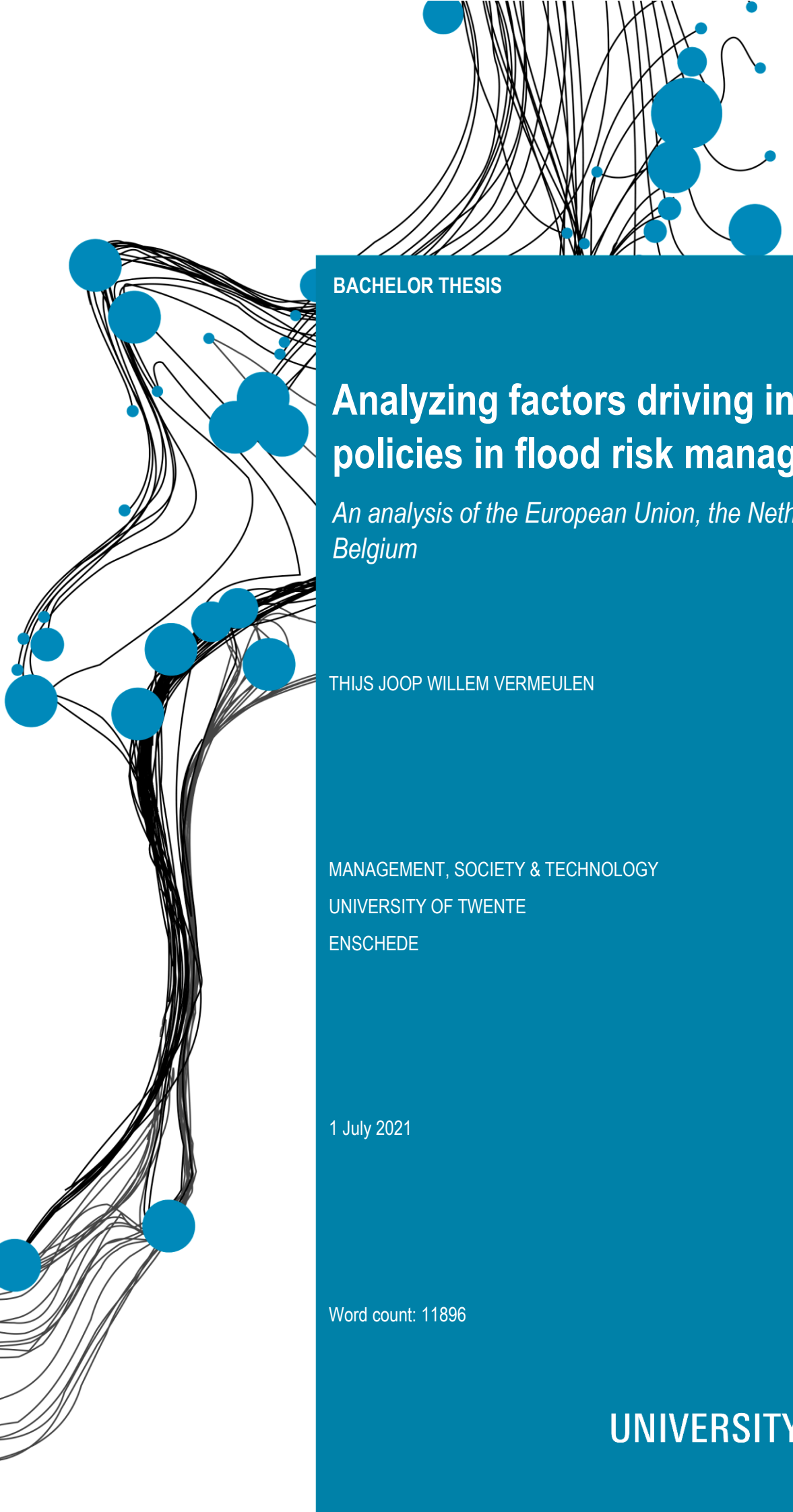

BACHELOR THESIS

Analyzing factors driving innovative policies in flood risk management

An analysis of the European Union, the Netherlands, and Belgium

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Abstract

In this bachelor thesis, factors driving and stimulating policy innovation in the field of flood risk management will be analyzed. In a changing climate, new challenges demand innovative solutions, measures, policies and governance structures. This topic is addressed via the analysis of a combination of policy plans on the level of the European Union, the Netherlands, and Belgium, and academic articles and evaluation reports. The academic articles on policy innovation and flood management formed the basis for the theoretical framework that has been set up. The literature study shows the importance of the structure of the policy innovation process, built on monitoring, reflection, and adaption and states the added value of the multi-sector approach. The results make clear that goal-setting, coalition-building, and momentum, based on a shared sense of urgency, are key factors in stimulating innovation. In this process, the distribution of knowledge and experiences to all relevant actors is of key importance in order to learn and successfully innovate. Examples in European, Dutch and Belgian policies and practices show a consistent overview of the need for new forms of governance structures and policies stimulating room for substantive innovation.

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1. Introduction

Climate change obligates us to adapt to higher risks. The Low Countries in Europe, the Netherlands, and Belgium, as the delta of European rivers, face an increased risk of floods (Dankers & Feyen, 2008). The vulnerability of these countries is based on two trends: higher levels of precipitation and more diverse draining influence the risks in the river regions (WUR, nd). Furthermore, rising sea levels in the North Sea affect the risks of floods coming from the sea (Wassink, 2018). Floods are thus a relevant theme, also given the societal impact. Belgium and the Netherlands have experiences with disastrous floods, for example in 1953 in Zeeland, the Netherlands (KNMI, nd), in 1993 and 1995 in Limburg, the Netherlands (KNMI, 2020) and in Flanders, Belgium in 2010 (NOS, 2010). Generations of inhabitants of these areas still remember these horrific events. The experiences that these countries have raise questions about the process of adapting to a new climate, in which floods are a relevant threat. Governments need to prepare both procedurally and substantively to this new world, and according to the literature, "a 'new' climate governance is emerging through transnational and/or local forms of action that will eventually plug the resulting governance gaps" (Jordan & Huitema, 2014, p. 387).

This new climate governance asks for innovation. Innovation in policies, in practices, in cooperation structures and in measures. The policy-making process is based on a tradition of previous measures, but now faces more urgent and threatening challenges that are the reality of today and tomorrow. This sense of urgency might be one of the key reasons for governments to explore and adopt new policies and strategies. It is therefore the aim of this thesis to explore how policy innovation works in the context of flood risk management in the European Union, the Netherlands, and Belgium. This thesis is of social relevance, given the tremendous impact floods have on societies, both because of their personal and material or economic damage. It is therefore society that can benefit from better organized flood management policies. Scientifically, the combination of policy plans and academic articles as sources of information enriches this study. Definitions and conceptualizations of policy innovation drive analyses of the actual innovativeness of new policy plans and therefore help closing the gap between academic evaluation studies and the actual development of new climate governance. By combining the drivers of innovative policies, a research agenda is proposed that stimulates future innovation.

Flood management policies are being made on different institutional levels. All kinds of actors operate in a multilevel governance framework, working on the prevention of floods. This variety of actors includes the European Union, national ministries, knowledge institutes, water and coast protection agencies, and local and/or regional water authorities and thus covers the complete institutional range. The Netherlands and Belgium have a similar geographic situation. However, this does not mean that they have a similar institutional structure. An important difference between them lies in the execution

of the policy plans. In the Netherlands, the district water boards in cooperation with Rijkswaterstaat, as part of the Ministry of Infrastructure and Water Management, are responsible for these measures.
In Belgium, each region has a governmental organization that is concerned with high water safety. Water is of course not bound by national borders. This means that flood management is by definition a transnational challenge. The interaction between these different levels in a multilevel governance framework will be discussed as an important driver of policy innovation.

These examples of differing governance structures illustrate the complexity of policy innovation in flood management, especially in the European context. Countries use different approaches and it is expected that this affects the speed of innovation. New policies proposed by the European Commission can have a common goal, but give the floor to discussions about the implementation and execution of these policy plans. Therefore, it is interesting and valuable to include the multilevel governance framework as a factor in the study of innovation. Additionally, innovation is about learning: learning from each other. Pilots with new measures in the Netherlands could be implemented in Belgium as well, and vice versa. Innovation is about thinking out-of-the-box and it is therefore helpful to develop new ideas collaboratively. This example touches on the substantive dimension of innovation. New types of dikes or dynamic weirs are designed to respond to the needs of citizens to live and work in the climate of the future.

This brief conceptualization of innovation will be discussed in more detail in the next section. In this theoretical section, the theory of multilevel governance is a useful tool in describing cooperation structures. This, in combination with the dynamic and multi-factor nature of path dependency theory as a source of additional information, constitutes the theoretical basis for this thesis. The research question that will be asked in the context of this thesis is '*What are the factors that impact successful policy innovation and development in the field of flood risk management in the European Union, the Netherlands, and Belgium?*'. With this descriptive research question, this thesis seeks to develop scientifically relevant answers in the form of clear factors under which the policy-making process in this field can be optimized.

In order to answer this research question, three sub-questions will be asked, forming the main guide through this thesis:

1. What are the key elements of policy innovation?
2. What are different roles that regional, national, and supranational institutions have in flood management?
3. What are innovative flood prevention policies existing in the European Union, the Netherlands, and Belgium?

The first sub-question is an exploration of the key elements of policy innovation. In order to define elements that make a policy innovative, attention will be given here to procedural and governance elements, goals and targets of new policies and systemic structures. Together, these provide an analytical framework to study the information gathered in sub-questions two and three. The second sub-question namely dives into the multilevel governance perspective, by comparing the roles that institutions have on the regional, national and supranational levels. This is a key perspective and a factor in the analysis because the transnational nature of water governance asks for a multilevel approach. Therefore, the interactions between the different levels may influence or be a reason for innovative policies and thus should be identified and analyzed. In the third and final sub-question, the focus will be primarily on applying the frameworks set up in the previous two sub-questions. Existing flood management policies that can be defined as innovative on the basis of the criteria will be highlighted, as well as innovative renewing partnerships and/or processes. Together, these sub-questions form the basis for addressing the main research question. By building up a framework of elements of innovation and a multilevel governance structure in combination with the practical examples from the European Union, the Netherlands, and Belgium, elements of successful policy innovation can be identified.

After this brief introduction, the next section will identify and discuss the core concepts and theories that will be used in this thesis. Here, there will be expanded on the main research question and the core concepts and theories introduce the sub-questions. In the methodology section, the research design of this thesis will be illustrated. After that, the analysis is conducted and described in order to discuss and answer the sub-questions, adding up to a conclusion of this thesis.

2. Theoretical framework

In this section, an overview of the main concepts and theories in the field of flood risk management will be provided. Before explaining the core concepts of policy innovation, flood management, and multilevel governance, the mutual relationship and the reasoning behind the choice of theories will be clarified.

The descriptive nature of the theory of multilevel governance enables the possibility to analyze water governance practices in their full context. It gives a variety of examples from different governance structures that are used in different cooperation processes. By the use of new management and governance theories, traditional hierarchies between different actors can be evaluated. These factual descriptions are useful in the context of this thesis in order to learn from others' experiences and facilitate the creation of a complete picture of the existing governance framework. The combination of the theory of multilevel governance with the theory of path dependency leads to interesting insights. Because the former theory is above all descriptive, the dynamic nature of the latter adds valuable information. Especially the multi-factor nature of the path dependency theory makes that it is a good combination with flood management, as a variety of elements influences the policy-making process. Finally, given the limited scope of the bachelor thesis, it was decided to not include the punctuated equilibrium theory. Although this is a useful framework in analyzing process of policy change and especially sudden, radical changes, the limited amount of available time asks to focus specifically on the core theories that best explain the process.

In the subsequent section, three concepts are defined. These three concepts form the basis in this policy field and are also the main variables of interest in the sub-questions.

2.1 Policy innovation

In the light of this thesis, the concept of policy innovation will focus primarily on factors of innovation in the design and implementation phase of policies. Van Buuren and Loorbach (2009) describe policy innovation on the basis of some key components. First, governments "experiment with new institutional arrangements in an attempt to realize hitherto unimagined solutions" (Van Buuren & Loorbach, 2009, p. 376). This clearly highlights the innovative character as a new, unforeseen measure or intervention. Although Van Buuren and Loorbach (2009) use the concept of governments in their definition, the process should be seen in a broader context of flood governance. In the policy field of flood management, knowledge and experiences are scattered and it is therefore not primarily governments that come up with new solutions: local and/or regional (non-state) authorities may have the need to try other insights. The instigator of innovative policies does thus not necessarily have to be a governmental actor. Garrelts and Lange (2011) confirm this idea of bottom-up innovation, by interpreting political

steering in need of "dynamic conceptualizations which grasp steering as a sequentially progressing and reciprocal process" (Garrelts & Lange, 2011, p. 207). This definition highlights the equality between different actors in the process of policy innovation. As has been shown in these definitions, innovative policies are very closely connected to multilevel governance, as they are usually developed in a broader context. This broader context has also been the consultative body for the first worldwide sustainable innovation foresight. "Since the 1980s much hope has been pinned on global collaboration through agreements, such as the Kyoto Protocol" (Jordan & Huitema, 2014, p. 387). This requires the involvement of a broader coalition of stakeholders that all contribute to the final policy (Van Buuren & Loorbach, 2009). This shift from government to governance entails the participation of a variety of actors, coinciding with institutional changes, is an important driver of innovation (Swyngedouw et al., 2002). Other relevant elements explaining innovation that will be included in this analysis are governmental fragmentation and setting goals and targets.

The main challenges to successful implementation of innovative ideas consist of divergent interests, multilevel governance structures and risk aversion in public administration (Science for Environment Policy, 2015). In order to prevent these challenges from becoming problematic, these will be included in the analysis.

2.2 Flood management

The concept of flood management covers a broad array of activities, aiming at reducing the risks of coastal and riverine floods (Marsalek, Stancalie & Balint, 2006). This aim is twofold:

1. Ways to reduce the chance of floods;
2. Ways to mitigate the, both personal and material, consequences of floods.

In their article, the researchers divide flood management activities into three categories (Marsalek, Stancalie & Balint, 2006, p. ix). First, living with the floods and thus accepting the risks of living in a delta landscape. Second, non-structural measures, including for example evacuations and warning systems, but also flood policies. The third category describes the structural measures, including, among others, dikes and polders. In the context of this thesis, especially the category of non-structural measures is of importance, a fortiori given the changing nature of these measures and their corresponding explanation for the innovation of measures and policies. As will be discussed in the next section, a variety of actors is included in the process of flood management, adding up to the complexity. It is namely a policy field that combines a diversity of branches of knowledges, i.e. natural, economic, social, institutional and legal fields that are all relevant to successfully design and implement new policy measures.

2.3 Multilevel governance

The concept of multilevel governance is a complex notion, for which a broad coalition of parties has to cooperate. This cooperation takes place in a multilevel framework, including local, regional, national, and transnational governments and governmental organizations, but also a variety of non-governmental organizations and companies are incorporated in this process. The stronger emphasis on governance as a form of governing, goes at the cost of national superiority (Moss & Newig, 2010). New networks are being formed, in accordance with New Public Management, accompanied by a redistribution of tasks. The "traditional nested hierarchies of national political-administrative systems" are confronted with trends both scaling up and scaling down, to the European Union and regional water authorities respectively (Moss & Newig, 2010, p. 1). An example of this trend is the European Union Floods Directive, which is binding for the EU member states. This means that the member states have a common goal in preventing floods, but that they are free to design the implementation (European Commission, 2019). This can take form in (sub-) branches of government that are in charge of the execution. In this new, political, playing field, actors have to look for other stakeholders to cooperate with.

The theory of multilevel governance is a framework that plays a meaningful role in explaining policy innovation. Water is by definition a cross-border theme, making the international component relevant for explaining cooperation. This theory, described among others by Maggetti and Trein (2019, p. 357), explains two different types of multi-actor cooperation, "which can occur either within a general purpose, territorially bounded polity (Type I) or according to a task-specific logic where jurisdictions are overlapping and potentially unlimited in number and scope (Type II)". In this light, the process of water governance is an interesting combination of the two types, as the field of flood management can be categorized as task specific. Nonetheless, it is a field with different jurisdictions, although they do fall under the European Union. This theory further helps in clarifying the role of political debates, as shifts in power structures tend to go with power struggles. The partial process of denationalization of water policies is an example of this phenomenon that gets attention in the thesis.

2.4 Path dependency theory

The discussion on innovation in the field of water management is focused on a variety of factors that impact on the process. Economic, safety, natural, social, cultural, and historic reasons are abundant in deciding to design or implement a new policy. In order to better understand these reasons for policy change or policy stability, it is useful to combine the multilevel governance framework with the path dependency theory. This theory namely describes and includes a multitude of factors as explainers for innovation. Together with the multilevel governance framework, path dependency theory provides a complete, both procedurally and substantially, theoretic basis for this thesis.

The main factors of interest are the limitations to political steering of societal development, which are divided in three categories (Garrelts & Lange, 2011, p. 201):

1. "Political and/or economic power constellations resulting in 'state failure';
2. Politological discourse on the politicocultural and institutional dynamics that determine path dependency;
3. Sociological descriptions of the complexity and momentum of social subsystems."

This shows a "permanently self-reinforcing dependency on once-adopted concepts of societal development in the sense of path dependency" (Garrelts & Lange, 2011, p. 201). What strengthens this line of argumentation, is the physical and long-lasting nature of flood prevention measures. Once a dike has been built, it is not easily replaced. As Garrelts and Lange phrase it (2011, p. 201), "adaptation brings us back to the issue of planning", thus advocating for a multilevel framework, in which substantive knowledge plays a more prominent and political or decisive role. This framework consists of content knowledge and cooperative experience. In this context, the concept of resilience explains the possibility of path-breaking changes. "Resilience is herein defined as being a measure of the ability of a system to undergo a disturbance without experiencing a fundamental change to its structure, status, or processes" (Cosens, 2010, p. 230). This means that the original structure remains in charge, but that at the same time, the modus operandi can change.

3. Methodology

This thesis is designed around the main research question '*What are the factors that impact successful policy innovation and development in the field of flood risk management in the European Union, the Netherlands, and Belgium?*'. With this descriptive research question, this thesis seeks to develop scientifically relevant answers in the form of clear factors under which the policy-making process in this field can be optimized. These factors are external conditions, which have an influence on the decision-making process. Examples of these factors are previous policies, existing legal frameworks, politics and power relations, socio-economic conditions and historic cooperation.

3.1 Research design

The study of this research question and its corresponding sub-questions will be conducted via a literature review. In this literature review, a distinction is made between academic literature on the one hand and policy plans on the other hand. This distinction serves different purposes. First and foremost, the use of definitions and concepts are a main variable of interest in this study. For many concepts, the academic and the practical meaning and/or implications may differ. This distinction is therefore relevant for sub-question one, in which the key elements of innovation are identified: to what extent do academic and policy papers set different requirements? Additionally, clearly making this distinction helps in discovering their mutual influence and the source of key elements in the study. This combination of academic articles and evaluations on the one hand and policy plans on the other hand is different from mainstream. Given the nature of this study, it is nevertheless seen as a useful and appropriate method. Policy plans in the field of sustainability, and flood management specifically, are often guided by goals and statements about the future. This implies that cross-referencing data could best be done via academic evaluations of these policy plans. Additionally, the multi-actor decision-making process asks for a helicopter view that can be found in academic articles.

In order to guarantee the quality of the literature review, a slightly adapted version of the Systematic Literature Review [SLR-method] is presented, with influences from content analysis, aiming at successfully analyzing academic literature and policy plans. The method will be discussed on the basis of the five-step model presented by Khan (2003):

1. *Framing the questions for a review*;
   The research questions are specified in the first beginning of the study and only slightly modified to cover the exact right concepts.

2. *Identifying relevant work*;
   This step is an extensive part of the study. Because policy plans and academic literature should discuss similar time periods, jurisdictions and topics. The reasons for inclusion and exclusion are discussed later in this section.
3. *Assessing the quality of studies*;
   The questions and relevance of the work defined in the earlier steps form a framework that is built up from documents, covering all topics and jurisdictions.
4. *Summarizing the evidence*;
   The differences between policy plans and academic literature discussed earlier are described here in terms of the narratives that are being used, including the main findings of the documents.
5. *Interpreting the findings*.
   Cross-checking the types of documents with each other to reduce the risk of biases. For policy plans, the goals and process as described are of special importance.

The first type of documents thus consists of policy plans from all actors involved in flood management. These documents explain the measures and argumentation to take these measures. Examples of these policy plans are available on all institutional levels. For example, in the European Union, the EU Floods Directive and the Flood Risk Management Plans are of central importance. On the national level, governments and water authorities work on the implementation, guided by their own policy documents. The analysis of these documents will provide the information for answering sub-questions one and two, after which the differences and similarities in roles and responsibilities form the primary source of information for sub-question three.

Next to the existing policy documents, a variety of studies has been conducted to assess the effectiveness of different policy plans and measures. In the Netherlands for example, it is the Delta program that offers these evaluations. For European member states, including the Netherlands and Belgium, StarFlood, a European evaluation consultant, executed these evaluations (StarFlood, 2016). These reviews are of great value in analyzing situations that ask for change or innovation, based on empirical evidence. In order to get these insights from the academic literature, peer-reviewed articles were collected via Web of Science [WoS] and Library, ICT-Services and Archive [LISA] from the University of Twente. These search engines are useful tools for identifying theoretical frameworks and evaluation reports of existing policy plans or policy practices. Table 1 gives an overview of the number of search results per keyword. As can be seen in table 1, the search terms result in many documents. Given the scope of this thesis, a further selection was applied. It was decided to include explicitly articles focusing on the innovative element of flood management and the geographic scope of (Western) Europe. Further, the selection should be a mix of descriptive and evaluative studies, in order to select the relevant work for answering the research questions.

Keyword	WoS	LISA	Total
Multilevel governance and flood risk management	19	266	285
Multilevel governance and flood management	26	395	421
Multilevel governance and sustainable flood risk management	1	150	151
Multilevel governance and sustainable flood management	3	211	214
Policy innovation and flood risk management	40	8	48
Innovative policies and flood risk management	26	8	34
Path dependency and flood risk management	17	13	30
Transition management and flood risk management	6	20	26

Table 1

Literature found on Web of Science and LISA by keywords and corresponding counts.

The following steps give an overview of the process towards answering the main research question:

1. Selecting and reading literature;
2. Creating an overview of the existing policies in the field of flood management;
3. Identifying completeness of literature and policy overview;
    a. If necessary, take action to complete literature and policy overview;
4. Completing a theoretical section, containing descriptions of the concepts being used;
5. Creating an overview of the actors involved on the different institutional levels;
6. Creating an overview of the historical development of the flood management policies;
7. Identify patterns and factors that played a key role in the innovation and development process;
8. Compare these factors with the theoretical section;
9. Answering the sub-questions;
10. Concluding the thesis by addressing the research question.

The main threat to this type of research is that differences may not always be directly visible. New policy documents may for example describe new strategies, but thereby not paying attention to smaller adjustments that actually did play a role in the innovation. To avoid this problem, specific attention will be paid to the development over time. To facilitate this, position papers can be useful here, as they sketch the background behind policy changes. A second threat to this type of literature research is the potential incomparability of policies. Politicians may highlight different aspects of a policy plan and thereby framing the discussion in a specific direction. To overcome this problem, it is important to consider all perspectives and weigh them against each other. This cross-checking of information could further be done via comparing policy alternatives with scientific evidence.

4. Key elements of policy innovation

Water is a vital resource for all life on earth and deserves therefore our full protection. Challenged by climate change and a growing world population, water management is constantly adapting to new trends and developments, aiming at a safe environment. Innovation helps in mitigating the negative consequences of these challenges. In this context, innovation can be divided in two categories. First, water management is a policy field that is shaped by technical innovations. New types of dikes preventing riverine floods or subsidies for adaptation on a household scale. Examples of innovative structural measures are the high-ground dike and the steep edge dike as implemented in the flood protection program in the Netherlands, because they combine flood management with scenic quality. In 2019, these measures won the Water Innovation Price (Maaspark Ooijen-Wanssum, 2019). The second category of innovation consists of policies and new governance structures. Flood management is a complex field, including a wide array of environmental, social, and economic factors, in which cooperation is of central importance. This new type of adaptive governance is described by projects in which organizations are "learning more about something from managing that something" (Allan, Xia & Pahl-Wostl, 2013, p. 626), describing effective networks aiming to achieve a common goal: water safety.

In order to study the topic of policy innovation, this section addresses the sub-question 'What are the key factors of policy innovation'. Here, an analysis will be provided of the main elements that build innovative policies.

4.1 Elements of the policy innovation process

The study of innovation in flood risk policies in the European Union, the Netherlands, and Belgium will take place on the basis of the five-step model by Khan (2003). The analysis framework as proposed in this section contains a range of factors that contains both the procedural and the governance types of factors. In the remainder of this section, these factors will be explained, including their role in the analysis.

The process of innovation can be broken up in three phases that describe a step in the systematic approach to improving policies and policy practices. These phases are: monitoring, reflection and adaptation. In the first monitoring phase, the effectiveness of current policies and measures is being evaluated, also in relation to the deployed time and resources. Monitoring is therefore "the basis for robust decision making" (Science for Environment Policy, 2015, p. 10), because it opens the floor for reflection and adaptation. Learning from what has been done before gives useful insights in what to do next. Is it sufficient to fine-tune existing policies, or is it necessary to design completely new structures? In order to incorporate this modus operandi in all organizations, it is helpful to discuss on an overarching level and learn from the best practices.

Especially in the context of flood management, this integrative approach has both a multi-actor and a multi-disciplinary component. Innovation has both a procedural and a substantial element. Procedural innovation in terms of new cooperation mechanisms or evaluation studies and substantial innovation in terms of new structural measures as innovative weirs. To combine existing practices to learn effectively from each other, it is good to have a broad coalition of cooperation partners. In addition, limiting this process of learning and adapting to governmental actors would be to narrow. In fact, specified authorities can add a lot of knowledge. Together, "these forms of collaboration can lead to highly effective networks which enhance learning and knowledge exchange" (Science for Environment Policy, 2015, p. 10).

The final elements that play a role in processes of policy change are momentum and consensus. Both will be discussed descriptively in this section, as these are concepts that come forward in multiple theories. Climate change for example is often discussed as a challenge that needs to be tackled now. Via coordination, coalitions can be built that are helpful in supporting new initiatives. In these processes, engagement, for example from citizens, is critical (Özdemir, 2014). In this context of coalitions, it is interesting to look at the role of pioneering countries or organizations. "The success of pioneer countries will convince others to take a similar path towards a sustainable energy system – or to speed up their existing efforts" (Özdemir, 2014, p. 54). Innovating countries that lie ahead in the process of change may thus have a motivational effect on others. By enthusiastically conveying this message, momentum for innovative policies could be created.

4.2 Goals and targets

The element that differentiates innovation from change is its sustainable nature: "Innovation is a special investment in long-term, intangible assets that will generate profits in the future. It is different from regular investment in tangible assets such as capital expenditures because of its longer investment time horizon and higher tail risk" (Bhattacharya et al., 2013, p. 1). Long term change is guided by goal setting and the theory of motivation and in the context of flood management, it is about one clear goal that reappears in a variety of policy documents: water safety for all citizens. This is a goal that functions as an explicit purpose, pave the way for change. In order to actually achieve a change, it is necessary for goals to be accepted (Lunenberg, 2011). This seems needless to say, but according to Lunenberg (2011, p. 3), "to allow organization members to participate in the goal-setting process" is "a powerful method of obtaining acceptance". This leads to a situation in which the group process stimulates the willingness to implement the means. This willingness is further influenced positively by evaluation programs. When organizations know that their successfulness in achieving the goals will be subject to evaluation, goals are more effective (Van de Walle et al., 2001). This highlights the importance of Europe-wide evaluation studies, as executed for example by StarFlood.

4.3 New local policies for a worldwide challenge

Before turning to new governance structures in the next section, it is useful to discuss the effects of the applicable systemic structures on innovation. As was discussed earlier in this thesis, the field of flood risk management is one in which a variety of levels of government and non-governmental authorities are involved in, all working on preventing or mitigating the effects of floods. The European Union, national governments, but also regional (water) authorities play a role in the policy and implementation process. In this cooperative field, all levels innovate and renew from their own perspective. Therefore, the traditional processes of either bottom-up or top-down innovation do not necessarily apply here. The degree of centralization and decentralization however is important in facilitating to realizing an organization's goals. As Vantrappen and Wirtz (2017) discuss in their article and visualized in table 2, there are four underlying qualities to determine the right amount of centralization. Two of these are of key interest for this thesis, given their relationship with innovation, i.e. responsiveness and efficiency.

When it is important to have…	Responsiveness	Reliability	Efficiency	Perennity
…it is usually advantageous to veer toward…	Decentralization	Centralization	Centralization	Centralization
…as that solution enables and stimulates	Immediacy	Compliance	Syndication	Detachment

Table 2

An organization's goals as a determinant of the degree of centralization (Vantrappen & Wirtz, 2017).

"Responsiveness is all about taking the right action quickly in response to opportunities and threats. If the sources of these opportunities and threats occur at the level of the operating unit, and if these interfaces are genuinely different between operating units, it makes sense to locate the corresponding tasks and the accountability for proper execution at that level" (Vantrappen & Wirtz, 2017, p. 3). This enables local or regional authorities to carry out their expertise in a way that benefits the local circumstances. Especially because flood risk management is based on a variety of factors, having the possibility to adapt policies or structures to the local needs strengthens the practices. In addition, efficiency is a value that relates to the concept of subsidiarity: what is the lowest possible level on which the task could be executed successfully. A traditional economy of scale, in which scaling up leads to lower costs, should be balanced here with the local knowledge of a specific territory. Innovation in this context gives room to learn from each other, producing outcomes that may otherwise not have been considered. This approach combines thus the advantages of responsive, local governments with the large amount of knowledge available in all European Union member states.

4.4 Conclusion

Policy innovation is more than the sum of new policies. It is a process of change: of thought processes, substantive measures, and modus operandi. The academic literature and the policy plans show various but overlapping elements that constitute policy innovation in the flood management sector. On the basis of the academic literature, two main conclusions can be drawn. First, the framework based on monitoring, reflection and adaptation provides a solid basis for policy innovation. The systematic analysis of the advantages and disadvantages of current measures and policies gives input for possible improvements. Critically assessing current methods is described as a good basis for policy learning and thus innovation. Second, academic literature pays extensive attention to a strong multi-sector approach. Different branches of knowledge need to work in coordinated collaboration in order to adapt to a changing climate in an integrative way. To facilitate policy innovation, this multi-sector approach should be institutionalized, since teams with diverse knowledge and expertise will come up with more creative and innovative ideas. In this context, the European Union could adopt a facilitating role, by using its exemplary role: in public tenders, diversity in backgrounds could be incorporated as a point of interest. In addition, the EU Floods Directive guides the national processes of implementation and adaptation and is a useful instrument in setting goals for the inclusion of 'other' ideas and insights.

This asks for a decision-making process that is based on coalition-building and momentum. These are described in the academic literature as methods to enthuse others to act in a responsive way to new developments. This well-defined process of decision-making and coalition-building overlaps with the process descriptions in the governmental policy plans. Governments and other organizations use similar structures of monitoring, reflection and adaptation and add the variable of efficiency as a driver of new innovations. Goal-setting and clear, long-term motivation guide this process. In the analysis, the diffuse distribution of information came to the fore as an obstacle to innovative policies. Because local water authorities and governments work more on the basis of technical and area-specific information, the processes of both procedural and substantive innovation work differently from those of (trans)national governments. At the same time, this argues even more for a decision-making process in which 'coalitions of knowledge' operate on the basis of shared information, in order to optimally adapt to a changing climate.

In the next section, the focus will be on the multi-level component of the main research question. The development of policies is a multi-level, multi-actor and multi-sector process and it is this process that combines and describes policy innovation in the procedural definition. An open, continuous dialogue between organizations, governments, and water authorities to pave the way for substantive innovation.

5. Key actors and their roles in flood management

It is the aim of this section to clarify the current state of flood management governance in Europe. The European Union, the Netherlands, and Belgium are interlinked and cooperate in the management of floods and flood prevention, but each has its own structure. The focus of this section will be on the interactions and arrangements between public and/or private actors that are aimed at purposefully steering collective issues of adaptation to climate change (Termeer et al., 2011). Theories of multilevel governance and the study of (inter)national cooperation will be of special importance in this context, because these theories are useful in describing the ways of cooperation and the corresponding advantages and disadvantages. As explained earlier in this thesis, water does not stop at national borders. "Most river systems operate over a range of spatial scales and institutional levels (Cosens et al. 2014). This is especially the case in relation to transboundary river systems, necessitating multilevel governance" (Priest et al., 2016, p. 50). Questions that arise when analyzing flood management governance systems in Europe include the advantages and disadvantages of apparent contradictions or different methods. In order to be able to understand the development of new policies, measures and partnerships, the sub-question that will be addressed in this section is 'What are different roles that regional, national and, supranational institutions have in flood management?'. By identifying these roles, both existing and new structures in which innovation is facilitated, can be better understood.

This section is divided in three parts, i.e. multi-level, multi-actor, and multi-sector analysis. In the first part, the cooperation between the European Union and the member states will be the key theme, after which the second part focuses on the internal cooperation between (governmental) authorities in the Netherlands and Belgium. The third and final part aims at defining the representation of different branches of knowledge within the decision-making process, both at the national and the international level.

5.1 Multi-level analysis

In order to describe the context in which the European Union and its member states cooperate, it is important to analyze the legal status of partnerships and documents. "The EU legal setting distinguishes between primary EU law, i.e., the Treaties that establish the EU and its functioning, and secondary EU law (e.g., Regulations, Directives, case law) by which the EU regulates more specific policy fields" (Priest et al., 2016, p. 50). This distinction means that Directives do not prescribe the path leading to the result, but function as documents that state common goals and are a confirmation of member states to work towards execution. The EU Floods Directive thus binds countries to achieve a common goal: "to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity" (European Commission, 2007).

In national legislation, this directive is elaborated and connected with concrete measures, which contributes to achieving the European goal. On this national level, the European Union does play a role as well, via the introduction of Flood Risk Management Plans, focusing on prevention, protection and preparedness (European Commission, 2007). Innovative elements of these national plans relate to the information provision directed towards decision-makers. Risk maps, for example, illustrating flood hazards and potential damage degrees, are set up to inform also neighbouring countries about upcoming, threatening situations. However, the performance of this system is often poor, due to "subjective and not careful interpretation" (Albano et al., 2017, p. 158). The advantages of the system include the possibility to measure flood risks both in quantitative and qualitative, socio-economic terms, enabling prioritizations and cost-benefit analyses (Albano et al., 2017, p. 170). The Flood Risk Management Plans are thus a tool to facilitate better informed decisions on the national level to execute Europe-wide policy goals.

National governments thus form the key coordinating actor in the implementation of the EU Floods Directive. The adaptation of legislation and measures is based on experiences from other countries, in order to adopt new policy insights. "A prerequisite for successful adaptability is that competent authorities duly take into account lessons learned stemming from periodic reviews and monitoring" (Clarvis et al., 2014, p. 107). In this context, the EU can use its role to draw political attention to new ideas and solutions, in order to let these substantive innovations flow to the member states.

5.2 Multi-actor analysis

The multi-actor dimension of the policy innovation process relates to the roles and responsibilities that (non)governmental, public and private actors have in the field of climate change adaptation governance. Modes of cooperation, for example between different organizations within a country, are the main interest of this challenge.

In the Netherlands, the responsibility for water management is vested with Rijkswaterstaat and the district water boards. Rijkswaterstaat is the executive organization of the Ministry of Infrastructure and Water Management and manages the major waters, including the sea and the rivers (Rijksoverheid, nd). In the context of flood management, district water boards are responsible for regional waters and flood protection, via the construction of permanent measures as dikes. The district water boards form a bridge between traditional executive branches of governments and general governments, like the national, provincial, and municipal governments. They are managed by elected representatives, who do not per se have a background in water management. Rijkswaterstaat, as an executive organization, is a non-political organization, although it falls under the ministerial responsibility (Infomil, nd). The Water Act 2017 sets out these responsibilities and is therefore the key document for the implementation of the EU

Floods Directive in the Netherlands (Rijksoverheid, nd). The ambitions of the Netherlands are laid down in the National Water Plan 2016-2021, including a preview towards 2050 (Rijksoverheid, 2015).

In Belgium, it is the three regions of Flanders, Wallonia, and Brussels-Capital Region that are responsible for flood management. Via the Decree on Integrated Water Policy in Flanders and the Water Code in Wallonia, the regions can be advised on the aspects of spatial planning of permanent measures as dikes (Mees et al., 2017). An important difference between the Netherlands and Belgium visible in the implementation of the EU Floods Directive is the use of safety standards. As explained before, member states are free to decide on the precise measures, as long as they can conform to the European goals and standards. Where the Netherlands adopt a minimum safety standard for primary floods of one in 4,000 years (1/4000), Belgium focuses more on the spatial planning aspect of flood management (Van Rijswick, 2014). In this respect, Belgium moved to a higher extent towards the multi-sector approach that is highlighted in the theory of policy innovation.

Each organization involved in the policy-making process works within a particular background. Boasson and Wettestad (2014) differentiate between 'tortoise' and 'carpe diem' types of policy entrepreneurs (Boasson & Wettestad, 2014). "The tortoises – mainly existing of bureaucrats, NGOs and industry actors – do the preparatory work. The carpe diem entrepreneurs – mainly highly placed politicians – associate themselves with the initiatives in a much more ad hoc fashion – for instance because they want to leave their mark on decision making" (Boasson & Wettestad, 2014, p. 406). The behaviour of carpe diem entrepreneurs may work in a stimulating way, because they motivate others to cooperate. The distinction describes the different roles organizations can take and may be useful as well in the next section, the analysis of the multi-sector dimension.

5.3 Multi-sector analysis

The representation of different branches of knowledge is at the core of flood risk management. The local elements of area-specific information make that the inclusion of apolitical and more technical specialists is required. Coordination with other policy fields, as for example nature conservation and spatial planning, is essential for the successful introduction of substantive innovations. Other important specialisms that are advised by Van Rijswick and Havekes to be included are monitoring, public participation, and adaptive and cyclic planning specialists (Van Rijswick & Havekes, 2012).

On the basis of key criteria and steps in the policy-making process, Uittenbroek constructed the typology in table 3, differentiating between the dedicated approach and the mainstreaming approach to climate change adaptation (Uittenbroek, 2014). The former describes the creation of new policy sectors, with its own objectives, policy processes, agenda-setting arena, and resources. The latter approach to adaptation is one in which new policies are integrated into existing policy sectors and frameworks.

	Dedicated approach	Mainstreaming approach
Objective	Adaptation as main objective	Adaptation as one of the objectives
Policy process	Linear	Dynamic
Criterion for evaluation	Conformance	Performance
Framing of adaptation	Main objective (explicit)	Added value (implicit)
Political commitment	Direct	Indirect
Agenda-setting arena	Political arena	Policy department arena
Resources	New assigned resources supported by new organizational structures	Reallocating resources within existing organizational structures
Policy design	Specific policy	Synergies in policy objectives
Implementation	Fast	Erratic

Table 3

A dedicated and a mainstreaming approach to climate change adaptation (Uittenbroek, 2014).

This typology clarifies the roles and the corresponding implications regarding responsibilities and define the rationale on how an actor cooperates. By identifying which actor adopts which role, the organizational structures and strategies in the decision-making process are more easily understood. In the remainder of this section, the roles that are adopted by the relevant actors in this flood management context are discussed.

The European Union adopts the mainstreaming approach. For example, via the funding mechanisms, the EU sets goals for the percentage of budgets that should be spent on climate change adaptation measures. This means that the theme is mainstreamed in all European spending programs and thus adds up to the distribution of goals and knowledge. Additionally, this approach includes an important role in the agenda-setting arena. Because the focus is primarily on implementation and technical or financial solutions, the political arena of the dedicated approach is less important. In Belgium and the Netherlands, it is the water management authorities that have more similarities with the dedicated approach. The issue of framing adaptation as the main issue of interest as a goal in itself, corresponds with the institutional structure; the dedicated approach asks for new funding mechanisms. Furthermore, the political component is more prominent in the Netherlands, given the political elections for the district water boards. In this way, the effect of the EU Floods Directive is clearly visible here, by the attention the European Commission gives to flood management, while leaving the implementation to dedicated organizations. This freedom in deciding which measures to choose and implement increases the possibility of locally fitting solutions.

5.4 Conclusion

The different roles existing in the field of flood management have been analyzed in this section on the basis of two typologies. The distinction between the multi-level, multi-actor, and multi-sector components is a descriptive depiction of the representation of actors. The European Union uses the main documents of the Floods Directive and the Flood Risk Management Plans to guide the process and set common goals. Member states are free to design their implementation process and the corresponding cooperation structures, for example with non-state actors. These strategies are informed by the second typology, i.e. the difference between the mainstreaming and the dedicated approach. The mainstreaming approach that is chosen by the European Union gives room for substantive innovation in the flood management sector. In a variety of papers concerning innovation in this sector, this mainstreaming approach is described as a facilitator of new insights and solutions because the integration in other departments raises awareness (Dewulf et al., 2015). The dedicated approach, which more often can be found among water managers in the member states, given their continuous search for new funding mechanisms and flood adaptation being the main frame of interest. In this sense, the path dependency theory described the political and economic constellations that form the basis for state failure. The coexistence of both approaches to flood management shows a more adaptive government structure.

This analysis shows that a well-structured and successful cooperation framework is missing in policy innovation theory. Currently, the European Union, the Netherlands and Belgium cooperate under a common set of goals, whereas structural cooperation has been identified, also in the previous section, as an important driver of innovation. Further cooperation could be connected with the area of monitoring, as the first phase in the policy innovation process. The transboundary nature of rivers for example creates possibilities for the Netherlands to measure the effectiveness of measures in Belgian waters and vice versa. Momentum and coalition-building as some of the main elements of section four are prominently visible in the multi-actor approach as well. Cooperative behaviour from all relevant organizations is necessary given the integrated process that flood management is. The effects of this strategy will be discussed in the next section on current and previous innovative policies and practices.

6. Innovative flood management policies

Policy innovation in the sector of flood risk management is relevant now and in the future. As former secretary-general of the United Nations Ban Ki Moon put it: "We need all hands on deck" (Hale, 2016, p. 14). This section will address the third and final sub-question of this thesis, i.e. 'What are innovative flood prevention policies existing in the European Union, the Netherlands, and Belgium?'. More than section four, this section is about the innovative examples existing in Europe. The concepts, theories, and analyses in the previous sections give a solid basis for the study of innovative policies and practices in the European Union, the Netherlands, and Belgium. On the basis of policy plans and academic literature, influential innovations will be discussed, also in terms of their contribution to actual innovation in the field of flood management.

6.1 European Union

The European Union uses three main policy plans in the context of innovation in the flood management sector. The EU Floods Directive and the Flood Risk Management Plans set the borders for flood prevention policies (European Commission, 2019). Additionally, the EU uses a climate change adaptation strategy specifically for new permanent measures. Relevant innovations in these documents will be discussed in the following section.

The European Floods Directive, which entered into force in November 2007, aims at reducing and managing the risks floods bring (European Commission, 2019). It encourages member states to innovate and make these experiences public to facilitate group learning. In implementing the Floods Directive in the member states, countries are given extensive opportunities to collaborate in their river-basin district, in order to recognize the transboundary nature of flood risk (Van Rijswick, 2004). The Floods Directive at its introduction was innovative because it introduced a deeper and more solid institutionalization of flood management policies in the European Union. Because it is not one particular policy, but a framework that sustainably produces a new policy field. Such a policy field is less likely to be dismantled by a new generation of politicians and thus facilitates greater amounts of substantive innovation. The implementation of the Floods Directive lead to innovations on the national levels and these developments ask for an update of the Directive. In order to stimulate further innovation, the EU could focus more on the execution, by adopting a delta commissioner, overlooking the implementation of the goals.

This would streamline international cooperation, since, in the Netherlands, a delta commissioner is responsible for an annual update of the implementation plan (Jong & Brink, 2013). The Flood Risk Management Plans are evaluated every six years, coordinated with the Floods Directive implementation cycle. This process is useful to institutionalize new ideas that have been tried in a pilot case and turned

out to be successful. To foster additional substantive innovation, the European Union could stimulate regular meetings, focusing on the apolitical exchange of knowledge and experiences. This would further increase the effectiveness of updates of the national plans. Unique for these plans is the use of multi-criteria analyses, enabling a useful integration of societal and economic threats. This approach corresponds with the multi-sector approach and deserves further attention in the implementation.

In April 2013, a new climate change adaptation strategy was presented by the European Commission. This meant a change of direction compared to previous years. Previously, the focus of the EU had been on "encouraging and supporting member states to develop and implement adaptation strategies" (Dewulf et al., 2015, p. 2). The new strategy illustrates a more hands-on mentality, given the goals that were formulated. The general aim is "to contribute to a more climate-resilient Europe" (European Commission, 2013). Before discussing the challenges facing this strategy and the corresponding changes in the next part of this section, first the sub-goals will be described here.

1. *Promoting actions by member states*;
   The European Commission encourages the adaption of comprehensive adaptation strategies and funds new adaptation capacities. This is further promoted by the creation of Action Groups. "These voluntary, multi-stakeholder groups aim to develop, scale up, and take innovative technologies to market, as well as initiating and promoting collaborative processes for change" (Science for Environment Policy, 2015, p. 11). Via these newly established networks, best practices can be shared.
2. *Promoting better-informed decision-making*;
   Better-informed decision-makers make better decisions. With this idea, the European Commission in collaboration with Climate-ADAPT give access to data and information on, among others, current and future vulnerability of regions and innovative tools that support adaptation planning (Climate-ADAPT, nd).
3. *Promoting adaptation in key vulnerable sectors*.
   This goal acknowledges the importance of the multi-sector approach. The Action Groups mentioned earlier help in bringing substantive innovations to the market, facilitating adaptation to floods in areas at risk.

This strategy can be analyzed in the light of the three-phase description in the theory of policy innovation. Monitoring the effectiveness of existing methods forms the basis of the second goal, in that the status quo is better understood. On this basis, the evaluation phase brings together best practices, pathing the way new measures in the adaptation phase. This corresponds with the goals described above, in which action is promoted, based on knowledge from a variety of actors.

The goals described by the European Union are defined as a way to overcome the general challenges to successful implementations of new, innovative ideas. As outlined in the theoretical section, the main challenges to successful implementation of innovative ideas consist of divergent interests, multilevel governance structures and risk aversion in public administration (Science for Environment Policy, 2015). The European Union is successful in overcoming the first challenge by formulating common goals, aiming at a shared idea of the future. By using this system in the context of the EU Floods Directive, member states are facilitated in using a similar governance structure. Finally, the promotion of action via practical help ought to guide public administrators through the implementation phase.

6.2 The Netherlands

The Netherlands have been living with the water since its existence. 26 percent of the country is below sea level (PBL, 2010). This means that the Dutch are in the front line of a changing climate and developed extensive knowledge on coping with rising sea levels. In order to successfully do this, a lot of innovation exists and according to journalist Jeff Goodell, author of the book 'The water will come: rising seas, sinking cities, and the remaking of the civilized world', they are "trying to export that expertise; it's their growth industry… it's their Silicon Valley" (Goodell, 2018). In Netherlands Water Partnerships, a network operates to help setting up partnerships worldwide to export flood management knowledge (Netherlands Water Partnerships, nd). This program exemplifies the Dutch attitude towards innovation: new measures are necessary to protect our land and our society and in order to be successful in achieving these goals, it is necessary to share flood management knowledge and experiences.

The Netherlands have a tradition of engineering-based water management, but this shifts towards a governance type of prevention. The most structurally new way of thinking led to the introduction of the Room for the River Programme in 2006 (Dutch Water Sector, 2019). Where flood prevention programmes consisted for decades of building more and higher dikes, in this programme, dikes were replaced and removed. One of the reasons for changing is the integrated way of thinking. Floods were not approached solely from a water safety dimension, but moreover from a climate change dimension. This means that drought challenges were included as a solution to flood problems. Via the creation of river buffers, surplus river water could be saved in secondary channels and given the time to infiltrate into the groundwater. In this programme, measures are being taken at more than 30 locations in the Netherlands (Dutch Water Sector, 2019).

This nation-wide approach is described in the National Water Plan 2016-2021. This plan can be seen as the national implementation strategy of the EU Floods Directive. All flood management organizations in the Netherlands are involved in this document, making it an ambition document with supported goals. Ambitions are being defined for the short term and the long term, i.e. 2050. What is different in the Netherlands, compared with Belgium and other European countries, is the calculation method of

standard specifications for dikes. “This not only takes the probability of a flood into account, but its potential consequences too” (Rijksoverheid, 2015). By using this standard method, actors use the same language and better know what to expect, and thus smoothening the cooperation process.

Next to this example of process innovation, Dutch flood management is also characterized by substantive innovations. One example related to coastal flood prevention is the introduction of the Sand Motor. This large artificial sandbank helps protecting the coast, with the help from waves, wind and currents and is thus an example of working ‘with’ instead of ‘against’ the water. “The resulting area bears an increasing resemblance to the dynamic coastal of the Wadden Islands. Various plants, birds and other animals have taken up home in this new, attractive coastal landscape”, making this project a successful combination of sustainable flood management and biodiversity (Zandmotor Monitoring, nd). This combination of procedural and substantive innovation is the strength of Dutch innovation is characteristic of the institutional structure of the Netherlands. The long tradition of the polder model, i.e. a deliberative decision-making model based on building consensus between parties (Kuipers, 2015), is effective in this context. Consensus has been identified as one of the key drivers of innovation. This collaborative strategy is successful because parties align their strategies. The water strategies of provinces and district water boards for example are designed simultaneously, to address similar challenges in a similar way. Opportunities for enhancement lie in the use of certain elements of the mainstreaming approach. In this way, flood management and adaptation strategies become a more omnipresent area of interest. For example, framing flood management as an added value to existing projects creates new opportunities for innovative combinations. In addition, the use of performance as the main criteria for evaluation, instead of conformance, gives substance to the execution of the goals agreed upon.

In relation with the European Union, the Netherlands in this way gives substance to the climate change adaptation strategy from 2013 and the Floods Directive from 2007. The former described the three goals of promoting action by member states, promoting better-informed decision-making, and promoting adaptation in vulnerable sectors. The Dutch approach scores well on the decision-making element, by including all relevant actors. The subsequent discussions can thus be based on a wide array of experiences and angles. Political actors within the Netherlands are expected, given the current dedicated approach, to stimulate further action. In the context of the Floods Directive, it can be noted that there is relatively less attention for the river-basin approach that is proposed by the EU. The idea of selling flood management solutions is more prominently present than cross-border cooperation.

6.3 Belgium

Since 1980, Belgium started a process of decentralization from the federal level to the level of the three regions of Flanders, Wallonia and the Brussels-Capital region (Mees et al., 2017). This process encompasses more a recentralization at the regional level, since here the former national tasks were overtaken. All regional governments make effective use of the multidisciplinary multi-sector approach, by including for example spatial planning experts. Contradictory to the Netherlands, the compensation policy after a flood is also decentralized, since the 2014 Sixth State Reform. This measure is both substantively and procedurally innovative, because the regions in Belgium now are responsible for the combination of flood prevention and potential compensation, where these functions are clearly separated in the Netherlands. By doing this on the local scale, Belgian governments stimulate citizens to take measures such as adaptive building and flood proofing at the property level (Mees et al., 2017). In this context, cooperation between public and private actors is key and could be promoted. According to StarFlood, this cooperation is hampered by a lack of risk awareness, and a lack of incentives for engaging in flood management (Cordis, 2017).

A fragmented governance structure could reduce the speed of innovation, because a new measure or procedure adopted by one organization is not automatically used by other organizations. This may actually cause innovations to disturb the cooperation process. On the other hand, a variety of actors leads to a variety of birth places for new ideas. This can create “a more open and dynamic character” (Termeer et al., 2011). Although the tasks and responsibilities are fragmented to a variety of actors, especially in Flanders the multi-sector approach is taken into account. “In 2013 the Flemish Environment Agency (VMM) launched the concept of MLWS, which calls for the use of flood prevention (i.e. spatial planning, property-level protection), protection (i.e. preventing floods) and preparedness (i.e. crisis management) measures" (Mees et al., 2017, p. 275). This new policy document sets out that tasks in the broad field of flood management “should be shared between water managers and actors from other policy domains and society” (Mees et al., 2017, p. 275). An example illustrating this approach is the inclusion of spatial planning specialists in the decision-making process. This exemplifies procedural innovation, but the exchange of knowledge and experiences here drives substantive innovation largely (Dewulf et al., 2015). This collaboration for example lead to the introduction of flood proofing houses, aiming at the reduction of damage caused by floods. Although this lead to interesting insights, policies are not fundamentally different. To justify the spatial planning specialists’ voice and reduce the flood risks, new policies could introduce flood and building zones to direct building decisions.

Governments can use previous floods to learn. “The 1998 floods in Flanders and 2002–2003 floods in Wallonia demonstrated the inadequacy of the classical defence approach” and provided the opportunity for a new flood management window (Mees et al., 2017, p. 278). In this context, especially the inclusion of ecologists in flood management decision-making attracted new funding mechanisms. This policy is

one example of a variety of ambitious, innovative policy plans introduced in Belgium. However, the fragmentation and unclear division of tasks lead to problems. Actors have different interests that may undermine each other's goals and therefore, better coordinated and complementary strategies are necessary. This will increase the effectiveness and speed of innovation.

In the context of the European policies, the Belgian governments are working on the goals set in the climate change adaptation strategy. The inclusion of vulnerable sectors is of special importance here, as the spatial planning specialists have shown. Although this approach needs to be fine-tuned, it is a good way to make use of the available expertise and thus contributes to a better-informed decision-making process. The European Commission could further promote action sharing innovations and experiences in order to achieve the goal of the EU Floods Directive.: reducing and managing the risks floods bring.

7. Conclusion

In this last section, an answer to the main research question '*What are the factors that impact successful policy innovation and development in the field of flood risk management in the European Union, the Netherlands, and Belgium?*' will be formulated. This will be done on the basis of the sub-questions as discussed in the previous sections. After that, the limitations to this study will be discussed and recommendations for further research will be provided.

7.1 Discussion of the sub-questions

The first element in the main research question that was addressed in the sub-questions is policy innovation. It was concluded that this concept describes a process of change: of thought processes, measures, and modus operandi. The study of academic literature describes a process of policy innovation that is based on three phases: monitoring, reflection and adaptation. This model is relevant as it defines the process of change and the corresponding expectations towards actors. In the first phase, the status quo is evaluated and discussed, leading to insights on the effectiveness. These outcomes form the basis for further action in the second and third phase of the model. Academic literature further showed a differentiation between the multi-level, multi-actor, and multi-sector elements. The explicit inclusion of these elements in the policy-making and decision-making process improves the predictability of and the trust in the process. These three types of cooperation take place in a multilevel governance structure. This theory describes the changing relations between governmental and non-governmental, public and private actors situated at different levels. In this thesis, the theory was used to describe the roles and responsibilities of different actors. Flood management is subject to new challenges and these impact on the cooperation structure, giving rise to both procedural and substantive innovation.

Before discussing the implications of these academic elements, policy plans add the concepts of coalition-building and momentum as drivers of innovation, given their unifying element. This increases the willingness to cooperate and work towards the stated goals. This cooperation is formed to a high degree in a multi-actor and multi-sector context, showing the dynamic nature of the policy field. Also in this context, the theory of multilevel governance helped explaining the interactions. A trend is being described showing the new roles for non-state actors: they are no longer merely a helpful addition, but form a core element of the adaptation strategies (Hale, 2016). For example in the rollout of new technologies on a scale that makes impact, non-state actors take a key role. This came forward in both the EU Floods Directive and the national implementation plans, where implementation actors are being valued for their expertise and experience.

The implementation is preceded by the stage of goal-setting, often forming the ambitious start of a new policy document. Goals can be used eminently to connect and find opportunities for cooperation, aiming

at long-term improvements. As the EU shows in its adaptation strategy, encouragement can be successful by defining both procedural and substantive goals. Arriving at a common set of goals should, according to Massey et al. (2014), be done with the flexibility for countries to choose their own policy design. This corresponds with the legal status of the EU Floods Directive, in which member states cooperate "to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity" (European Commission, 2007). However, this strategy of individual implementation is also a pitfall. Because member states design their own implementation mechanisms, these may be incomparable, making it difficult to check whether countries are living up to the goals set in the Floods Directive. Inconsistency in the implementation further disturbs effective policy learning.

Learning from other projects and/or initiatives is an important factor in the inspiration phase. What came forward in the analysis consistently is that for learning to be successful, jurisdictions that policy-makers feel culturally close to has a much higher chance of being adopted. "This 'dynamic of affinity' between jurisdictions is alluded to by both Biesenbender and Tosun (2014) and Stadelmann and Castro (2014)" (Jordan & Huitema, 2014 p. 391). More broadly, the European Union is a good facilitator of policy learning. The multilevel aspect in this context can be a stimulator of innovation, by focusing explicitly on the model of monitoring, evaluation and adaptation. The Water Framework Directive does allow for this approach, by letting member states free to use several iterative cycles for policy implementation. However, in many cases, systematic methods to incorporate new knowledge incrementally, and hence deal with uncertainty and complexity, are lacking.

7.2 Discussion of the main research question

The research question focused on elements impacting on policy innovation. On the basis of this analysis, it can be concluded that there are different categories of factors influencing the successfulness of a new innovation. Before turning to the explanation of the elements, this means that there is room for improvement. Current innovations in the flood management sector in the context of the European Union are based primarily on evaluations, as those for example by StarFlood. The recommendations that are derived from these studies define new developments in the sector. Although new climate adaptation plans have been adopted since then, this has not been translated in new flood management strategies. It would be good if the EU more explicitly uses its new climate change strategy as a determinant of innovation, by putting into practice the goals from the climate change adaptation strategy of promoting action by member states, promoting better-informed decision-making, and promoting adaptation in vulnerable sectors. These goals have a stimulating effect and strengthen a common sense of urgency.

Next to the importance of monitoring and subsequent adaptation via regular audits, the need for an integrated, multi-disciplinary, multi-sector approach to innovative water governance is widespread among researchers. This approach includes the participation of policy fields that indirectly link with

flood management. These forms of collaboration can lead to highly effective networks which enhance learning and knowledge exchange and are already implemented in the European member states. In this respect, Belgium lies more ahead than the Netherlands. In flood risk management, Belgium explicitly includes spatial planning as a source of information for preventing future floods (Dewulf et al., 2015). This approach allows for better informed decisions and mainstreams the urgent problems of climate change and flood management into other policy fields. Additionally, In Belgium, the inclusion of ecologists in the multi-disciplinary approach offered water managers an increase in the amount of possibilities to acquire funding for their new 'space for water' measures.

In addition, some other elements play a role in the start of the process. Climate change is generally considered to be an urgent problem for which solutions should be designed and implemented soon. This visibility of the problem simplifies the start of the process, since the agenda-setting step has already been taken. It turns out that the nature of the problem of climate change motivates actors to participate. In this case, actors want to avoid being blamed for not taking action when the world is in danger. At the same time, this element creates the danger of symbolic action and must thus be prevented by setting clear and result oriented goals per participating organization. In sum, these elements and analyses of the policy-making and decision-making process form a guide based on successful experiences from the participants involved and can help innovating other flood management authorities.

7.3 Limitations and a research agenda

There were some limitations to this study. Given the available time for this bachelor thesis, choices had to be made regarding the exclusion of the punctuated equilibrium theory. The analysis of the Belgian policy documents is to a higher degree than for the Netherlands and the European Union based on evaluations of policy strategies.

The transboundary nature of water makes that in flood management, collaboration is necessary for innovation to be successful, especially in relation to the strategy of monitoring, reflection and adaptation, in order to stimulate innovation. Literature shows that there are few examples of evaluative studies being fully implemented (Allan, Xia & Pahl-Wostl, 2013). In the context of the European Union, the financial consequences of this approach have largely been out of view for this thesis. Because they are expected to be a strong facilitator of change, follow-up research adds useful new insights. Therefore, the following research agenda is proposed to extend and further test the theories in this thesis:

1. An in-depth analysis of the role of funding in the context of the European Union;
2. A follow-up analysis of the role of the mainstreaming approach in the context of a decentralized policy area, as a method to stimulate ongoing substantive innovation;
3. An in-depth analysis of the implementation of evaluation studies, focusing specifically on monitoring, reflection and adaptation.

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Appendix

A. Overview of tables

Keyword	WoS	LISA	Total
Multilevel governance and flood risk management	19	266	285
Multilevel governance and flood management	26	395	421
Multilevel governance and sustainable flood risk management	1	150	151
Multilevel governance and sustainable flood management	3	211	214
Policy innovation and flood risk management	40	8	48
Innovative policies and flood risk management	26	8	34
Path dependency and flood risk management	17	13	30
Transition management and flood risk management	6	20	26

Table 1

Literature found on Web of Science and LISA by keywords and corresponding counts.

When it is important to have…	Responsiveness	Reliability	Efficiency	Perennity
…it is usually advantageous to veer toward…	Decentralization	Centralization	Centralization	Centralization
…as that solution enables and stimulates	Immediacy	Compliance	Syndication	Detachment

Table 2

An organization's goals as a determinant of the degree of centralization (Vantrappen & Wirtz, 2017).

	Dedicated approach	**Mainstreaming approach**
Objective	Adaptation as main objective	Adaptation as one of the objectives
Policy process	Linear	Dynamic
Criterion for evaluation	Conformance	Performance
Framing of adaptation	Main objective (explicit)	Added value (implicit)
Political commitment	Direct	Indirect
Agenda-setting arena	Political arena	Policy department arena
Resources	New assigned resources supported by new organizational structures	Reallocating resources within existing organizational structures
Policy design	Specific policy	Synergies in policy objectives
Implementation	Fast	Erratic

Table 3

A dedicated and a mainstreaming approach to climate change adaptation (Uittenbroek, 2014).