is subject to the *Besluit risico's zware ongevallen 2015* decree [Brzo 2015] (Inspectie SZW, n.d.). Brzo companies are therefore often businesses that work with or store chemicals, gas and/or oil on a large scale (Brzo+, n.d.; Inspectie SZW, n.d.), and they fall under the V&K functions of oil and chemistry (TwynstraGudde & ORG-ID, 2019). In the Netherlands, there are around 400 Brzo companies (see figure 7) (BRZO+, n.d.).



Figure 7: Geographical spread of Brzo functions in the Netherlands (Risicokaart.nl, 2020)

The Brzo is the Dutch translation of a European Directive for companies working with dangerous substances: the Seveso III Directive. This directive is in line with the European Classification of Hazardous Substances (Kenniscentrum InfoMil, n.d.). The Brzo contains rules to help limit the risks of large quantities of hazardous substances as far as possible. The strict Brzo regulations are aimed at the prevention of major accidents with major consequences for people, the environment and infrastructure. The rules and the resulting measures are also intended to limit the consequences of a major accident as much as possible if something does go wrong (Inspectie SZW, n.d.). The Brzo 2015 has replaced the Brzo 1999. The amendment mainly concerns new European requirements for the categorisation of hazardous substances. In addition, the decision requires more information from inspections to be made public and more information to be shared with the European Commission (Inspectie SZW, 2015). The Brzo 2015 also introduces the use of indicators that provide information on the safety of a company and can help to assess the safety of companies. Examples of such indicators are the amount of 'almost-accidents', the responses to those events and how often maintenance takes place. However, these indicators are not required by law: Companies are encouraged to draw them up themselves, so that they are tailored to their own production processes. These indicators are also referred to as SPI's: safety performance indicators (Sol et al., 2015).

Under the Brzo 2015 decree, Brzo companies are divided under high and low-threshold businesses. The classification is depending on the nature, quantity and category classification of hazardous substances (BRZO+, n.d.; Inspectie SZW, 2015; Kenniscentrum InfoMil, n.d.). Upper-tier companies are more risky than the lower-tier companies, and have corresponding obligations and inspection frequency (BRZO+, n.d.) High-threshold companies are obliged to draw up and submit a safety report. In this report, the establishments must be able to demonstrate that they have taken appropriate measures to prevent major accidents or to limit their consequences. Low-threshold establishments must also take these measures, but do not have to write a safety report (Inspectie SZW, 2015).

4.2 Execution

As mentioned, Brzo companies are encouraged to draw up their own SPI's. When these indicators are sufficient, they can be used to measure the safety performance of the facility over time. The SPI's enable both annual trend analyses, as well as a one-time snapshot or helicopter view (Sol et al., 2015). Therefore, in practice, the Brzo companies themselves are responsible for taking the measures that are necessary to prevent major accidents or to limit their consequences (Inspectie SZW, 2015). The results of measurements based on SPI's should be able to lead to actions, such as adjustments and corrections. And, the entire management system of SPI's must have a place in a structured safety management system and in the company's culture (Sol et al., 2015).

4.3 Responsibilities

The responsible ministries for the V&K functions of oil and chemistry are respectively EZK and IenW (TwynstraGudde & ORG-ID, 2019). On a regional level, the legal responsibilities of

provinces lie with spatial development, infrastructure management, public transportation, and environmental and water management (Peters, 2007; Van Oevelen, 2016). The roles of provinces regarding V&K can be divided based on new and existing infrastructure. Provinces always have a role to play in the construction of new V&K functions because of their spatial planning role and instruments. Provinces also have a role for existing infrastructure, such as managing their own assets (which are mainly roads and waterways) by performing stress tests, risk dialogues and taking measures, adjusting their own policy and rules and the supervision of waterboards, municipalities and Brzo companies (through the *Omgevingsdienst*). Concerning Brzo functions specifically, provinces have a supervisory role through the *Omgevingsdienst* (TwynstraGudde & ORG-ID, 2019). Lastly, the managers of Brzo functions have a legal duty to protect their functions from external influences and to identify risks (Rijksoverheid, 2020).

4.4 Monitoring

Because of the risk posed by the large quantities of hazardous substances, Brzo companies are regularly inspected for compliance with the law (Inspectie SZW, 2015). Brzo inspections are carried out by an inspection team. The Brzo inspection team consists of inspectors from multiple organisations (BRZO+, n.d.; Inspectie SZW, 2015). First of all, the *Omgevingsdienst* checks for environmental aspects and external safety by order of municipalities or provinces. Secondly, the *Inspectie SZW* inspects from the point of view of employee safety. Lastly, the safety region checks for fire safety and disaster relief. These organisations operate together as a single inspection team, each based on its own expertise and its own areas of attention. *Rijkswaterstaat* or water boards can also be involved as an adviser when there is a risk of an unforeseen discharge into surface water or a sewage treatment plant (BRZO+, n.d.; Inspectie SZW, 2015).

The inspection team evaluates whether or not a company has a so-called safety management system that is tailored to the function-specific risks and whether it works well. The SPI's can help in this process. Additionally, they can help companies to prove to the government and to society that the company's safety risks are under control (Sol et al., 2015).

5. Vital and vulnerable: the case results

In this chapter, the results of the research are presented. First of all, the results of the explorative part, the policy arrangement, are given. Secondly, the results of the stakeholder participation part are presented, based on the in-depth interviews. Third and last, the other part of the in-depth interviews have resulted in data regarding the desired leadership functions for climate adaptation of Brzo companies in the Netherlands.

5.1 Policy arrangement

The four dimensions of the policy arrangement, the involved actors, the division of power and influence between them, the rules of the game and the prevailing discourses (Arts et al., 2006) of Brzo functions in the Netherlands have been investigated through desk research and completed with expert interviews. The results of the desk research are partly described in the previous chapter. The additions of the interviewees are described below.

Involved actors

All three interviewees mention the Brzo functions themselves as the most important players in their climate adaptation processes. Additionally, they all mention branch organisations, the *Omgevingsdienst*, municipalities, the national government or ministry, provinces and the *Deltaprogramma* (Lauwerijssen, personal communication, April 10, 2020; Pijnenburg, personal communication, April 15, 2020; Van Hal, personal communication, April 14, 2020). This programme is considered an actor, since it is a cooperation between the central government, provinces, municipalities and water boards. Lauwerijssen mentions the *kernteams* already as a future actor (Lauwerijssen, personal communication, April 10, 2020). Van Hal adds the European Union as an involved actor, as well as port-organisations and managers of water quality (Van Hal, personal communication, April 14, 2020). This last group is also mentioned by Pijnenburg, who adds that there is a distinction between regional and national water quality managers: water boards work regionally, and *Rijkswaterstaat* nationally. To complete the list, safety regions and local residents are mentioned as actors involved in the climate adaptation of Brzo functions (Pijnenburg, personal communication, April 15, 2020).

Division of power between actors

The mentioned actors all have different powers and influences on the climate adaptation process of Brzo functions. Brzo companies have the power to implement climate adaptation measures. They can do so on their own initiative or because they are obligated to do so by law. Branch organisations are often closer to the companies in terms of communication than the provinces or national government, which is one of their assets. *Omgevingsdiensten* are also relatively close to the Brzo companies (Van Hal, personal communication, April 14, 2020). The *Omgevingsdienst* has the legal task to monitor the Brzo companies; they are the enforcers for the provinces (Pijnenburg, personal communication, April 15, 2020). They can largely determine what they will and will not enforce (Van Hal, personal communication, April 14, 2020), and have possibilities to intervene, for example with periodic penalty payments (Pijnenburg, personal communication, April 15, 2020). Lauwerijssen therefore adds that the *Omgevingsdienst* can put issues on the

companies' agenda and can request attention for climate adaptation within the Brzo functions (Lauwerijssen, personal communication, April 10, 2020). This is similar to the role of municipalities in climate adaptation processes, which is partly to raise awareness of climate adaptation (Lauwerijssen, personal communication, April 10, 2020). A municipality can also be a shareholder of a company. In that way, it can influence its business operations (Van Hal, personal communication, April 14, 2020).

The European Union is a stakeholder because European legislation and regulations on climate adaptation or Brzo functions form the basis for national translations (Van Hal, personal communication, April 14, 2020). The national government has a framing role; it creates the main body of legislation based on the European guidelines. Additionally, it is involved with some aspects of monitoring and inspections (Lauwerijssen, personal communication, April 10, 2020). Pijenburg adds that the national government has the power to implement rules, even when other actors, such as *Omgevingsdiensten* or consultancy firms, disagree with their contents. The national government always has the deciding vote, and it turns out that companies do not even fight them anymore: "*Companies say that they do not want to enter this fight, because the government has such a dominant position*" (Pijenburg, personal communication, April 15, 2020, par. 1.6). As for the responsible ministry, I&W tries to make connections between the different actors involved when this is asked for or needed (Lauwerijssen, personal communication, April 10, 2020). She summarized the role of the ministry as follows: "*It's indeed about policy, regulation, frameworks and control. That is the role of the Ministry*" (Lauwerijssen, personal communication, April 10, 2020, par. 1.3.1). The *Deltaprogramma* is a national programme that influences the actors involved by setting frameworks for Brzo companies by means of joint agreements (Lauwerijssen, personal communication, April 10, 2020).

Provinces are involved in the climate adaptation process of Brzo functions because they are the competent authority for Brzo permits. Because of this role, they have to carry out inspections to ensure that the companies comply with their laws and regulations. In their turn, they commission *Omgevingsdiensten* to enforce (Pijenburg, personal communication, April 15, 2020; Van Hal, personal communication, April 14, 2020). Furthermore, provinces can be a shareholder of a company as well, exerting influence on the business in that way (Van Hal, personal communication, April 14, 2020). Lauwerijssen adds that provinces are also able to answer more specific questions of Brzo companies, as opposed to the ministry. Van Hal concludes with the following statement: "*They [provinces] may not have the most influence, but in the end they are the ones who get the most done, which you really have to if you want to change something*" (Van Hal, personal communication, April 14, 2020, par. 1.1).

Future involved actors are the *kernteams*. Within a *kernteam*, there will be no hierarchy: "*It's really a joint linking of partners and those involved in a certain function, helping each other to share information*" (Lauwerijssen, personal communication, April 10, 2020). Inside this team, one coördinator is needed, but that party is not necessarily in charge. However, when it comes to determining ambitions, for example whether extra legislation or additional requirements are needed, power or influence from certain players are essential. It is likely that a ministry or province

will have to do this, because of their legal roles and influences (Lauwerijssen, personal communication, April 10, 2020).

Port organisations or terrain managers are close to the Brzo functions and could therefore communicate with the companies on their terrain. For example, they could share information about climate adaptation and provide manuals on the implementation of measures. They could also state that any new investment on the site should be climate adaptive, but they have no legal authority to enforce this (Van Hal, personal communication, April 14, 2020).

Water quality managers (water boards & *Rijkswaterstaat*) are working on climate adaptation from the perspective of their own water management task, for example based on the *Deltaprogramma*. They do not have a direct role in the climate adaptation of Brzo functions in terms of legal obligations, but they do take responsibility (Van Hal, personal communication, April 14, 2020). They generally have more knowledge on subjects such as flood risks than the competent authorities, which is why process agreements have been made with the water quality managers: They check the technical analysis of the companies with regard to flood risks (Pijenburg, personal communication, April 15, 2020).

Safety regions do not have a legal task or obligation until there actually is a flood or disaster. They are included in climate adaptation of Brzo functions so they can better prepare for possible disasters with these companies (Pijenburg, personal communication, April 15, 2020). The last involved actors are the local residents. Their power comes mainly from their legal participation possibilities. Especially in the *Omgevingswet*, local residents are given a larger role in terms of participation in for example the licensing of Brzo companies. They are therefore also a party that must be taken seriously (Pijenburg, personal communication, April 15, 2020).

Based on this information, a power-interest matrix has been created. This matrix is presented in table 11 below.

ID	Stakeholder	Level	Type	Resources
1.	Brzo companies	Local	Special interests	Economic
2.	Branch organisations	National	Special interests	Economic
3.	Omgevingsdienst	Regional	Experts / bureaucratic	Political / legal
4.	Municipalities	Local	Political	Political
5.	National government /ministry	National	Political / bureaucratic	Political / legal
6.	Provinces	Provincial	Political / bureaucratic	Political / legal
7.	<i>Deltaprogramma</i>	National	Political / Experts	Political / cognitive
8.	<i>Kernteam</i> s	National	Political	Cognitive
9.	European union	International	Political	Legal
10.	Port organisations / managers	Local	Special interest	Economic / cognitive
11.	Water quality managers (water boards and Rijkswaterstaat)	Regional	Political/Experts	Political / cognitive
12.	Safety regions	Regional	Special interests	Political / cognitive
13.	Local residents	Local	Special interests	Legal

Table 11: Power-interest matrix of Brzo functions in the Netherlands

Rules of the game

As mentioned, the Brzo 2015 subjects companies that work with chemicals, gas and/or oil (Brzo+, n.d.; Inspectie SZW, n.d.). Brzo companies have the obligation to comply with the Brzo 2015 legislation. Both low and high category companies have the responsibility to take 'appropriate' measures to prevent accidents and to limit their effects (Inspectie SZW, 2015). The *Deltaprogramma* has four themes: drought, heat stress, peak rainfall and floods. Only this last theme is regulated in the Brzo 2015. For the other three items, Brzo companies have no legal obligation. And, a flooding analysis has only been made compulsory for the high-category companies. If a Brzo company does not fall under the high-category and an enforcer also wants them to look at the four climate themes, they could fall back on annex III of the Seveso III Directive, part B ii. This concerns the identification of hazards and risk assessment. However, this 'route' has not yet been legally tested (Pijnenburg, personal communication, April 15, 2020).

Within the *kernteams*, ambition setting and altering or adding legislation accordingly will take place through existing frameworks. This structure already includes the players who determine

legislation and regulations, such as the national government or provinces (Lauwerijssen, personal communication, April 10, 2020). Provinces can also oblige new investments to be climate-adaptive by means of their *Omgevingsverordening* (Van Hal, personal communication, April 14, 2020). As far as the water quality managers concerns, some formal rules apply as well. However, they are involved with climate adaptation from the water management point of view, and not because they have to based on the Brzo 2015 legislation (Van Hal, personal communication, April 14, 2020).

There are also non-legally binding 'rules' of the game. For example the *Deltaprogramma*. According to these joint agreements, the Netherlands must be climate-proof and water-resistant in 2050, and have its policy and regulations altered accordingly in 2020 (Lauwerijssen, personal communication, April 10, 2020). The parties involved in this agreement; the national government, provinces, municipalities and water boards, have agreed to do their best to achieve these goals. And finally, some rules for political interaction have been observed. Van Hal mentions the unwritten rule that companies should be approached with caution (Van Hal, personal communication, April 14, 2020). Pijenburg adds that another important unwritten rule is that governments should set a good example for businesses. They can do so for example by making their own business operations climate adaptive: The companies will follow their lead (Pijenburg, personal communication, April 15, 2020).

Prevailing discourses

The last dimension is that of the prevailing policy discourses and programmes in the policy domain (Arts et al., 2006). For Brzo companies, a decentralisation has taken place of tasks and responsibility regarding emergency management. Previously, this was the task of the fire brigade, but now the companies must arrange this themselves. This has created a false sense of safety: *"This type of construction creates distrust of the government, and distance. And then you actually get less done, because companies are no longer open and honest"* (Pijenburg, personal communication, April 15, 2020, par. 1.3.1). Van Hal also mentioned that many Brzo companies have a closed character and that they do not share much information. He states that this is because the companies are afraid that more disclosure of information will lead to extra rules they have to follow. Additionally, the companies see opening up about their climate adaptation status as an opportunity for reputational damage if, for example, they honestly indicate that they are not well prepared for climate change. However, Van Hal also sees a turnaround in this attitude: *"Two years ago there was almost no demand for it [help or information regarding climate adaptation] from companies, but now we do get people around the table to talk"* (Van Hal, personal communication, April 14, 2020, par. 1.5). Lauwerijssen also acknowledges the change that managers of vital functions are more involved with climate adaptation, but adds that this is still very limited. For example, most companies only have 0.5 fte available to deal with climate adaptation (Lauwerijssen, personal communication, April 10, 2020). Lastly, Van Hal mentions some large, international Brzo companies have their priorities decided on higher levels. When these levels do not value climate adaptation, the lower levels cannot change too much about this (Van Hal, personal communication, April 14, 2020).

According to Van Hal, branch associations do not feel called to initiate anything regarding climate adaptation, and they are not eager to participate in the projects of others as well (Van Hal, personal communication, April 14, 2020). *Omgevingsdiensten* also have a closed attitude. According to Van Hal, they are especially worried about gaining extra work. They are already extremely busy and cannot handle additional work pressure. They do think along with other parties, but tend to keep the boat off as soon as it leads to more work (Van Hal, personal communication, April 14, 2020). Pijenburg states that within the *Omgevingsdienst*, climate adaptation of Brzo functions is not specifically picked up, since they do not know exactly how to do so. However, the *Omgevingsdienst* has started working on sustainability in more general terms (Pijenburg, personal communication, April 15, 2020)

For smaller municipalities, climate adaptation is often a difficult subject, because there is limited capacity and it does not have much priority. Larger municipalities tend to have a little more space and find it more relevant, but many organisations still hire an agency in order to meet the agreements of the *Deltaprogramma*, because they do not have the capacity themselves (Lauwerijssen, personal communication, April 10, 2020).

The national government has long been unsure of what to do about climate adaptation of V&K functions (Pijenburg, personal communication, April 15, 2020). Recently, the government has been lobbying to unite the provinces in the task of climate proofing V&K functions, for example by means of the *kernteams* that are about to be set up. This unity is the new line of the national approach (Van Hal, personal communication, April 14, 2020). Pijenburg does mention the changed role of the national government. Previously, they were more steering, also in policy, but nowadays they only make legislation. The tendency now is: the national government formulates legislation (often on the basis of a European duty) in such a way it is often very generally formulated. The national government then delegates responsibility downwards, so that the responsibility lies there. Because it is not well demarcated, the provinces cannot properly interpret this and simply pass it on to the *Omgevingsdienst*. As a result, they are then struggling with the implementation, which sometimes leads to mistakes (Pijenburg, personal communication, April 15, 2020).

The provinces feel compelled to act on the climate adaptation of Brzo functions because of their responsibilities for the licensing of these companies (Van Hal, personal communication, April 14, 2020). Provinces often have the same capacity or prioritising issues regarding climate adaptation as larger municipalities, which is why they also often hire an agency to perform stress tests for example (Lauwerijssen, personal communication, April 10, 2020).

Earlier it was mentioned that process agreements have been made with the water quality managers to have them check the technical analysis of the companies' flood risks. However, of the two water quality managers (water boards and *Rijkswaterstaat*), only the water boards have agreed. *Rijkswaterstaat* still seems reluctant in this regard (Pijenburg, personal communication, April 15, 2020)

In general, some trends regarding the prevailing discourses and programmes have come forward in the interviews. Lauwerijssen notices that climate issues are increasingly being put on the agenda by both civil servants and administrators in the last two or three years. Possible reasons

for this are the noticeable changing weather conditions, such as droughts. When asked whether companies see climate adaptation as an assignment from a higher government (because of the *Deltaprogramma*) or if they see it as a necessity themselves, she said: *"I think a lot of organizations see and experience it as an assignment. Only I hope, and expect, that when they learn what is actually going on, they will also experience more urgency. Because if you don't know that there's a problem, then it's not important either"* (Lauwerijssen, personal communication, April 10, 2020, par. 1.7). Van Hal also mentions the changing attitude of Brzo companies to cooperate on climate adaptation issues. He reasons that possible causes for this change are the droughts in the previous years and the fact that sustainable entrepreneurship and social sustainability are becoming important selling points for companies (Van Hal, personal communication, April 14, 2020).

A less optimistic trend in the climate adaptation of Brzo companies is seen by Pijnenburg. In his work with the *Omgevingsdienst* he has noticed a changing playing field: *"It's a bit hardened. Previously, Omgevingsdiensten and companies saw each other as equal partners with a common goal. Nowadays, companies have become a bit suspicious of governments"* (Pijnenburg, personal communication, April 15, 2020, par.1.3.1). The reason for this change is the fact that the government is assigning more tasks and responsibilities to the companies, and that companies learn that when they share too much with the government it is likely that something will be added to that. In conclusion, Pijnenburg states that *"There is actually too little knowledge, that's what you notice. I myself am still of a previous generation and have a lot of knowledge, but there is no longer any demand for it. It's all about the responsibilities now, and that's another game"* (Pijnenburg, personal communication, April 15, 2020, par. 1.9).

5.2 Stakeholder participation

In the in-depth interviews, the interviewees have been asked about their current way of participation in climate adaptation processes based on Reed's (2008) principles for stakeholder participation. An overview of the results is displayed in table 12 below. Each best practice has been operationalised through indicators. For some best practices, there are multiple indicators. See table 5 for the exact operationalisation. The numbers above the last four columns represent the interviews: interview 1 (Roelant Rosman), 2 (Annemieke Böhm), 3 (Anonymous) and 4 (Monique Commeren). In the table, each indicator has been allocated a color. Green signifies that according to the interviewee, the indicator is present. Orange means that it is partly present, but that there is room for improvement. Red shows that the indicator is not present. When an interviewee does not know whether an indicator is present or not, or if it does not apply to the company, the result states 'N.A.'. Below the table, argumentation for the allocation of each color is explained.

Best practice	1	2	3	4
Basing stakeholder participation on a philosophy that emphasizes empowerment, trust and equity				
Consider stakeholder participation as early as possible and throughout the process				
Systematically analyse and represent relevant stakeholders			N.A.	N.A.
Create clear objectives that are agreed upon by all stakeholders from the start			N.A.	
			N.A.	
Select methods specifically for each decision-making context, considering the objectives, types of participants and appropriate engagement level	N.A.	N.A.	N.A.	N.A.
Provide highly skilled facilitation	N.A.			
			N.A.	
Integrate scientific and local knowledge				
Institutionalise participation				

Table 12: Results of stakeholder participation based on in-depth interview

The first best practice, to base stakeholder participation on empowerment, trust and equity is partly present. Rosman’s company has multiannual agreements with governments, which gives the company much space and freedom to participate and creates an equal partnership. Because the company is still dependent on the owner of the land to be able to make investments there, ‘two way learning opportunities’ has been scored orange (Rosman, personal communication, May 19, 2020). This is different for Böhm. Her company is a large cooperation that, together with one other competitor, controls about 90% of the Dutch grain trade. This gives them the opportunity to participate in all kinds of national working groups, in which they can directly or indirectly influence plans or proposals of the national government. However, there is no level playing field between the stakeholders yet, because it takes time to create trust and cooperation between governments and companies. This has been tried in the past as well, but because of missing knowledge, it has not always turned out well. On the other hand, two-way learning possibilities are present according to Böhm: *“I think companies are happy to take a step forward, and governments are happy when their advice or directions are being followed. So there is a learning opportunity for*

them too: to learn how to take a step forward and not make companies fight them. So I think it is mutual" (Böhm, personal communication, June 2, 2020, par. 2.3). The experiences of empowerment, trust and equity are different for the last two interviewees. Interviewee 3 states that their influence is very limited, and always indirect through interest groups. They are therefore not empowered to engage in decision-making processes. They also state that there is no level playing field as far as they are concerned: *"I don't think that we have any real influence on it [decision-making processes], or that we can put the things that we think are important forward to the other party"* (Interviewee 3, personal communication, June 8, 2020, par. 2.2). However, two-way learning possibilities are present because of lessons that are drawn from practice and theory, hence the green score (Interviewee 3, personal communication, June 8, 2020). Commeren experiences the same lack of influence and empowerment. She explains this as follows: *"The regulations are imposed from above. And, only the very large companies are involved in the drafting of guidelines and so on, so there are a lot of Brzo companies that are not included"* (Commeren, personal communication, June 9, 2020, par. 2.1). The same uneven representation is seen on the playing field. Nevertheless, Commeren does state that she sees many learning possibilities between governments and businesses, for example when *Inspectie SZW* visits a company to learn from its practices (Commeren, personal communication, June 9, 2020).

The second best practice; to consider stakeholder participation early on in the process, was present with both Rosman and Böhm. Rosman says this is due to the environmental permits for his company, of which he is being informed by the public authorities in early stages (Rosman, personal communication, May 19, 2020). For Böhm, stakeholder participation starts in the national working groups, where they can already influence legislative proposals (Böhm, personal communication, June 2, 2020). Again, a distinction between the first and last two interviews can be made: The companies where interviewee 3 and Commeren work are not at all involved in the preparation phases by the government (Commeren, personal communication, June 9, 2020; Interviewee 3, personal communication, June 8, 2020).

Best practice three, to systematically analyse and represent relevant stakeholders shows mixed results. According to Rosman, there is room for improvement. His company has to coordinate with the province or *Omgevingsdienst*. However, some municipal actions (such as the creation of a *Omgevingsvisie*) are also relevant for the company, but the municipality fails to involve them in these processes (Rosman, personal communication, May 19, 2020). Böhm states that all relevant stakeholders are (or can be) represented in the working groups, either directly or through membership of larger corporations (Böhm, personal communication, June 2, 2020). Since the last two interviewees are not at all involved in decision-making processes, they also could not say whether the relevant stakeholders are represented (Commeren, personal communication, June 9, 2020; Interviewee 3, personal communication, June 8, 2020).

The fourth best practice; to create clear objectives that are agreed upon from the start by all stakeholders, was mostly present in the first two interviews. The multiannual agreement of Rosman's company ensures annual administrative meetings and quarter-annual meetings with civil servants. During these meetings, the company is warned about arrangements that should be made in the future, and how government and business can arrange permits together. This

arrangement ensures frequent discussions about issues and plans, and enables conversations at an early stage (Rosman, personal communication, May 19, 2020). According to Böhm, the creation of objectives in meetings and deliberations is based on facts. Negotiations may take place, but are always in the best interest of everyone's own organisation. This approach leaves some room for improvement; to leave the 'game' of negotiations and solely focus on collaboration in order to achieve the best interests for everyone, hence the orange score (Böhm, personal communication, June 2, 2020). Interviewee three is not involved in deliberations of any kind, and could therefore not say what approaches or techniques were being used (Interviewee 3, personal communication, June 8, 2020). Commeren adds that companies are often involved at too late a stage. At that point, it is no longer about creating an overview of input, but rather communicating the outcomes to the companies. None of the companies she worked for have not been part of any deliberations (Commeren, personal communication, June 9, 2020).

The fifth indicator; adapting methods for communication, consultation and participation to the decision-making context and the stage of the process, was not applicable in all four cases due to the lack of different contexts or involvement of the companies at all.

Best practice five is to provide highly skilled facilitation and to use ground rules, plannings and feedback loops. An impartial facilitator who is capable of dealing with group dynamics has not come up in the interview with Rosman. He did state that the government uses a planning, because *"If it is not laid down, companies take more freedom. And when it is laid down, you can work together towards a deadline or goal"* (Rosman, personal communication, May 19, 2020, par. 2.7). Böhm says that the chairmen of the national working groups occupy an independent position, and could therefore function as this facilitator. In these working groups, ground rules, plannings and feedback loops are also present (Böhm, personal communication, June 2, 2020). Interviewee 3 mentions branch organisations or other interest groups that could function as an impartial facilitator, but acknowledges they have never proactively tried to contact them (Interviewee 3, personal communication, June 8, 2020). Commeren is also unsure of the party she could turn to but suggests the RIVM, since they have given impartial and clear advice regarding non-climate adaptation related Brzo questions in the past. She also mentions that governments always work with a concrete planning, but there is no room for feedback: If companies have problems with new regulations, their comments may be acknowledged, but will then be stashed away (Commeren, personal communication, June 9, 2020).

The sixth best practice concerns the integration of scientific and local knowledge. In the case of Rosman, this can be improved. He mentions tension between the opportunities for companies based on experience and science, and rules the government imposes. He states that there is a lack of flexibility from the government to alter rules for different parts of the country or province.. This is because the government wants to create and enforce a central policy, but sometimes flexibility and cooperation is required in order to achieve the best results (Rosman, personal communication, May 19, 2020). This is different from Böhm's experience, who gives the example of the working group in which governments, companies and knowledge institutions such as Wageningen University are represented. All their knowledge and input is represented and valued equally (Böhm, personal communication, June 2, 2020). Interviewee 3 also gives a positive view

on the coordination of practical and scientific knowledge, but is unsure whether they have the same perceived value among the stakeholders (Interviewee 3, personal communication, June 8, 2020). Commeren barely experiences the combining of practical and scientific knowledge. But, because the government does attach value to the practical experiences of companies, as mentioned earlier, this indicator is scored orange (Commeren, personal communication, June 9, 2020).

The last indicator, that institutional and organisational structures of an organisation enable participation, is present according to Rosman. He states that the multiannual arrangement his company has with the government helps with the necessary environmental permits: *“If you arrange that well, you can move forward in the coming years”* (Rosman, personal communication, May 19, 2020, par. 2.9). For Böhm, improvements are needed on the communicational level from government to the companies: Laying down rules is not the best option, first you need to have support. The government will have to adjust their message accordingly, and have an idea of support and obstacles businesses might experience (Böhm, personal communication, June 2, 2020). Interviewee 3 does not feel like the current organisation of climate adaptation enables the participation in climate adaptation of his company: *“That’s because I don’t feel that we are or can be proactively involved as a Brzo company. Last year, I didn’t notice that they [the government] would like to hear our opinion and involve us. I think it’s a select club that decides things, and that communication is lacking further down the line. There’s still some work to be done there”* (Interviewee 3, personal communication, June 8, 2020, par. 2.10). Commeren also experiences that the Brzo companies she has worked for are barely involved in climate adaptation and are not asked for input, which means that their participation has not yet been institutionalised (Commeren, personal communication, June 9, 2020).

5.3 Leadership for climate adaptation

In the in-depth interviews, the interviewees have also been asked about the tasks (related to roles) they would want a governmental party to take on. Each role is discussed separately in the sections below. Afterwards, table 13 presents an overview of the results.

Political-administrative function

For the political-administrative function, a government sets the rules of the process, creates visions and provides a clear division of roles and tasks, including enforcement. Rosman said he would like a government organisation to define and enforce rules or visions, but only if the regulations would go to a certain extent. Companies need the freedom to do things the way they prefer, but also a commitment to act at all. A lack of regulations will lead to no actions at all for most companies. As Rosman said: *“Occasionally, investments have to be made in order to achieve things, and you definitely need the government for this”* (Rosman, personal communication, May 19, 2020, par. 3.1). Böhm mentioned another important premise for the government to define visions and enforce rules: More practical knowledge with the government and enforcers. She stated that she does have confidence in individual people, but that the knowledge and skills of government agencies are often far from reality. When asked how she would want the government to act, she said: *“I think in a completely different way than now. So*

don't point the finger, but look for cooperation" (Böhm, personal communication, June 2, 2020, par. 3.1). Böhm understands the need for supervision and enforcement, and agrees that this is a task a governmental organisation should carry out. Nevertheless, she again emphasizes the need for practical knowledge to be able to do this well (Böhm, personal communication, June 2, 2020). Interviewee 3 agrees with this vision, and states that the only way to tackle the climate problem is by having a government set rules and enforce them. However, they do state that enforcement could be arranged on a provincial level, for example in combination with the semi-annual audits his company already receives (Interviewee 3, personal communication, June 8, 2020). Lastly, Commeren also agrees that a government should take on rule-setting and enforcement tasks. She adds that a way this could be executed is by providing companies with concrete tools and guidelines they have to take into account. Now, they have to figure out themselves what could go wrong, what is or could be a big problem and what not, and what they have to do about it (Commeren, personal communication, June 9, 2020).

Adaptive function

The adaptive function entails the stimulation of technical innovations and cooperation between companies. Rosman mentioned the importance of innovations and the need for subsidies to further develop ideas. According to him, there is a win-win situation between governments that want to go a step further and companies that want to participate in the first step. That is the point where the government can really help companies. Another way the government could stimulate innovations and cooperation is by connecting companies in order to share knowledge, experiences and techniques (Rosman, personal communication, May 19, 2020). Böhm is not too sure about the use of subsidies. She believes that it could be more useful to focus on the communication and facilitation side of innovation and cooperation: *"So don't start throwing money and subsidies at a new idea, but try to find a way to develop the idea together"* (Böhm, personal communication, June 2, 2020, par. 3.2). She mentions a new working group to further develop a new idea as an example of how this could be done (Böhm, personal communication, June 2, 2020). Interviewee 3 shares Rosman's idea that innovations and collaboration should be stimulated, and that this is a role a government should fulfill. Interviewee 3 adds that it might be better to let new parties join existing deliberations and meetings instead of creating new ones (Interviewee 3, personal communication, June 8, 2020). Commeren believes a government could have a positive influence on the willingness of cooperation and innovation among Brzo companies. She mentions that particularly in industrial parks, where companies already have a lot to do with each other, they should also be aware of each other's climate change risks. There are opportunities to communicate on these issues, and perhaps even to create solutions together (Commeren, personal communication, June 9, 2020).

Enabling function

The enabling function also includes stimulation of new strategies, but adds the creation of a sense of urgency and trust building, and representation of less influential parties as tasks for the government. Rosman agrees with the need for the government to create a sense of urgency around climate adaptation for companies through stimulation or legislation: *"With no obligations, nothing happens"* (Rosman, personal communication, May 19, 2020, par. 3.3). Additionally, he states that governments should make sure to not only research solutions, but to take the next

step as well and implement them (Rosman, personal communication, May 19, 2020). Böhm again mentions the power of communication. According to her, the government operates isolated, but so do a lot of large companies. Big companies such as Shell or Esso are incredibly influential and dominant for smaller chemical companies. A governmental campaign to raise awareness for example will not stand against these giants. As a possible solution, Böhm suggests breaking up these structures in another way. This does not necessarily have to come from the government; it can also come from smaller companies, or a collaboration between the two (Böhm, personal communication, June 2, 2020). Regarding the stimulation of new strategies, interviewee 3 states that this should be a task of a governmental party: *“Well, sure. Stimulating innovation is often a money issue. If there is more of that, people will do it [innovate] easier”* (Interviewee 3, personal communication, June 8, 2020, par. 3.3). Additionally, they mention that the division of funding should be based on the potential impact of the innovation (Interviewee 3, personal communication, June 8, 2020). Finally, Commeren does not believe a governmental party should create a sense of urgency among companies, because she feels companies are responsible for their own safety and preparations. However, she does think the government has a task in making sure all relevant parties are adequately represented (Commeren, personal communication, June 9, 2020).

Dissemination function

The dissemination function entails the promotion and dissemination of new ideas and innovation among political decision-makers. Rosman said this could be useful, but first all governments should be on the same wavelength. He thinks it will be useful to have a shared goal between governments and companies: to move forward and to play a role as equal parties (Rosman, personal communication, May 19, 2020). Böhm agrees with the idea that collaboration and communication between governments themselves should first be improved before new structures are being set up (Böhm, personal communication, June 2, 2020). Interviewee 3 states that companies are always happy when innovations are discussed, especially in networks of positional leaders. Regarding the exact method to achieve this, they mention examples such as meetings or other consultation structures (Interviewee 3, personal communication, June 8, 2020). Commeren agrees that a direct approach to reach positional leaders will be better than a general newsletter for example. She therefore proposes to directly write to the companies or leaders they want to reach (Commeren, personal communication, June 9, 2020).

Connective function

In the connective function, a government brings together stakeholders to find solutions and to create mutual trust. Rosman is very much in favour of a government party taking up this role. He believes that group sessions and ‘climate tables’ where issues are discussed with other companies and stakeholders are a good way to do so. Böhm is also in favour of such sessions or groups, but mentions it is important to choose the right parties to participate, to learn what is really going on in the workfield: *“If you want to get cooperation and communication between parties for a better end result, I don't think you will have to sit down with the strategic board, but to have a conversation with people from the operational level”* (Böhm, personal communication, June 2, 2020, par. 3.2). Interviewee 3 believes this governmental role is important too: *“There are many parties who together are part of the problem and the solution. If you can gather everyone around*

the table, you can also look for a solution that works for everyone” (Interviewee 3, personal communication, June 8, 2020, par. 3.5). When asked how this could be approached, they mentioned quarterly or semi-annual meetings or conferences in which the participants look back on the objectives, new innovations and solutions, and still outstanding issues. During the meeting, these points will be discussed and a new meeting will be planned as well (Interviewee 3, personal communication, June 8, 2020. Lastly, Commeren agrees with the idea of a meeting, workshop or symposium to gather all participants. Furthermore, she emphasizes the need to start doing this early on in the process as well in order to create new legislation and regulations, and not just to look back on the effect of old ones (Commeren, personal communication, June 9, 2020).

Overview

Function	Summary / extra input:
Political-administrative	<ul style="list-style-type: none"> - Governments should provide and enforce rules and visions - Regulations should only go to a certain extent; companies must have some freedom to do things the way they prefer - Governments and enforcers should have more practical knowledge - Look for cooperation with companies when setting up rules and regulations - Governments should provide more concrete guidelines and tools (what could go wrong, when is it a problem, what can you do about it?)
Adaptive	<ul style="list-style-type: none"> - Governments should stimulate innovations among Brzo companies - Governments could connect companies to share knowledge, experiences and techniques - Do not always ‘throw money’ at a new idea, but first develop idea in working group - Set-up meetings or panels to kickstart innovations - Let new parties join existing deliberations, not start new ones
Enabling	<ul style="list-style-type: none"> - Divided opinions on whether sense of urgency is governmental task or not - Governments should aim to represent all stakeholders - Governments should not only research solutions, but also implement them - Governmental campaign will not help with giants such as Shell or Esso: instead lobby and/or collaborate with smaller companies
Dissemination	<ul style="list-style-type: none"> - Would be nice if governments would inform positional leaders on innovations, but this is not necessary - First all governments should be on the same wavelength before new structures are set up - Should be achieved through meetings or direct written communication
Connective	<ul style="list-style-type: none"> - Governments should connect stakeholders to find solutions and build trust - Groups sessions, (semi-)annual meetings, workshops and ‘climate tables’ to discuss issues with other stakeholders - Include all parties early in the process - Important to let the right parties participate: not only strategic board, but also people from operational levels

Table 13: Overview of results leadership functions

6. Discussion

In this chapter, the results described in the previous chapter are discussed. The first paragraph discusses the policy arrangement with regard to the literature, and compares the theoretical policy context from chapter 4 to the practical experiences that came forward in the interviews in chapter 5. In the second paragraph, interesting findings from the interviews of the in-depth phase are discussed with regard to the theory on stakeholder participation. In the third and last paragraph, the same has been done for the literature on leadership for climate adaptation. All discussions focus on relevant aspects for the role of the province and *kernteams*. Lastly, some remarks on the research are mentioned.

6.1 Policy arrangement of climate adaptation of Brzo companies in the Netherlands

The conducted interviews have provided information on the practical side of climate adaptation processes of Brzo companies. This has led to insights that did not come forward in the theoretical policy context chapter. Firstly, a number of additional actors became clear, such as branch- and port organisations, safety regions and local residents. The *Omgevingsdienst* turned out to be a more important stakeholder than initially expected because of their legal tasks, possibilities to enforce and the fact that they are relatively close to Brzo companies. Another interesting insight is that branch- and port organisations have additional value as stakeholders because of their close relationship to Brzo companies, especially compared to governments. Other findings are the involvement of safety regions and the influence local residents can have in licensing procedures for Brzo companies. Knowing what parties are involved, and which and how much power they have is necessary in order to have the *kernteam* function in an effective way.

The interviewees provided deeper insights in the legal framework, for example in the possibilities of the Seveso III Directive to enforce the identification and assessment of risks from all four climate change themes and for both high and low category Brzo companies. This could be an interesting point to investigate further in order to enforce climate adaptation action from a legal point of view. The *kernteam* could look into this as well. Additionally, the interviewees also mentioned non-legally binding or non-written rules for interaction in the sector that should be kept in mind. For example, the *Deltaprogramma* that binds its participants to its goal of becoming climate-proof and water-resistant in 2050 through joint agreements. Approaching Brzo companies with caution and setting good examples as a government are some non-written rules.

Lastly, the prevailing discourses revealed maybe the most interesting insights. The first one is related to the division of power and influence: The translation of European guidelines into national legislation, as described in chapter 4, turned out to work differently in practice. Apparently, the national government always has the deciding vote and the power to implement rules, even when other actors do not agree. This dominant position enabled the enforcement of the national government's own rules, but this did not create goodwill among companies and lower governments, nor did it ensure that the best solutions were implemented. This approach turned out to be disastrous for the trust of Brzo companies towards governments. It is important for the *kernteam* to be aware of the national governments' reputation, since the team will be a part of

the ministry. It will have to deal with the negative attitude of companies toward governmental parties, and will have to work to regain their trust. Secondly, branch- and port organisations are not proactive in climate adaptation processes. As mentioned earlier, they do have an unique, close position to Brzo companies. This position could be used to distribute information among or set-up meetings with Brzo companies. *Kernteam*s could try to find points for collaboration with branch- and port organisations because of this characteristic. Thirdly, as mentioned, *Omgevingsdiensten* have an important role in the climate adaptation of Brzo companies. But, they are also busy and struggle with execution of their work due to vague legislation. This vaguely formulated legislation results from the lack of topic-specific knowledge on the national governmental level. The *kernteam* could put this problem on the agenda on the national level, to help them develop more clear guidelines for the *Omgevingsdiensten* to enforce. Last of all, there are important general discourse trends. On the positive side, a lot of organizations are starting to pick up on climate adaptation and are showing a different, more willing attitude towards the subject. On the other side, the playing field has hardened due to the aforementioned decentralisation of tasks from governments to companies. This also makes the situation more complex, because companies who do want to act on climate adaptation are still hesitant to share information (such as results from stress tests) with the government, because they are afraid that more restrictions or obligations will result from these insights. The *kernteam* could try to soften these relationships by functioning as a middle-man between the national government, enforcers and Brzo companies.

This last proposition is also in line with the view of Van Tatenhove et al. (2000) on policy arrangements. They stated that policy arrangements allow the making of environmental policy to be seen as a combination of social change and interaction. In this case, especially the changing relations between market (Brzo companies) and state contribute to structural social change, leading to a poorly functioning organisation of climate adaptation of Brzo functions. This is based on the hardened playing field and changed relations between companies and the government, leading to a false sense of safety. It has also become clear that multiple cultural factors on the interaction level greatly influenced the policy arrangement of climate adaptation of Brzo companies in the Netherlands. Mainly social responsibilities and values lacked with many actors, which made them fulfill their responsibilities on a minimal level and fail to be proactive about taking action. Besides trying to positively influence the hardened relations between state and market, the *kernteam* could also try to work with cultural factors in order to positively influence the policy arrangement.

Finally, chapter 4 mentions the use of safety performance indicators, or SPI's, to provide information on and assess the safety of a company. Companies can draw these up themselves to make the SPI's compatible with their own production processes. However, none of the interviewees mentions SPI's. It could be worthwhile to investigate whether SPI's could be 'expanded' and used to promote climate adaptation, or if they do not meet their purpose and are therefore not mentioned in the interviews. The *kernteam* could take up this role, investigate the use and potential of SPI's and help companies develop and implement them.

6.2 Stakeholder participation in climate adaptation of Brzo companies

The overview table in section 5.2 (table 12) shows mixed results regarding their company's participation in climate adaptation processes. This itself is already an interesting result. It shows that each company has different arrangements and ways of participating in climate adaptation, and that there is no general feeling or method of participation in climate adaptation among Brzo companies.

Rosman and Böhm only have green and orange scores which means that the indicators were present, sometimes with room for improvements. The scores of interviewee 3 and Commeren look very different: some green and orange, combined with many red squares to indicate the absence of an indicator. The main reason for Rosman's scores is the fact that his company has special arrangements with regional governments. This allows the company to be involved in decision-making processes and be involved from an early stage and to express their opinion. The stakeholder participation of Böhm's company starts early on in national working groups, where legislative proposals can be influenced. Their presence in these working groups also enables the company to represent its members and provides an impartial facilitator (chairman of the working group). Main reasons for the red scores for interviewee 3 and Commeren are the fact that their companies are not at all involved in decision-making processes around climate adaptation. This means they have no or little insight in (early) participation methods, facilitation and the integration of scientific and local knowledge. The current organisation of climate adaptation therefore does not (sufficiently) enable climate adaptation at their companies. A last interesting finding is the fact that all four interviewees mention a different facilitator when asked about the presence of one. This shows that it is not clear for Brzo functions where they can ask questions about climate adaptation and where they can turn to when there are tensions between stakeholders. This last aspect seems especially important, since the relationships between governmental parties and Brzo companies is not always good and in the past has led to a hardened playing field and a false sense of safety. Having an impartial party where complaints or questions about legislation could be brought to, could help improve the trust of companies in the government's actions, next to improving stakeholder participation. In the composition and framing of the team, it might be needed to take this impartial role into account.

In general, Brzo companies should be able to be involved in decision-making about climate adaptation regulations if they want to. This involvement should happen as early in the processes as possible. Other possible improvements are communication about changes or new regulations from the government to the companies, the integration and valuation of scientific and practical knowledge and the further institutionalisation of climate adaptation. *Kernteams* could play to the strong points of Rosman's and Böhm's company, by aiding governments and companies in making individual agreements in which changes, permits and other climate adaptation related subjects can be discussed a couple of times a year. Additionally, the *kernteam* could try to improve the (early) representation of smaller Brzo companies. They could help improve communication from government to companies, for example regarding the existence of a facilitator or when working groups are organised and how companies can speak their voice. The *kernteam* could also help gather and provide trustworthy scientific and practical knowledge to aid decision-making

processes. Together, this will hopefully lead to the further institutionalisation of participation of Brzo companies in climate adaptation.

The discussed points are also in line with the presented literature on stakeholder participation. As described in section 2.2, the involvement of stakeholder in policy- and decision-making processes can take different forms (Pomeroy & Douvere, 2008). In the interviews, almost all forms have come forward: negotiation, dialogue, information and communication. However, they have not been purposely advocated in the different stages of the decision-making processes. Additionally, It has become clear that the four stages of a decision-making process (Pomeroy & Douvere, 2008); planning, evaluation, implementation and post-implementation, have not been applied properly in the case of climate adaptation for Brzo companies in the Netherlands. As Pomeroy & Douvere (2008) suggest, stakeholders should be involved in the planning phase to contribute, they should be informed on different options and be involved in the formulation and implementation of new rules and regulations. And, there should be room for feedback loops and evaluation based on the outcomes. In the future, *kernteam*s could see to these processes being implemented in the right way.

6.3 Desired leadership in the climate adaptation of Brzo companies

In this section, it is discussed if and how a *kernteam* should take on each function, keeping in mind the given conditions and extra input that the interviewees provided (table 13). Links to the literature on leadership for climate adaptation are also included.

Political-administrative function

The interviewees expressed they do need governmental regulations of some sorts in order for their companies to act. Regarding this function, the *kernteam* could best focus on two aspects. First of all, the enrichment of practical knowledge of governments and enforcers, for example by organising workshops or company visits in collaboration with Brzo functions. Secondly, the interviewees expressed a lack of concrete guidelines for companies to follow. This has already been done for flood risks in the Brzo 2015 legislation, but not for the other three climate themes (drought, heat stress, peak rainfall). The *kernteam* could help set up these guidelines (in collaboration with governments, enforcers and Brzo companies) and spread them among Brzo companies, so they all know the tools exist and know how to apply them. This could be done for example by organising meetings for Brzo companies for input and explanation, or by sending all functions an informational letter. However, the political administrative function can only be fulfilled by positional leaders (Meijerink & Stiller, 2013). A *kernteam* therefore could not take on this role entirely, but it could help the responsible positional leaders in its network.

Adaptive function

If the *kernteam* would take on the adaptive function, it could focus on the further development of new ideas and innovations in working groups or panels before granting subsidies to test and apply it on a larger scale. There is also a wish for connection and collaboration between Brzo companies to work on innovations together. The *kernteam* could help by setting up networks where interested companies can share knowledge, experiences and techniques. This is in line with Meijerink &

Stiller (2013), who stated that adaptive networks are needed to be able to adapt to changing circumstances.

Enabling function

The most important task of this function the *kernteam* could take on is to help better represent all stakeholders. Especially large Brzo companies tend to have a lot of power compared to small ones, and in some cases even the government. The *kernteam* could (help) set up a lobby in collaboration with the national government and smaller Brzo companies to fix the uneven power and influence relations. In enabling functions, positional leaders are important to help fulfil the tasks related to the function (Meijerink & Stiller, 2013). This is why the *kernteam* could also consider helping positional leaders perform tasks related to this function, in addition to concentrating on addressing these tasks itself.

Dissemination function

In order for a *kernteam* to take on roles from the dissemination function, the different levels of government would have to align with each other before a new party is introduced to the communication structures. Therefore, the *kernteam* will not have to focus on the tasks related to this role right away. Roles that the *kernteam* could take on later are for example the organisation and coordination of contact between companies and governments.

Connective function

The connective function is one where a *kernteam* could be especially beneficial. In this role, it would have to focus on bringing together all stakeholders (and not only the strategic boards, but also workers from operational levels) and to include them early on in decision-making processes around climate-adaptation. The *kernteam* could do so by organising repetitive group sessions, workshops and 'climate tables' where issues and developments can be discussed and where stakeholders can start to converse and cooperate. In this role, the *kernteam* would be the spider in the web, connecting all parties and staying up to date on developments. This position fits with the central role of the connective function in the integrative framework: The *kernteam* will be able to connect and integrate the actions of different actors in the network (Meijerink & Stiller, 2013).

6.4 Remarks

Some remarks need to be made in regard to the discussed topics. First of all, even though the interviewees from the exploratory phase are each working in a relevant field for climate adaptation of Brzo companies, they of course do not know everything that is going on. The results are therefore based on their own perceptions and experiences, which should be kept in mind when reading the results and conclusion. The results of the in-depth part of the research are based on four interviews. Despite the geographical spread, different businesses, size and categories, the results do not give a full representation of all Brzo companies in the Netherlands. The interviewees spoke from their own experiences, so not every Brzo company or other stakeholder might agree with the results or recognize their own situation in the described cases. Lastly, there is a rough idea of the tasks of a *kernteam* (as described in the introduction), but this is not set in stone. The exact division of powers and responsibilities is still to be decided. Whether or not the *kernteam*

could actually perform the tasks that are suggested in the previous section is therefore uncertain. This however can be used as input for the further development of the *kernteam*'s tasks.

7. Conclusion and recommendations

In the following sections, the subquestions and main research questions are answered and recommendations are made. In the last section, additional recommendations for further research are given.

7.1 Subquestion 1

The first subquestion is: *How is the protection of Brzo functions from the effects of climate change arranged now, what parties are involved and what are their responsibilities and obligations?* Currently, the Brzo 2015 legislation, which is directed from the European Seveso III directive, provides the main legal framework for protection of Brzo functions from the effects of climate change. However, the Brzo 2015 only covers flood risks for high-threshold Brzo companies; low-threshold companies do not have any legal obligations, and the other three climate themes (drought, heat stress, peak rainfall) are not covered either. The *Deltaprogramma* and the DPRA form the non-legally binding incentives for Brzo companies to work on all four aspects of climate adaptation. In the processes regarding the planning, organisation and implementation of climate adaptation measures in Brzo functions, many parties are involved. Each of these parties has their own responsibilities and obligations in the climate adaptation processes. The Brzo companies themselves are considered the most important player in their climate adaptation processes, since they can implement the climate adaptation measures. Other stakeholders are governments (European union, national, provincial and municipal), governmental (*Omgevingsdienst*, *Deltaprogramma*, *kernteams*, water quality managers and safety regions) and players from the market and societal sphere (branch- and port organisations and local residents). Their responsibilities and obligations range from creating policy, regulations and (legal) frameworks to controlling, enforcing, connecting, creating and spreading knowledge, and opportunities to participate in plan making.

There are some dominant discourses that greatly influence the relationships between different stakeholders, and therefore the functioning of climate adaptation processes of Brzo functions. First of all, the national government has a dominant position, which makes it possible to create and enforce its own rules. Because the government forced rules and regulations upon Brzo companies, they lost their trust towards governments and are not keen to share information. Additionally, in the past years, the national government has decentralized security tasks, for example from fire brigades to Brzo companies themselves. This has led to a false sense of security and added to the hardened playing field and worsened relations between governments, enforcers and Brzo functions in the Netherlands. Nevertheless, many companies are starting to work on climate adaptation issues in the last couple of years, but these are still small steps.

7.2 Subquestion 2

The second subquestion is: *In what way can the kernteam improve stakeholder participation of Brzo functions in the protection of these functions from the effects of climate change?* Stakeholder participation can be improved in multiple ways. Firstly, by making sure that all companies that

want to participate are able to do so. This participation should also start as early in the climate adaptation process as possible. The *kernteam* could help improve the early representation of all Brzo companies, big and small. Another way to involve companies is to design arrangements directly between Brzo functions and (lower) governments. That way, frequent communication is ensured and both parties are informed on changes or new regulations in time, after which they can work on solutions together. *Kernteams* could facilitate the meetings between governments and companies to set up such arrangements. Other possible improvements of stakeholder participation are related to communication about changes or new regulations from the government to the companies, the integration and valuation of scientific and practical knowledge and the further institutionalisation of climate adaptation. A *kernteam* could help improve the communication from government to companies, for example by being the central contact from which information is spread between companies or invitations for working groups or information sessions are sent out. In this central role, the *kernteam* could also function as an impartial facilitator where companies can turn to with questions and suggestions. Lastly, the *kernteam* could help gather and provide trustworthy scientific and practical knowledge to aid decision-making processes on a national level. This knowledge could be based on the results of the aforementioned working groups with Brzo companies that the *kernteam* could organise. In these meetings, it is important for the *kernteam* to let participants focus on mutual goals and ambitions, instead of their individual interests. It is also advisable to invite people from operational functions in addition to civil servants or administrators in order to create a good view of the practical side. Finally, the *kernteam* could check the implementation of the various forms of participation that are being used and the order in which they are implemented. Especially the early participation of parties and the use of feedback loops could potentially greatly improve stakeholder participation in the protection of Brzo functions from the effects of climate change.

7.3 Subquestion 3

The third subquestion is: *In what way could the kernteam, coordinated by NH, add value to the wishes of the Brzo functions?* Based on the wishes and ideas of Brzo companies, the *kernteam* could best focus on taking on tasks that belong to the adaptive, enabling and connective function of Meijerink & Stiller's (2013) leadership for climate adaptation functions. In the adaptive function, the *kernteam* should focus on the stimulation of innovations, not only by subsidizing but also by using working groups in which new ideas can be kickstarted or further developed. In the enabling function, the *kernteam* should focus on the representation of all stakeholders in participation processes. In order to improve representation of smaller Brzo companies, the *kernteam* could for example set up a lobby in collaboration with these companies and the national government. The connective function entails making connections between all involved stakeholders. In this role, the *kernteam* could function as a spider in the web, connecting all parties and staying up to date on developments. They could do so by organising returning groups sessions, workshops and 'climate tables' where Brzo companies and other stakeholders can hear about new developments, talk about issues and find ways to cooperate. The Brzo functions mentioned that some form of regulations is needed in order for them to act. This is why tasks belonging to the political-administrative function could also be of added value to the *kernteam*. Since the *kernteam* cannot fulfill this function by itself, it could help positional leaders by promoting practical knowledge

among governments, and by helping to create more concrete tools or guidelines for Brzo companies to follow in collaboration with the companies themselves.

7.4 Main research question

The main question of this research is: *In what way can the province of North-Holland coordinate the kernteam for Brzo functions in the second round of knowing-wanting-working, so that all relevant parties are involved, Brzo companies participate and most value is added to their needs?* First of all, the Province of North-Holland could coordinate the *kernteam* by taking into consideration the responsibilities and reputation of the national government. It could be useful to be patient with companies, and to prove that sharing information or collaboration with a governmental party does not always result in more rules or responsibilities. Another way the government could gain trust is by involving branch- and port organisations. They are currently not (proactively) involved in climate adaptation of Brzo companies, but their unique close position to Brzo companies offers opportunities for the distribution of information or the organisation of meetings that governments do not have. The *kernteam* could help involve these organisations by getting them to see the benefits of a successful climate adaptation strategy for Brzo companies. It would be recommended to further explore the possibilities of SPI's. The *kernteam* could put this on the agenda with the national or regional governments, or research it's potential by discussing it with different stakeholders.

Secondly, the *kernteam* should be focused on cooperation: When there is an issue, aim on finding a solution together rather than pointing the finger. Thirdly, NH could also make sure that the *kernteam* focuses on the representation and participation of all interested Brzo companies in climate adaptation processes. They could do so by asking for input per mail or in working sessions. The organisation of meetings is also in line with a fourth recommendation for the *kernteam*: To be an impartial facilitator that can help with problems between stakeholders and answer questions they have concerning for example the interpretation and implementation of guidelines. In this central role, the *kernteam* could also organise meetings where stakeholders can meet, connect and keep up-to-date on issues and developments. Finally, the *kernteam* could help with the development of more concrete guidelines for Brzo companies to follow, for example by promoting practical knowledge among the governments that have to create legislation and guidelines. This will also help the *Omgevingsdiensten*, who are currently struggling to enforce the vaguely formulated regulations.

The abovementioned suggestions for NH to coordinate the *kernteam* fit with the already established roles and tasks as mentioned in the introduction: The *kernteams* are to provide information on possible failures due to climate change of V&K functions to municipalities, provinces, water boards, sector organisations and managers of V&K functions. The idea is also that these managers can request to actively participate in climate adaptation processes. And finally, *kernteams* share information and issues with other governments and partners (Schumacher, 2020). It would therefore be advised that NH lets the *kernteam* for oil & chemistry follow the existing roles for *kernteams*, but also considers adding additional tasks such as the impartial facilitator, the organisation of returning meetings to let stakeholders connect and the development of more concrete tools for Brzo companies to work with.

7.5 Recommendations for further research

In this section, recommendations for further research are given based on results that have come forward. First off, it could be worthwhile to further explore the possibilities for legal persuasion of the Seveso III Directive, annex III, part B ii. This article has the potential of forcing Brzo companies to consider the identification of hazards and risk assessment, and could therefore be used to oblige them to take heat stress, drought and peak rainfall into consideration as well. However, this has not yet been legally tested, which is why further (legal) research on it's possibilities are needed. Furthermore, as mentioned, SPI's could potentially be used (further) in climate adaptation processes of Brzo companies. Next to having the *kernteam* investigate the potential use, it is also recommended to thoroughly research this in a more scientific manner. Ultimately, results showed that mainly large, international Brzo companies have a lot of influence and are often not too keen on taking climate adaptation measures when it is not obligated. It is also difficult for operational levels to implement measures when the priorities are set on higher, administrative and sometimes international levels. An interesting research angle could therefore be to investigate how these companies can be persuaded to participate in climate adaptation on a voluntary basis.

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