CROSSING BORDERS TO INNOVATE

The role of institutions in cross-border collaboration between the Northern Netherlands and Germany

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Preface

Dear reader,

Before you lies the last piece of the puzzle to graduate from the master Economic Geography at the University of Groningen (NL). This research was also carried out for the Northern Netherlands Alliance (SNN), where I took an internship from the period February until July 2018. My thesis focuses on the role of institutions in cross-border cooperation between the Netherlands and Germany.

I would like to thank my supervisors for their support during the process of writing this thesis. I also wish to thank the respondents who I consulted to gain improved understanding of the regional innovation strategies of the selected regions Bavaria, Berlin-Brandenburg, Lower Saxony and Saxony-Anhalt.

If there are any questions regarding this research, please do not hesitate to contact me by e-mail.

I hope you enjoy reading my thesis!

Irene Muller

Groningen, September 2018

Summary

Inter-regional collaboration is a key component of the concept of Smart Specialisation, part of the European Regional Development Fund (ERDF). Among European region there is a growing recognition that it is not possible to tackle societal challenges alone. Therefore, current Cohesion policies of the European Union emphasise the need for regional strategies to adopt an outward looking approach in terms of their orientation towards global value chains. However, cross-border networks often focus mainly on the development of linkages between bordering regions. For instance the Northern Netherlands is now actively collaborating with adjacent regions in North-West Germany within the Interreg program Deutschland-Nederland. This research investigates whether there are more opportunities for future cross-border collaboration with other German regions.

In literature it is often assumed that innovation mostly occurs within a regional cluster. Geographical proximity is seen as a major advantage in order to take advantage of knowledge spillovers from other firms located in the same area. However, also other forms of proximity influence the outcomes of collaboration, e.g. cognitive, social, institutional and organizational proximity. This report focuses on the role of institutional proximity within cross-border collaboration. Institutions are rules and regulations which are created by society and the government to govern and condition social life by reducing uncertainty in everyday life and by doing so provide (temporary) stability. One of these institutions is the regional innovation strategy for smart specialisation (RIS3) which is developed by a region to upgrade the attractiveness of regional economy as locations for investments and research and development.

The aim of this research is to examine the role of inter-regional collaboration in the RIS3 of the Northern Netherlands and four selected German regions, which have been selected based on their institutional quality. The selected regions are Bavaria, Berlin-Brandenburg, Lower-Saxony and Saxony-Anhalt.

The results from the analysis of policy documents and interviews show that within the innovation strategy of the regions, a different value is attached towards cross-border collaboration. Regions which are well-developed and invest systematically in innovation (Bavaria and Lower Saxony) defined their innovation strategy from an internal approach in which the regional government wants to protect the competitive position of the region, whereas regions which are less-developed in terms of R&D spending (Berlin-Brandenburg, Saxony-Anhalt and the Northern Netherlands) attach more value towards cross-border collaboration and are defined from an external approach. Moreover, in Germany regions the innovation strategies often focus on the development of innovative clusters to create critical mass, whereas the Northern Netherlands is dedicated to solve four societal challenges.

Samenvatting

Interregionale samenwerking is een belangrijk onderdeel van het concept slimme specialisatie wat deel uitmaakt van het Europese Regionale Ontwikkelingsfonds (EFRO). Europese regio's zijn zich er steeds vaker van bewust dat het niet mogelijk is om maatschappelijke uitdagingen alleen op te lossen. Daarom benadrukt het huidige cohesiebeleid van de Europese Unie de noodzaak om binnen de regionale strategieën, een naar buiten gerichte benadering te hanteren en zich ook te oriënteren op globale waardetekens. Echter ontwikkelen grensoverschrijdende samenwerkingen zich momenteel vooral rondom aangrenzende regio's. Zo werkt Noord-Nederland actief samen met aangrenzende regio's in Noordwest-Duitsland in het Interreg programma Deutschland-Nederland. Binnen dit onderzoek is onderzocht of er meer mogelijkheden zijn voor toekomstige grensoverschrijdende samenwerking tussen Noord-Nederland Duitse regio's

In de literatuur wordt vaak verondersteld dat innovatie meestal ontstaat binnen een regionaal cluster. Geografische nabijheid wordt hierbij als een groot voordeel beschouwd omdat bedrijven kunnen profiteren van kennis van andere bedrijven in de nabije omgeving. Echter, ook andere vormen van nabijheid kunnen de uitkomsten van een samenwerking beïnvloeden, b.v. cognitieve, sociale, institutionele en organisatorische nabijheid. Dit rapport richt zich op de rol van institutionele nabijheid binnen grensoverschrijdende samenwerking. Instituties zijn wetten en regels die door de maatschappij en de overheid worden opgelegd om structuur te geven aan het dagelijks leven en onzekerheden weg te nemen, op deze manier zorgen instituties voor (tijdelijke) stabiliteit. Een vorm van institutie is de regionale innovatiestrategie voor slimme specialisatie (RIS3). De RIS3 wordt door een regio opgesteld om de aantrekkelijkheid van de regionale economie als locatie voor investeringen en als vestigingslocatie voor bedrijven en instellingen te verbeteren.

Het doel van dit onderzoek is om de rol van interregionale samenwerking in de RIS3 van Noord-Nederland en vier geselecteerde Duitse regio's te onderzoeken. De regio's zijn geselecteerd op basis van hun institutionele kwaliteit. De geselecteerde regio's zijn: Beieren, Berlijn-Brandenburg, Nedersaksen en Saksen-Anhalt.

De resultaten van de beleidsanalyse en interviews laten zien dat verschillende regio's in hun RIS3 andere waarden hechten aan grensoverschrijdende samenwerking. Sterk ontwikkelde regio's die systematisch investeren in onderzoek en ontwikkeling (Beieren en Nedersaksen) hebben hun innovatiestrategie gedefinieerd vanuit een interne aanpak waarbij de overheid de sterke concurrentiepositie van de regio wil beschermen. Daarentegen hechten regio's, waarin bedrijven minder innovatief zijn en in sterkere mate afhankelijk zijn van overheidssubsidies, meer waarde aan grensoverschrijdende samenwerking in hun RIS3. Bovendien zijn de innovatiestrategieën in Duitse regio's vaak gericht op de ontwikkeling van innovatieve clusters om zich als regio to specialiseren, terwijl Noord-Nederland zich inzet om vier maatschappelijke uitdagingen aan te pakken.

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1. Introduction

Globalisation has caused a transformation of economic, social en environmental prospects and potentials. It created more opportunities for both businesses and citizens, as they are able to reach larger markets to sell their goods and services. But the rapidly changing circumstances on global markets also places new demands on the innovation policies of all European regions. These circumstances include, among others, the challenges of demographic- and climate change and the requirements to ensure the continued availability of natural resources. At the same time new forms of innovation also provide new opportunities to achieve sustainable regional growth.

European cohesion policies pay increasing attention on the role of innovation fostering regional development and is the main fundament of the Horizon 2020 strategy of the European Union which aims at smart, sustainable, inclusive growth in all European regions. In the context of the economic crisis around 2008, the concept of smart specialisation was developed, aiming to promote integrated, transformative and place-based approaches to economic development (Pike et al., 2011). Smart Specialisation enables regions to define their own innovation strategy and develop their competitive advantage based on their strengths and societal challenges (McCann & Ortega-Argilés, 2016). Specialisation arises within the region by exploiting place-based industrial skills and expertise within the regional innovation system (Mariussen et al., 2016). Although a Smart Specialisation Strategy is created within the region, cross-border collaboration offers great opportunities for regions to further strengthen their regional innovation eco-systems. As the world is becoming more interconnected, research and innovation is increasingly taking place in cross-border networks (Makkonen et al., 2018), because local actors realize that it is impossible to tackle societal challenges alone. Nevertheless, regions are also protecting their competitive position on the global market whereby borders are still seen as a barrier or a threat. Therefore, finding new partners for collaboration can be challenging and is influenced by several factors. This research aims at identifying these factors with a focus on the role of institutions in (cross-border) innovation networks.

The Northern Netherlands defined their Regional Innovation Strategy for Smart Specialisation (RIS3) in 2013. One of the aims of this RIS3 is to stimulate inter-regional collaboration. The Northern-Netherlands believes that innovation requires open borders and implies inter-regional, nationwide and international export of products and services (SNN, 2013). Local knowledge is insufficient to come to sustainable solutions for societal challenges captured in the RIS3. To achieve this, the Northern Netherlands wants to expand existing partnerships and develop new partnerships. A region which the Northern Netherlands is already actively collaborating with is Lower Saxony, especially within European funded cross-border programs (Interreg A). In preparation of the current cohesion

programme (2014-2020), both regions have mapped their strong industry sectors, knowledge institutions and available entrepreneurial networks. Additionally, the regions established where there are opportunities and challenges for their RIS3 (SNN, 2013).

Developing a new cross-border collaboration can be challenging as there are many aspects influencing the successfulness or failure of new collaborations. Regions differ a lot between each other, there might be different institutional settings influencing entrepreneurial activities in the region. There might also be cultural differences in attitudes towards entrepreneurship and cross-border collaboration. The concept of smart specialisation involves many different actors (i.e. Entrepreneurs, firms, government, universities and the civil society) from a region, which makes it also rather complex to select one specific region to collaborate with. Different benchmark tools, for example from the European Commission, already exist to compare regions based on several indicators (e.g. priority areas, allocated funding and investments in research and development as percentage of GDP). However, the indicators used in these tools do not tell us directly something about the success or failure of cross-border collaboration between two regions and are often of an objective nature. Additionally, the practice of regional and urban benchmarking is point of discussion as they tend to compare unlike locations, industries and indicators into aggregates that tend to ignore important regional differences (Thissen et al, 2013).

The aim of this research is to gain improved understanding of the different factors influencing the success or failure of cross-border collaboration. Specifically, attention will be paid to subjective (i.e. soft) factors like the institutional setting of the selected regions. There is growing recognition amongst scholars that institutions matter in economic development. However, there is no agreement about how and to what extent they matter and whether institutions are the 'cause' or a 'consequence' of innovation and economic development (Morgan, 2017).

As such, this research intents to help to understand the role of institutions within cross-border collaboration in the research area. Therefore, the main research question is formulated as follows:

How does the regional innovation strategy for smart specialisation (RIS3) of the selected regions influence the outcomes of cross-border collaboration between the Northern-Netherlands and German regions?

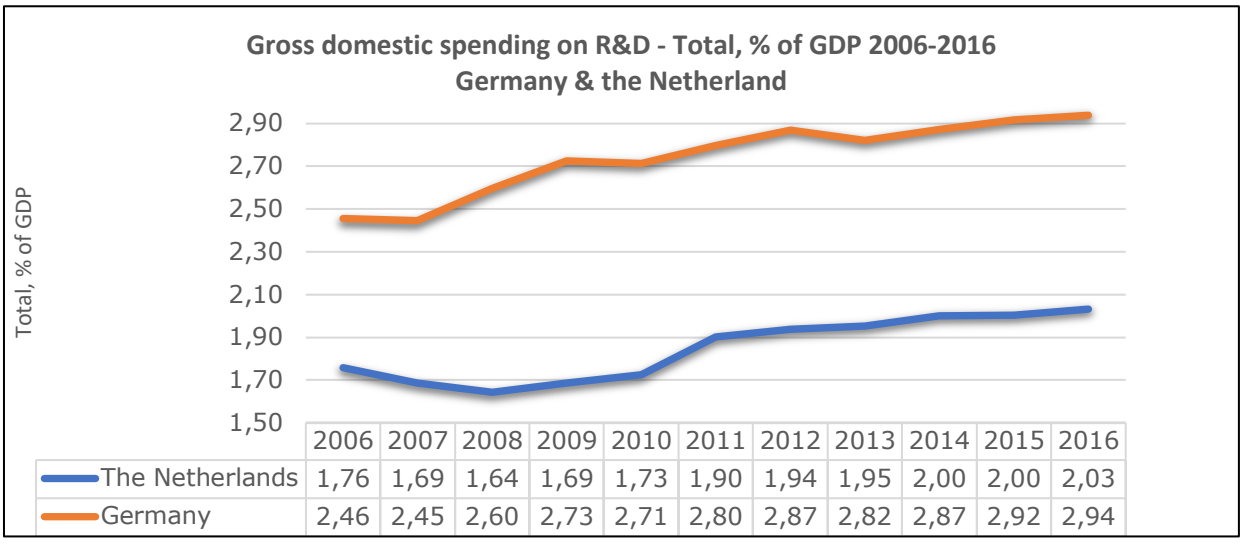
Sub questions:

- What is the regional context of the selected regions?
- What are the research and development priorities of the selected regions?
- Which value is attached towards cross-border collaboration in the RIS3 of the selected regions?

1.1. Research area

As neighbouring countries the Netherlands and Germany have maintained close political, cultural and economic ties which go way back in time (Rijksoverheid, 2016). For Dutch export, Germany is by far the most important destination. In 2017, the Dutch economy exported goods and services to Germany with a total value of around 107 billion euros. In that year export figures exceeded the threshold of 100 billion euros for the first time in history. Also for the import of goods and services, Germany is the largest source for the Dutch Economy. The Netherlands imported goods with a total value of 74,5 billion euros in 2017, which accounts for 18% of the Dutch imports (CBS, 2018).

Furthermore, in both countries innovation plays an important role in the economy, however Germany invests structurally more in innovation. In Germany the total spending on R&D accounted for 2,9% of GDP in 2016, which is above OECD average of 2,3%. Dutch expenditures on R&D (2%) remained low in compared to other Western European countries (OECD,2018). Constant innovation is an essential condition to maintain a technological lead and to stay competitive. Germany invests very systematically, consistently and sustainably in R&D. Figure 1 shows that also during the economic crisis, Germany continuously increased their spending on R&D, whereas in the Netherlands the percentage of R&D investment decreased until 2008 and increased again after the economic crisis. Moreover, in terms of R&D investments the Netherlands must catch up to achieve the Europe 2020 targets to spend 3% of total GDP on Research and Development. This research will help the Northern Netherlands to identify opportunities for collaborations with German federal states in order to achieve smart specialisation objectives.



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
The Netherlands	1,76	1,69	1,64	1,69	1,73	1,90	1,94	1,95	2,00	2,00	2,03
Germany	2,46	2,45	2,60	2,73	2,71	2,80	2,87	2,82	2,87	2,92	2,94

Figure 1: Gross domestic spending on R&D (OECD, 2018)

Another reason why German regions have been chosen is that the Northern Netherlands is already actively collaborating with Lower Saxony, for instance within the European Interreg A program

Deutschland-Nederland. This strong collaboration can be seen as a test case. As being adjacent regions, it will be investigated if the strong relationship is caused by spatial proximity or also because of institutional similarities. Each of the German states has a smart specialisation strategy as it was set as a precondition by the European Commission to be eligible for support from the European Regional Development Fund (ERDF) but the extent to which the concept of smart specialisation is part of the regional policies differs heavily across regions. For instance, some regions are registered at the S3 platform of the European Commission and more engaged in the process of smart specialisation within Europe.

This research focuses on the institutional setting of the Northern Netherlands and four selected German regions. The German regions were selected based on their institutional quality. Smart Specialisation Strategies were basically formulated on European NUTS1 level (country parts in the Netherlands and state-level in Germany), therefore this research is carried out on NUTS1 level.

1.2. Reading guide

This report is structured as follows. First the theoretical background about innovation, cross-border collaboration, proximity and institutions will be discussed. Followed by a chapter about the European Regional Development Fund (ERDF), hereby the concept of Smart Specialisation will be described. The research method of this research was a comparative analysis of innovation policies. In the chapter 'methodology' it will be described why this method has been chosen followed by the analytical framework. Moreover, the selection of the regions will be described. Chapter five presents the results of this research. Finally, this reports ends with a conclusion chapter which included the policy implications for the Northern Netherlands and discusses possibilities for future cross-border collaborations with German regions.

2. Theoretical background

In this chapter relevant theory concerning this research will be discussed. First of all it will be explained why innovation matters for regional development and why knowledge should also be exchanged across regional borders instead of solely focusing on actors within a local cluster. Secondly, literature about proximity and institutions will be presented and it will be investigated how institutions affect the success or failure of cross-border collaboration.

2.1. Innovation

In general, innovation is the result of an interactive process in which actors share different types of knowledge and competences with the aim to solve technical, organisational, commercial or intellectual problems (Bathelt, 2004) and it is seen as one of the key drivers of economic development (Audretsch & Feldman, 1996; Lundquist & Trippl, 2013; Pike et al., 2011). Through innovation, businesses and workers become more productive, the prices of goods and services fall and wages rise which results in a higher standard of living. Already in the beginning of the twentieth century, Joseph Schumpeter argued that carrying out innovation is the only function which is fundamental in history.

As innovation is an outcome of recombining elements that have already been investigated and accessible, the creation of innovation depends heavily on knowledge which is already available in a region (Alnuaimi et al., 2012). However, In the past decades, the process of innovation have become increasingly complex, because actors are required to deal with a larger variety of knowledge sources and labour is divided into disaggregated value chains, that are not necessarily at one location (Asheim & Coenen, 2006). On the other hand, the tacit nature of knowledge makes it also difficult to transfer knowledge across boundaries, either firm or regional boundaries and the generation of new knowledge often involves substantial investments in research and development (Sorenson et al., 2006). However, the application of this new knowledge, once produced and codified, entails little if any additional costs (Arrow, 1962). In the end, the diffusion of knowledge and innovation generates scale economies and stimulates economic development by allowing several firms to benefit from the research and development activities undertaken by an individual firm (Marshall, 1890).

2.1.1. Regional clusters and external linkages

An important element of regional innovation systems is the creation of local clusters. According to Porter (2000, p. 254, in Bathelt, 2007) a cluster is “a geographically proximate group of inter-connected companies and associated institutions in a particular field, linked by commonalities and complementarities”. These clusters can arise in different spatial contexts (i.e. city-, regional-, national- or international level) and actors located within this cluster are able to take advantage of firms located within a cluster. These firms benefit from **knowledge spillovers** (employees of a particular firm have

easy access to employees and their knowledge from other firms which are located in the same cluster) and l**ocal non-traded inputs** (the input of specialists within a cluster in a more efficient manner). Moreover, they are able to take advantage of a **local skilled labour pool** (reduction of labour acquisition costs) (Marshall, 1890 in McCann, 2013). These location-specific economies of scale or clusters are also known as agglomeration economies. Within these agglomerations firms can profit from economies of scale and to access knowledge which is external to an individual firm but internal to the local cluster.

As mentioned earlier, organisations innovate through combinations of existing and new knowledge (Kogut & Zander, 1992), thus these organisations often need to consult external sources to narrow knowledge gaps. External sources are of great importance to bring about growth within a region. Bathelt (2004) paid attention to the importance of going beyond regional borders and build global pipelines in order to connect to knowledge created elsewhere. Figure 2 illustrates the structure and dynamics of a regional innovation clusters and the internal and external linkages of actors within a cluster.

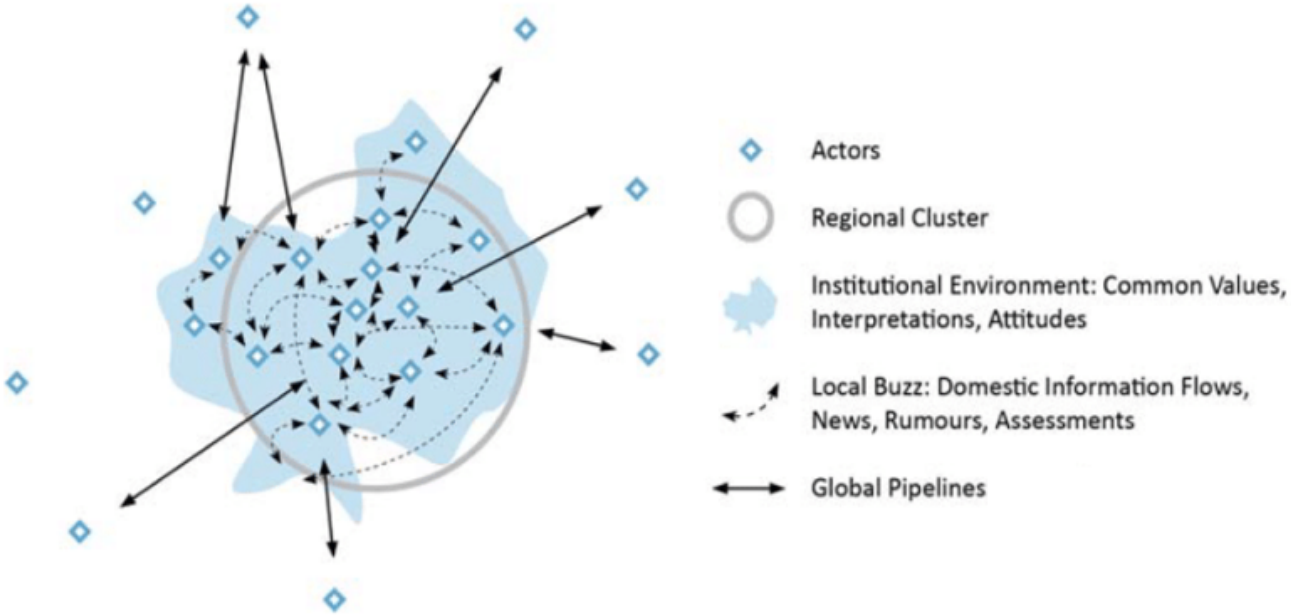


Figure 2: Structure and dynamics of local buzz and global pipelines (Bathelt, 2004)

The model helps to understand the importance of co-location of actors within a regional cluster as they have a common institutional environment with shared values, interpretations and attitudes. Within this cluster, interrelated actors and firms interact by sharing information, gossip and news, which is referred to by the author as *local buzz*. This local buzz encourages the local actors to engage in interactive learning and problem-solving, leading to new innovation. The model also emphasizes that an innovative cluster can and should not be restricted to a specific place and therefore some of

the actors are located outside the regional cluster. To prevent a lock-in effect in the region, these external linkages to actors outside the region are extremely valuable because even the strongest regions in terms of economic development need external linkages for the creation of knowledge and can in that sense not be self-sufficient (Bathelt, 2004). Actors which are able to build so called *global pipelines* to actors outside the region are able to access new knowledge and create a competitive advantage because it allows these actors to access and implement knowledge which was created elsewhere. These cross-border activities can take place at different spatial levels.

Issues arising in building these global pipelines and cross-border collaboration will be discussed in the next section of this chapter.

2.2. Cross-border collaboration

Western economies are increasingly dependent on the production, distribution and use of knowledge (OECD, 2013). They show a higher share of investments in research and development resulting from a higher stock of human capital and more knowledge-intensive production (e.g. software development and engineering). Additionally, production processes are fragmented and geographically dispersed into global value chains (Baldwin, 2016; Timmer et al., 2013). Due to lower transportation costs, firms are able to offshore specific tasks in the production process in order to reduce labour costs. Baldwin (2016) refers to this phenomena as the second global unbundling.

If firms are able to share the location-specific knowledge across the global network, new opportunities for innovation are generated but it can be rather challenging to share knowledge across larger spatial distances. If partners within this global network are able to share their knowledge and are capable to integrate this knowledge in their local economy, knowledge will become a source of competitive advantage (Grant, 1996). The distribution of tacit or complex knowledge across large distances can be achieved through the creation of strong interpersonal ties between distant partners. However, these interpersonal ties are more likely to occur within a region than across regions. But if these ties occur across regional borders, cross-regional ties can essentially act as structural bridges in achieving innovation. and will only occur if the willingness to share high-fidelity knowledge with international partners exists (Gertler, 2004).

Apart from the willingness of sharing knowledge across long-distances, a number of different costs are involved when long-distance knowledge transfer takes place, for instance partners need to invest in shared electronic knowledge repository and there is an important precondition that the involved individuals are willing to dedicate time towards coordinating activities and generating shared norms such that the knowledge can be transferred in high-fidelity. These costs are higher when knowledge is

more complex or when larger distances separate the regions (Alnuaimi et al, 2014). To overcome the costs threshold, interpersonal ties between individuals and institutions are of great importance.

Currently, intensive German-Dutch collaboration takes place mainly around the border regions. This is also due to the fact that the European Interreg program focuses and subsidizes cross-border collaboration mainly within these cross-border areas (the different types of Interreg will be distinguished in chapter three). The German-Dutch border is divided into four cross-border regions, namely Euregio Eems-Dolland, Euregio Gronau-Enschede, Euregio Rijn-Waal and Euregio Rijn-Maas Noord. The Northern Netherlands is part of the Eems-Dollard region. In these Euregio regions, cities, municipalities and countries are involved in partnerships aiming at stimulating the transfer of knowledge between science and businesses in cross-border projects. The Euregio regions are also committed to cultural connection and are predominantly supported by the European Development Funds (Duitsland Instituut, 2012).

2.3. Proximity

Due to the tacit character of knowledge, it is often assumed that knowledge spillovers mainly occur at places which are geographically clustered and geographical proximity is seen as an advantage as it is easier to have face-to-face interactions. In that sense it can be questioned if it is possible to successfully collaborate with regions which are not necessarily at close spatial proximity. On the one hand geographical proximity can be beneficial for the transfer of tacit knowledge which contributes to the regional innovation system, but on the other hand globalisation and the possibilities offered by information and communication technologies (ICT) influence the role of geographical proximity as it allows to communicate effectively and at low costs with distant partners (Gust-Bardon, 2012).

Several researchers argue that besides geographical proximity, other proximity dimensions also influence successful collaborations and the exchange of knowledge (Boschma, 2005; Ponds et al., 2007) and that geographical proximity cannot be assessed in isolation. According to Boschma (2005, p. 61), “geographical proximity is neither a necessary, nor a sufficient condition for interactive learning”. Other proximity dimensions brought forwards in literature are cognitive, institutional, organizational and social proximity. For all dimensions, it holds that too much and too little proximity may be harmful for the effectiveness of collaborations and innovation. Table 1 briefly describes the characteristics of the different forms of proximity.

Table 1: Different forms of proximity (Boschma, 2005)

Cognitive proximity	Proximity to the knowledge base of a region, closeness provides opportunities or sets constraints for further improvement. Should be close enough in order to communicate, too much proximity will lead to a lock-in effect.
Geographical proximity	Spatial or physical distance between economic actors, both in its absolute and relative meaning.
Institutional proximity	Set of common habits, routines, established practices, rules or laws that regulate the relations and interactions between individuals and groups – Focus on the **macro** level.
Organizational proximity	The extent to which relations are shared in an organizational arrangement, either within or between organizations.
Social proximity	Economic outcomes are also influenced by social ties or relations. When the relationships between two firms are socially embedded, these relationships have a positive effect on interactive learning and innovative performance of the actors – Focus on the **micro** level.

This report emphasizes the role of institutional proximity in order to compensate for geographical distance between regions. Institutional proximity can be seen as a substitute for geographical proximity and determines to what extent the actor's rules and habits are related to each other which influences the outcomes of collaborations.

2.4. Institutions

In the past it was assumed that regional development was mainly caused by investments in physical capital, e.g. by infrastructure improvements (Solow, 1956; Aschauer, 1989) and other additional factors stimulating regional development like innovation (Romer, 1986) and education (Lucas, 1988). The role of institutions contributing to economic growth have been overlooked in economic theory for decades (Boschma, 2005). Rodríguez-Pose (2013) concluded that local and regional institutions are crucial for economic development.

To better understand the role of institutions it is necessary to distinguish between organisations and institutions. North (1990) described institutions as the "rules of the game" and the organisations as "the teams that play the game in accordance with these rules". As such, the institutions can be divided into formal and informal institutions. Formal institutions include laws and rules, and informal

institutions cover the routines, habits and cultural standards which are common in a specific region or within an organisation. The goal of institutions is to govern and condition social life by reducing uncertainty in everyday life and by doing so provide (temporary) stability (Gertler, 2004; van den Broek & Smulders, 2013).

The Institutional setting of a region is the results of collective choices and are often influenced by a political process (Acemoglu & Robinson, 2008). One of the tasks of a regional government is to facilitate and stimulate businesses to invest in innovative activities. Therefore, the institutional setting of innovation systems can be directly linked to the role of the government (Capron & Cincera, 2000). Innovation systems are defined by Metcalfe (1995 in Capron & Cincera, 2000, p. 2) as "the set of distinct institutions which jointly and individually contribute to the development and diffusion of new technologies and which provides the framework within which governments form and implement policies to influence the innovation system". However, Nelson (1990) also stresses the importance of an appropriate balance between private and public incentives in encouraging technological and societal innovation.

Despite the fact that institutions are able to facilitate interaction in regional innovation systems, institutional gaps can also create hinderances for inter-regional and cross-border collaboration (Van den Broek & Smulders, 2013). These institutional gaps can be categorised into three pillars (Scott, 2005). First, regulative gaps which result from rules and regulations which are laid down in policies and laws. Second, normative gaps which result from limited knowledge about informal institutions like norms and values. And third, cultural or cognitive gaps which result from cultural and social differences. This research focuses mainly on identifying formal institutions and the regulative gaps between the selected regions and the Northern Netherlands. However, according to Scott (1995), these regulative gaps may over time operate more like normative or cultural-cognitive gaps.

An example of regulative institutions are the regional policies, which attempt to upgrade the attractiveness of regional economies as locations for investments (McCannn, 2013). Regional policies are especially important for regions which lag behind in terms of economic development. One of these regional policies is the regional innovation strategy (RIS), which embraces the idea that innovation is a key driver of economic development and aims at further developing regional innovation systems which are the network of interconnected institutions and organizations that together drive innovation among companies (Nelson, 1992). One of the aims of regional innovation strategies is to support structurally weaker regions in the process of economic adjustment. The economy is structurally changing, which is not a major problem for most regions as this change also offers new opportunities for business development which leads to economic growth, but for weaker regions, these changes can provide significant challenges. In the current cohesion policy period (2014-2020) of the European Commission,

the development of the regional innovation strategy is based on the concept of smart specialization. This concept will be described in the third chapter of this report.

At this point the question arises how institutions can be measured. An objective approach of measurement is described in the next subchapter.

2.4.1. European Quality of Government Index

The quality of institutions, either formal or informal, have been accepted to be of great importance for the degree of innovative capabilities and the scope of development (Marques & Morgan, 2018). Rodriguez and Di Cataldo (2015), in their paper about how institutions shape the innovative capacities, argue that the quality of institutions is of greater importance in less developed regions and the authors provided a causal link between the quality of local governments and the capacity of regions to generate innovation. And even though there is growing consensus about the important role of institutions for economic development of regions, the measurement of institutions is rather challenging due to the abstract nature of institutions (Rodriguez-Pose, 2013; Grillitsch, 2016).

However, the Quality of Government Institute, part of the University of Gothenburg in Sweden, have attempted to measure the quality of formal institutions at regional level and measured to which extent citizens believe that the public-services sector is of good quality, are functioning impartially and is free of corruption. The European Quality of Government Index (EQI) 2017 edition is currently the only measure available at the regional level in the European Union. Three editions (2010, 2013 and 2017) of the EQI have been published so far, in this research the 2017 version will be used to compare the institutional quality of German NUTS1 regions. This version builds upon the opinions of 78.000 citizens from 192 regions from 21 European countries (Charron & Lapuente, 2018)

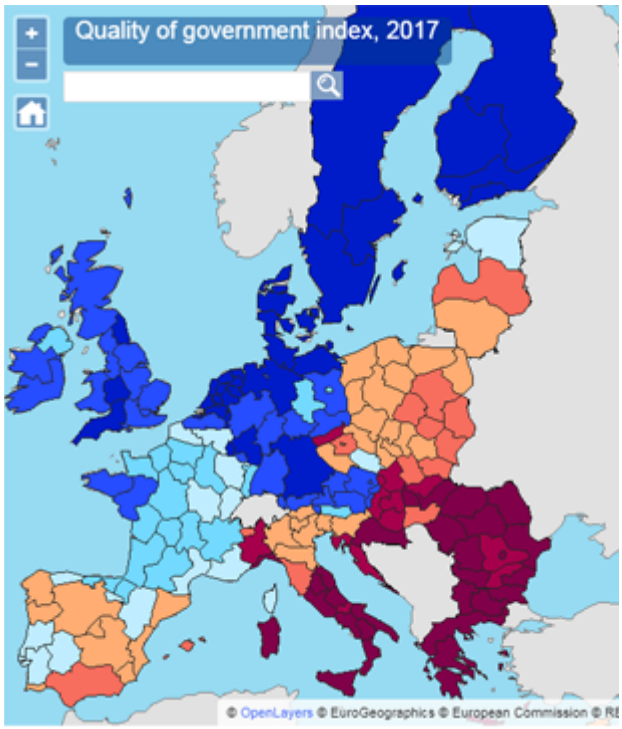


Figure 3: Quality of Government Index 2017 (European Commission, 2017)

In Figure 3 the institutional quality of government map of 2017 is presented, which shows a clear difference between the northern and southern parts of Europe and also between the west and east. In comparison to the earlier versions of the EQI especially eastern regions have shown significantly improvements in their institutional quality. The opposite is visible in some western European

regions, where the institutional quality and trust in the regional government is decline (European Commission, 2017).

The Quality of Government Institute initially started measuring the governmental quality because they saw that despite the fact that the European Union intends to reduce regional differences in terms of development, the opposite happened as differences with regard to economic performance, productivity and employment have increased over time (Charron & Lapuente, 2018). Researchers assume that the differences in performance partly result from formal and informal institutions existing in a region (Farole et al., 2011) and argue that the quality of these institutions of a regional government are an important factor in determining regional differences, because institutions shape the ability of regions to use and develop their resources. Various analyses have shown high correlations between the quality of government and other variables about the regional well-being (e.g. economic inequality, gender inequality, unemployment, educational levels and social trust).

This chapter gave an overview of relevant theories about innovation, proximity, cross-border collaboration and institutions. The next chapter will focus on the role of the European Union in fostering Innovation. Furthermore, the concept of Smart Specialisation of the European Commission as part of the European Regional Development Fund will be discussed.

3. European Regional Development Fund (ERDF)

The previous chapter gave insights in the literature about innovation and cross-border collaboration. In this chapter the focus will be on the role of the European Union in stimulating regions to innovate and collaborate. One of the key priorities of the European Union is to reduce disparities in economic performance and development among European regions (Farole et al., 2011). Innovation is an important element to secure the competitiveness of Europe in the global economy. Regional policies are often implemented partly or wholly with financial aid of public sector funds. These funds tend to be granted predominantly in less-developed regions (Eurostat, 2017). The European Union implements a great number of programs and policies which are aiming at the development of innovation to increase investments in research and development, and to better convert research into improved goods and services for the market (European Union, 2018). They are also aiming at the improvement of territorial cooperation and cohesion, the creation of jobs, economic growth, sustainable development and the overall improvement of the quality of life (Eurostat, 2017).

One of these cohesion policies is the European Regional Development Fund (ERDF), the ERDF provides financial support for the development and structural adjustment of European regions but also on territorial cooperation throughout the EU. For the current funding period from 2014 – 2020, the total budget amounts about 250 billion euro and focuses on four main priorities:

- Strengthening research, technological development and innovation
- Enhancing access to, and use and quality of ICT
- Enhancing the competitiveness of SMEs
- Supporting the shift towards a low-carbon economy in all sectors (European Commission, 2013)

3.1. Smart Specialisation

One of the tasks of the public sector to stimulate regional development. Therefore, public authorities should support the creation, dissemination and application of innovation (Edquist, 2006). But with a view to budgetary cutbacks for public support for research and development in many European regions, it is important to use funding more effectively. Earlier attempts to innovation strategies were 'spatially blind' and were based on a one-size fits all approach for both peripheral and core regions (Campagni & Capello, 2013; Barca et al., 2012). Resulting in strategies which were not designed based on the specific strengths of a region.

The concept of Smart Specialisation was introduced by the European Commission, as part of the Cohesion Policy period 2014-2020 and currently occupies a particular place in the innovation policy place (Foray, 2016; Morgan, 2017). The aim of this concept is to reduce differences between regions

and to ensure structural growth across Europe by enabling regions to turn their needs, strengths and competitive advantage into marketable goods and services (European Commission, 2017). Smart Specialisation is based on the idea that regions cannot excel in everything in sciences, technology and innovation, therefore regions need to specialise. It also intends to overcome the fact that all regions try to create or investigate more or less the same with identical approaches. This place-based approach to innovation strategies is particularly crucial for regions that are not leaders in specific science or technology domains (Foray et al., 2009). To create more diversity among regions, Smart Specialisation helps to answer the critical question about the respective and unique positions in the knowledge economy. It can be seen as an effective way to encourage regions to take a different and more strategic approach to their development activities (McCann, P. & Ortega-Argilés, R., 2014).

Against this background, all member states of the European Union were called upon to develop a Regional Innovation Strategy for Smart Specialisation (RIS3) in order to use the scarce financial resources more efficient and to be able to concentrate on promising areas.

A key element of Smart Specialisation is the Entrepreneurial Discovery Process (EDP). EDP refers to the bottom-up identification of investment priorities on R&D (European Commission, 2017). The process involves stakeholder interaction supported by a sound base of evidence with the aim to boost specific regional strengths through targeted support for research and innovation. Through its partnership and bottom-up approach, smart specialisation brings together local authorities, academia, business spheres and the civil society in a quadruple helix construction, working for the implementation of long-term growth strategies supported by European Regional Development Fund.

One important goal of smart specialisation strategies is to create more effective innovation policies and stimulate interregional collaboration in new value chains across borders (European Commission, 2017). The objective of this cross-border collaboration is that national, regional and local parties from different member states can exchange experiences and set up joint initiatives to come up with common solutions to shared problems. International collaboration in R&D is an important means for generating new and impactful ideas through the cross-border integration of knowledge. Alnuaimi et al. (2012) showed that cross-country collaboration improves not only the resulting ideas, but also includes long-term benefits for the involved inventors in terms of continuing to generate higher-impact ideas for the future. The authors argue that if inventors are located in dispersed regions, the diversity of the collective knowledge and the range of possible solutions is larger compared to a situation in which inventors limit themselves to a local cluster.

The idea of Smart Specialisation is quite simple but the actual implementation of this idea to an regional economy is rather complex and there are several issues related to RIS3 implementation. It can

be questioned whether less developed regions with low institutional capabilities are able to implement an effective regional innovation policy (Marques & Morgan 2018) because for the implementation of the RIS3, regions rely also heavily on the innovative capabilities of entrepreneurs and SMEs.

3.2. European territorial cooperation - Interreg

As part of the ERDF, several programs exist which have a specific theme, for instance Horizon2020, which focuses on an excellent knowledge base, industrial leadership and societal challenges. Another program is Interreg which aims at European territorial cooperation, Interreg provides a framework for the implementation of joint actions and policy exchanges between national, regional and local actors from different member states (European Commission, 2018). The ultimate goal of Interreg is to tackle common challenges together and find shared solutions in for example the field of health, research and education, transport and sustainable energy.

Figure 4 shows that Interreg has grown rapidly since the program was developed in 1990. An increasing amount of member states are involved in the program and the height of funding have risen gradually from 1,1 billion euros between 1990-1995 to over 10 billion euros in the current funding period 2014-2020.

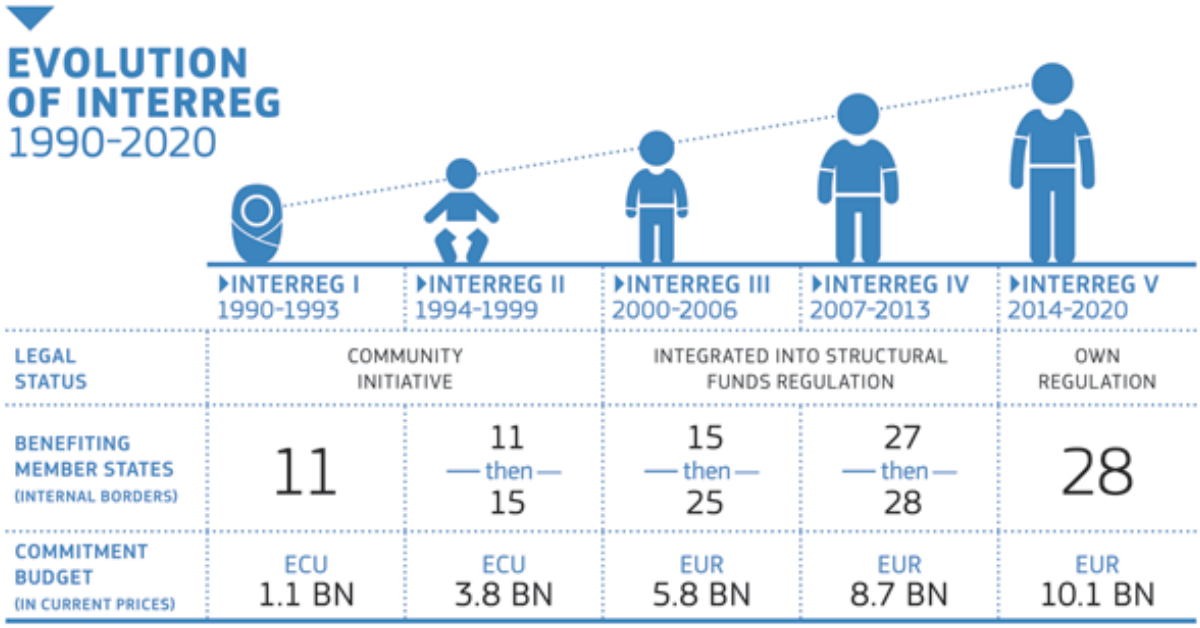


Figure 4: Evolution of Interreg 1990-2020 (European Commission, 2015)

The Interreg program is again subdivided into three programs (Interreg A, B and C), each program is based on a different subnational cooperation level. The different programmes and how the Northern Netherlands is involved in each program will be described shortly in the next sections.

3.3. Interreg A - Cross-border Cooperation Programs

Interreg A supports the cooperation between adjacent regions from at least two different member states. The program aims to tackle common challenges and to exploit the growth potential of bordering regions. Interreg A promotes to cross the border in order to find employment, harmonizing working conditions or receive better healthcare. The Northern Netherlands is involved in the Interreg A program Deutschland-Nederland which goes along the whole Dutch-German border as illustrated in figure 5.

3.4. Interreg B - Transnational Cooperation programs

Interreg B is oriented towards transnational cooperation between functional regions and promotes the cooperation of people and organisations across administrative and national borders. Interreg B involves regions from several countries of the EU forming larger areas and is related to innovation, environment, accessibility, telecommunications and urban development. The Northern Netherlands is part of the Interreg North Sea Region in which several regions from the Netherlands, Belgium, Germany, Sweden, United Kingdom are involved. In addition Denmark and Norway are involved as a country as shown in figure 6.

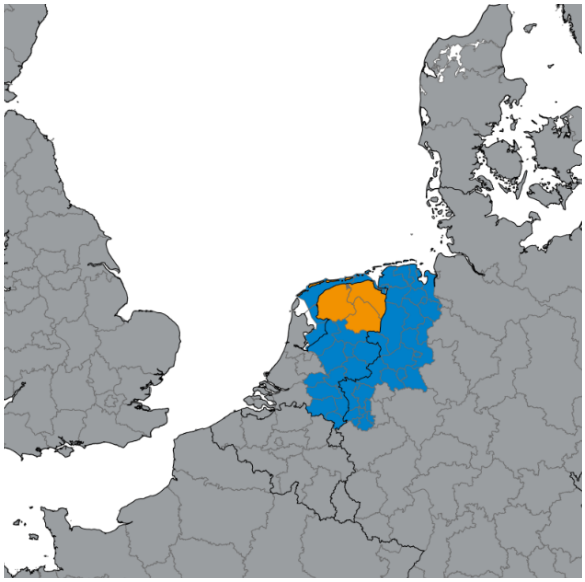


Figure 5: Interreg A - Deutschland-Nederland

Figure 6: Interreg B - North Sea Region

3.5. Interreg C - Interregional Programs

Interreg C, or also known as Interreg Europe, includes projects which cover all European member states but also allows regions outside the EU to participate in a project. Regions can be part of different projects within Interreg Europe and builds on networks to develop good practices and facilitate the exchange and transfer of experiences by successful regions. The Northern Netherlands Alliance (SNN) is currently involved as a partner in two Interreg Europe projects, namely BeyondEDP and ClusterFY.

BeyondEDP deals with the question how regions can encourage companies, knowledge institutions and relevant partners in Europe to search for new ideas leading to innovation in the entrepreneurial discovery process (EDP). In this project, partners from Belgium, France, Germany, Italy, Romania, Sweden, Spain and Poland are involved (figure 7).

Another Interreg Europe project in which the Northern Netherlands is involved is ClusterFY. ClusterFY aims to improve regional and national policy instruments seeking to intensify Key Enabling Technologies (KET's)-related to the creation of clusters as well as fostering interregional cooperation between and among clusters and business networks and encourage their integration into innovative value chains. In this project, partners from Lithuania, Sweden, Poland, Romania, Spain, Slovakia and Greece are involved (figure 8).

Apart from SNN, also other organisations (e.g. municipalities) can be involved in other Interreg Europe projects and collaborate with other European regions.

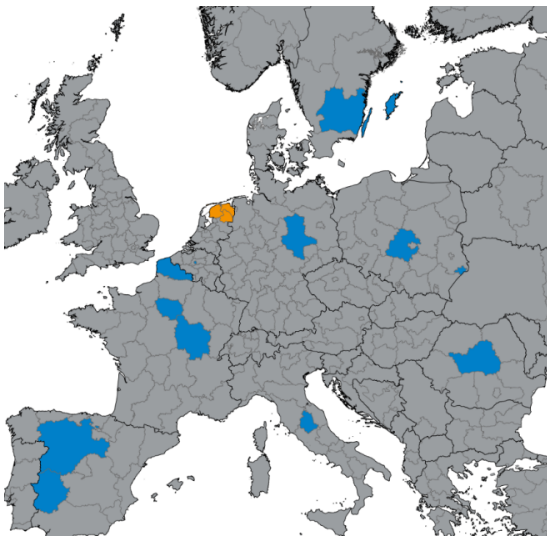


Figure 7: Interreg Europe - BeyondEDP

Figure 8: Interreg Europe - ClusterFY

This chapter has analysed and described the different elements of the European Regional Development fund. This is relevant to this research as the empirical study is based on the concept of smart specialisation.

4. Methodology

In the previous chapter, the relevant theory concerning innovation, cross-border collaboration, institutions and cohesion policies have been discussed. The methods used during this research will be presented in this chapter. First it will be described how the case studies of this research have been selected. The next part of this chapter deals with the research methods used during this research and ends with the analytical framework.

4.1. Selection of the case studies

Regions are often benchmarked based on their Gross Domestic Product (GDP) which measures the economic performance of regions resulting from the monetary value of goods and services produced by the economy during a given period. It is a useful measurement for the comparison of different regions, but it is insufficient to capture the complex nature of economic and societal progress in European regions (European Parliament, 2016), as it does not take into account subjective factors like institutions or satisfaction of citizens. An alternative to compare European regions have been developed by the Quality of Government Institute of the University of Gothenburg, namely the European Quality of Government index (EQI). The latest version of the EQI originates from 2017 and is the third round of data collection after 2010 and 2013. The EQI is used in this research to compare the institutional quality of German regions by means of an objective approach in order to select the case studies. The EQI measures to which extent citizens believe that the public-services sector is of good quality, are functioning impartially and is free of corruption. The data is available on NUTS1 level.

Based on the EQI, four German regions have been selected for an in-depth analysis of their institutional setting in which specific attention will be paid to the role of smart specialisation and cross-border collaboration. The EQI-measurement outcome of the Northern Netherlands is used to select four German regions. Two federal states will be selected which are institutionally strong and 'close' to the Northern Netherlands and two which are rather weak and 'distant' to the Northern Netherlands. This approach has been chosen because it will be investigated whether the institutional setting of a region is able to compensate for geographical distance between the regions and if differences in EQI outcomes are also reflected in the in-depth analysis of this research.

In 2017, the Northern Netherlands scored 78,8 points on the EQI 2017 and ranked on the 9th position compared to 202 European regions. For the analysis two regions which are close to the EQI of the Northern Netherlands have been selected and two which are institutionally weaker compared to the other German regions and the Northern Netherlands.

Figure 9: European Quality of Government Index German states and the Northern Netherlands (Authors own production, data retrieved from Charron et al., 2017)

Figure 9 shows the institutional quality of the 16 German states. The selected regions for the in-depth analysis are:

- Bavaria (Bayern) (Score: 78.6, ranking 13/202)
- Lower Saxony (Niedersachsen) (Score: 76.5, ranking 20/202)
- Berlin-Brandenburg[1] (Average Score 64.1, ranking 62/202)
- Saxony-Anhalt (Sachsen-Anhalt) (Score 62.2, ranking 70/202)

[1] The regions Berlin and Brandenburg have been merged into one region because these regions have a joint regional innovation strategy.

4.2. Research methods

To answer the research questions, different research methods have been used. A quantitative approach to compare some basic indicators of the region. In addition, two qualitative approaches have been used, namely a literature study and conducting interviews. Overall, this research has an explorative character, which means that this research intends to explore the research topic and helps to better understand the topic of institutions and cross-border collaboration within the European Union.

To compare the progress of economic development in the different regions, several demographic and economic indicators have been selected. Six different indicators have been used to benchmark the regions with an objective and qualitative approach: population, unemployment rate, GDP per capita, R&D spending total and as percentage of GDP and R&D expenditure of the business enterprise sector as percentage of GDP. Eurostat have been used as the main source of data collection. Within Europe, Eurostat is responsible to provide statistical information about all European member states. For all indicators the most current data is used.

After this objective way of regional benchmarking, a more in-depth and subjective analysis of the institutional setting will follow. This was done by qualitative research in which a mixed methods approach of semi structured interviews and document reviews was used. For each region, the Regional Innovation Strategy for Smart Specialisation (RIS3) for the current ERDF period 2014-2020 was taken as a starting point for the analysis. The information was gained primarily by document analysis of innovation policies and where necessary strengthened with information acquired from interviews with policy makers engaged in the process developing regional innovation strategies. In preparation of this research, the researcher has succeeded a massive open online course (MOOC) at the BAK S3 Association about innovation policies for regional development. The course provided numerous perspectives regarding the concept of smart specialisation.

Throughout this research, both primary and secondary sources have been used. Primary sources include policy documents of the different regions and their operational programs. Secondary sources consist mainly of scholarly articles and information gained from the Smart Specialisation Strategy (S3) Platform of the European Commission. This platform provides advice to European regions for the design and implementation of Smart Specialisation Strategies and policy makers can exchange their experiences regarding the implementation of innovation strategies. In order to determine the attitudes of regions towards cross-border collaboration, the policy documents were scanned for various key words such as collaboration, cooperation, internationalisation or inter-regional.

The research method of this research is a comparative analysis. This method has been chosen to gain a better understanding of the differences between the regional innovation strategies, implementation and attitudes towards cross-border collaboration in the selected regions. Building on the comparative analysis of the institutional setting of the Northern Netherlands and the selected German federal states, the institutional differences between these regions and the implications for future cross-border collaboration have been identified.

Interviews

To maximize the understanding of the institutions involved in the innovation process in a regions, several interviews have been conducted during this research. The interviewees which were consulted, are selected because they were appointed as a contact person of the affected regions on the S3-Platform of the European Commission. The S3-platform provides advice to European regions for the design and implementation of their Smart Specialisation Strategy. All interviewees work for the regional government and are involved in the implementation of the regional innovation strategy. In some cases, the contact person mentioned on the platform was not the right contact person, in these cases the employee provided the contact details of the employee involved in the innovation strategy. An overview of the interviewees can be found in appendix 8.1.

The aim of the interviews was to gather improved understanding of which role smart specialisation plays in the regional government and how they think about cross-border collaboration. The interviews with the German interviewees were conducted either by phone or in writing. Due to geographical distance to the selected regions it was not possible to meet the interviewees in person. This can also be a hindrance to successful cross-border collaboration. However, due to technological development it was also possible to gather information from a distance.

As the circumstances in each region differ, there was no strict guide for every interview and the interviews were semi-structured. Each interview was prepared individually and the questions were sent to the interviewees in advance, this gave the interviewee the opportunity to prepare the interview. In one case, at the request of the interviewee, the questions were answered by e-mail.

Appendix 8.2. provides an overview of the main sources consulted to answer the sub questions and which questions were asked during the interviews.

4.3. Analytical framework

Figure 10 illustrates and summarizes the different steps of this research and shows the structure of the results chapter. The regional context of each region will be described briefly, followed by an analysis of the R&D priorities and attitudes towards cross-border collaboration. The outcomes of this analysis have been compared to the Northern Netherlands and institutional gaps have been identified. Finally, the implications for future cross-border collaborations are described.

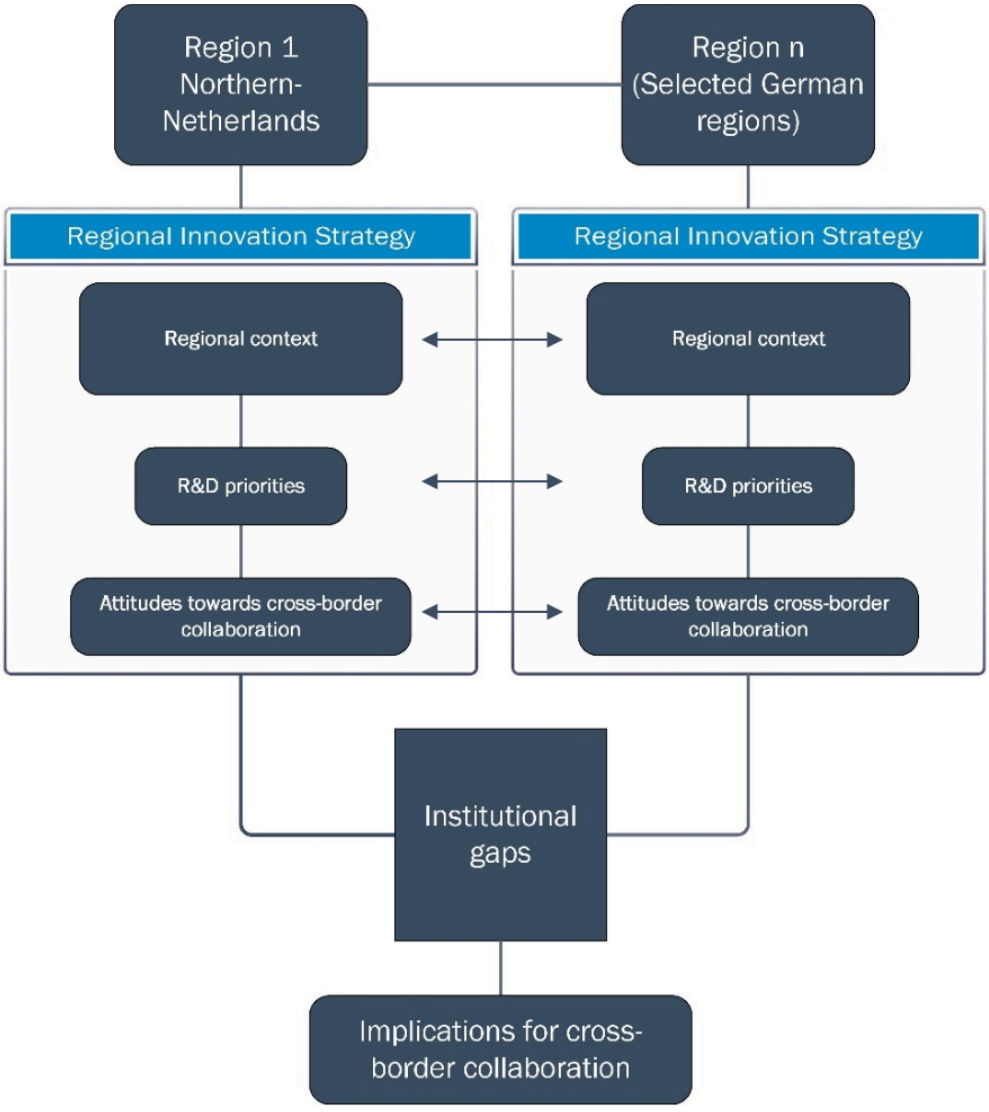


Figure 10: Analytical framework research

5. Results

Before the regional innovation strategies of the selected regions will be discussed, the regions will be benchmarked based on some main economic regional indicators. These indicators have been chosen to compare the regional differences and state of economic development of the regions.

Table 2: Regional economic indicators selected regions (S3 Platform, 2017)

Region	Population (2015)	Unem-ployment (2016)	R&D spending total (million euro)(2013)	GDP per capita (2015)	R&D spending as percentage of GDP (2013)	R&D expenditure Business Enterprise Sector (private) as percentage of GDP (2013)
Northern-Netherlands	1.718.775	6,5 %	766,38	€33.800	1,19 %	0,49 %
Bavaria	12.691.568	2,5 %	15.922,07	€43.100	3,14 %	2,40 %
Berlin	3.469.849	7,8 %	4.007,94	€35.600	3,55 %	1,49 %
Brandenburg	2.457.872	4,6 %	932,99	€26.500	1,54 %	0,45 %
Lower-Saxony	7.826.739	4,0 %	6.999,96	€32.900	2,83 %	1,92 %
Sachsen-Anhalt	2.235.548	7,4 %	776,78	€25.100	1,41 %	0,42 %

Table 2 shows that Bavaria and Lower-Saxony perform well on all indicators. In Bavaria, a high percentage of R&D expenditure by the private actors is striking, around 80% of all investments in R&D are spent by the business enterprise sector. Also in Berlin and Lower Saxony entrepreneurs are very eager to innovate, shown by an overall higher percentage of R&D spending of GDP. The opposite of these regions are the Northern Netherlands, Brandenburg and Sachsen-Anhalt, these regions show overall lower investments in R&D and are more dependent on public funding. Hereby, it is noticeable that the German regions which have proven to be institutionally weaker in the European Quality of Government Index (EQI) are those regions which also underperform in terms of R&D spending and also need more financial support from the European Regional Development Fund in the 2014-2020 period as shown in figure 11. The figure illustrates the total height of subsidies allocated to the German states for the period 2014-2020. Rodríguez-Pose and Di-Cataldo (2015) also provided evidence that there is

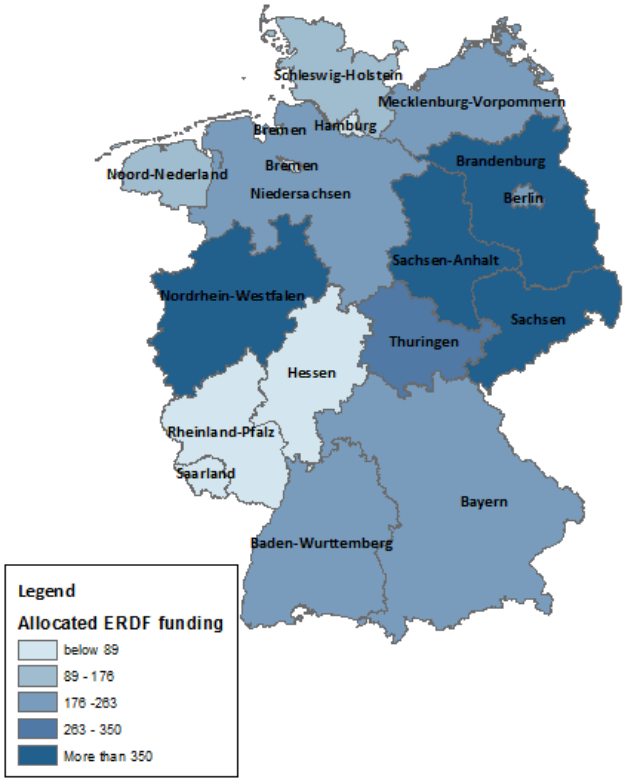


Figure 11: Allocated funding from ERDF fund (European Commission, 2017)

a causal link between the quality of local governments and the capacity of regions to generate innovation. The underlying regional differences of the economic structure will be described in the regional context in the next sections of this report.

Before proceeding to examine the regional innovation strategy of the Northern Netherlands and the selected German regions, the national innovation policies will be described briefly as it helps to understand the position and the role of the regional innovation strategy within the national context.

5.1. Dutch innovation system

Together with Germany, the Netherlands has been one of the world's most innovative nations and belong to the leading group of countries with innovation performance well above the EU average (Global Innovation Index, 2017). To maintain the competitive and innovative position of the Netherlands a number of innovation policies have been developed by the Dutch government.

In 2011, nine top sectors were appointed by the national government which are knowledge-intensive and export-oriented. In each of these sectors, entrepreneurs and scientists indicated how they want to strengthen the global position of that specific sector. Based on this approach, the government improves funding opportunities, rules and sufficient skilled workers (human capital), because these sectors are of strategic importance to the Netherlands. The nine top sectors of the Netherlands are illustrated in figure 12.

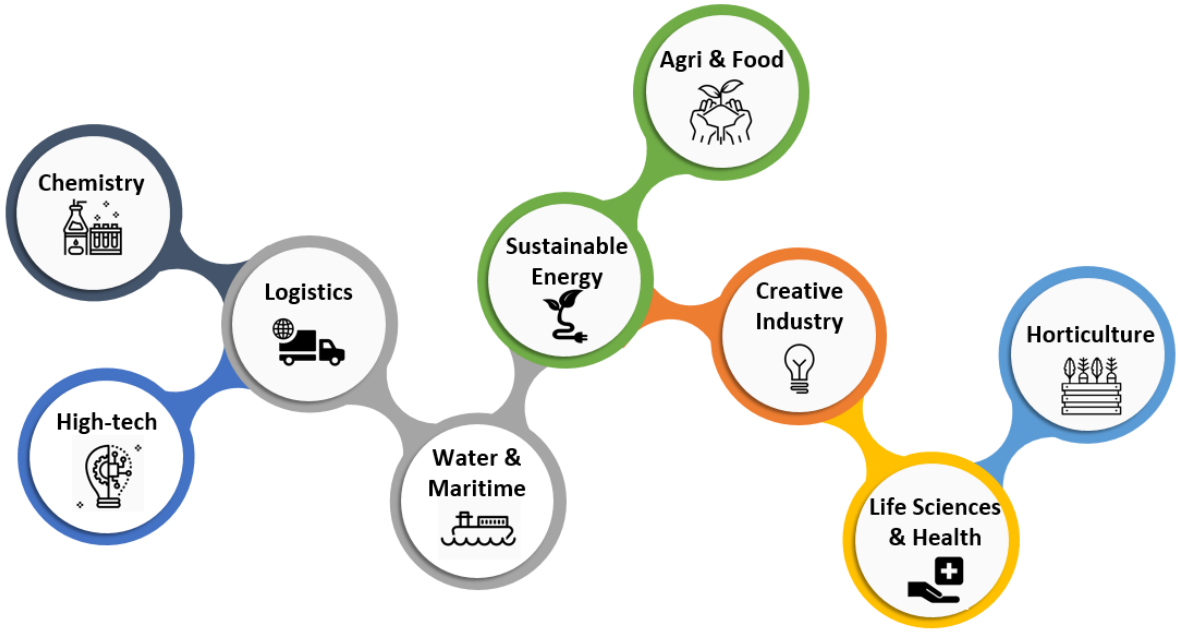


Figure 12: Top sectors of the Dutch government

By 2020, the Netherlands wants to be in the top five of most knowledge-intensive economies. To achieve this, the country wants to increase investments in R&D to 2,5%. In 2016, the R&D intensity of the Netherlands stood at 2,03% of GDP. Leading regions in the Netherlands in terms of R&D investments are the provinces Noord-Brabant and Zuid-Holland. These regions account for almost half of the total private R&D spending. Groningen, Drenthe and Zeeland belong to the provinces with low efforts in R&D (CBS, 2017).

Regional Innovation Strategies for Smart Specialisation in the Netherlands

In addition to national policies, the Netherlands also has regional innovation policies. Regional Innovation Strategies for Smart Specialisation (RIS3) are formulated on country part level (NUTS 1). As such, the Netherlands is divided into four regions, north, east, south and west (figure 13). Every region consists of three provinces. For the implementation of the ERDF program period 2014-2020, the Netherlands receives €507 million from the European Union.

Figure 13: Country parts the Netherlands

This research focuses on innovation policies of the Northern Netherlands, which we will turn to in the next section.

5.1.1. Northern Netherlands

Regional context

The Northern Netherlands is one of the four country parts of the Netherlands and consists of the provinces Drenthe, Friesland and Groningen. The three provinces collaborate with regard to the regional innovation strategy and national and European funding as the provinces have comparable economic, social and demographic characteristics. Even though they work together in the field of innovation, each province still has its own provincial government. In 2017, 1,7 million people lived in the Northern Netherlands which is about 10% of the total population of the Netherlands (CBS, 2018), overall the region is sparsely populated. The regional GDP per capita was €33.800 in 2015 (Eurostat, 2015), which is below the Dutch average of €39.937.

In preparation of the innovation strategy, the Northern Netherlands have mapped their regional strengths and weaknesses. The strengths of the Northern Netherlands are that the region offers enough space for recreation, housing and for companies to settle their business. Furthermore, the inhabitants of the Northern Netherlands are seen as reliable people with a hands-on mentality. Besides this, the Northern Netherlands has broad knowledge institutions (SER, 2012). The region has one academic university, the diverse faculties are mainly located in the city of Groningen. However, in addition the University of Groningen has a campus in Leeuwarden. Moreover, the Northern Netherlands has two Universities of Applied Sciences, namely NHL-Stenden and Hanze, whose educational locations are spread over the entire region. Besides the contribution to public research, public-private collaborations play an important role for the educational institutions. A prominent example is the Energy Valley, which is a joint effort by the market, knowledge institutions and the government to contribute to the production of clean and innovative energy. In 2013, the energy sector offered fulltime jobs to 31.300 citizens at 4.550 companies (Energy Valley, 2013).

Economic activity is mainly concentrated around the cities which can be considered as urban cores. In the Northern Netherlands these cities are Groningen, Leeuwarden, Assen and Emmen. The economy of the Northern Netherlands is characterized by a large number of SMEs, as such the region has only a limited number of large companies located in the region, which often account for a large proportion of private R&D expenditures. Important sectors with a high share of employment are the health care, trade, business services, industry and education.

The Northern Netherlands faces several challenges such as an ageing population and contraction in the rural areas of the provinces. Currently The natural gas extraction in Groningen and the resulting earthquakes are an important issue in regional and national politics. By gradually phasing out gas production in the province of Groningen, the province, but also the rest of the Netherlands, have a

considerable challenge in the energy supply of a large number of households and businesses which are currently dependent on gas, this challenge requires innovative and sustainable solutions.

For several years in a row, the Northern Netherlands Alliance (SNN) and the University of Groningen (RUG) annually publish the regional Innovation Monitor for the Northern Netherlands. The results of 2017 have shown that firms from the Northern Netherlands which are investing increasingly in R&D are improving their innovative capacity, but at the same time the high investments in R&D lower the profitability of these firms. This effect seems to be higher for firms investing solely in technological innovation, while firms which invest in technological and organisational innovation (the introduction of new business practices for organizing work and responsibilities inside and outside the firm) are able to innovate at relatively low costs (Faems, 2017). Moreover, businesses involved in the innovation monitor indicated that lack of time and financial resources are seen as the main impeding factors for innovation.

To increase the innovativeness of businesses and knowledge institutes in the Northern Netherlands, several stakeholders have developed the Regional Innovation Strategy for Smart Specialisation in 2013. The R&D priorities will be discussed in the following section.

R&D priorities

The three provinces have assigned the management authority Samenwerkingsverband Noord-Nederland (Northern Netherlands) to be responsible for the allocation of regional, national and European funding and the ERDF Operational Program of the Northern Netherlands. SNN is a semi-public organization which was created with the aim to strengthen the economic position of the region by fostering innovation and is a bridging organisation between the three northern provinces. SNN played a key role in the development of the RIS3. The Northern-Netherlands started developing their RIS3 in 2012 as a co-creation process with several stakeholders from the region, they brought together the business community, knowledge institutes, the civil society and authorities with the aim to use innovation to achieve societal and economic ambitions, not solely on the regional level but also within the broader European and global context. Instead of prioritise specific economic sectors in Research and Development, the Northern Netherlands decided to implement a challenge-based approach in their RIS3. The region is committed to tackle four societal challenges, namely (1) Health, Demography and Welfare; (2) Food Security, Sustainable Agriculture and Bio-Economy; (3) Reliable, Clean and Efficient Energy and (4) Clean, Safe Water. Within the RIS3, an analysis has been made to distinguish the clusters that can contribute maximally to the regional competitiveness of the Northern Netherlands and to the four societal challenges. This analysis resulted in five key clusters: Agrifood, Energy, Healthy Ageing, High Tech and Sensor Systems and Water. These are clusters in which the

Northern Netherlands has a distinctive profile and which make a necessary contribution to the specialization of the region.

It have been a deliberate choice to keep the societal challenges rather broadly defined as the specific focus will be initiated and developed during the implementation process of the RIS3 (SNN, 2018). This approach aims at connecting different resources and knowledge across fields by creating cross-overs between different sectors in order to provide solutions to the societal challenges. Focusing on these challenges can be beneficial because it gives a broader set of regional stakeholders the opportunity to come up with innovative ideas, rather than excluding some sectors beforehand. Nonetheless, smart specialisation requires that regions narrow down these broad domains into specific fields in order to achieve competitive advantages (OECD, 2013). This focus is currently lacking in the Northern Netherlands.

Figure 14 gives an overview of the challenges, ambitions and coordination of the RIS3 agenda of the Northern Netherlands.

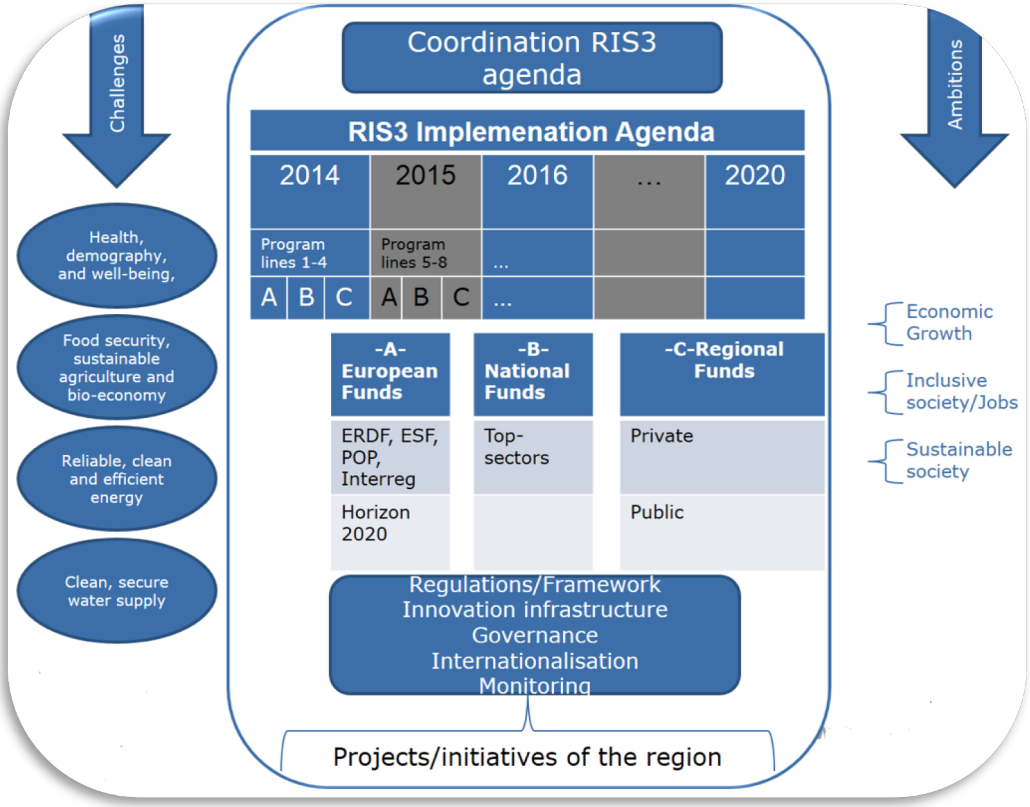


Figure 14: Coordination RIS3 agenda Northern Netherlands (SNN, 2017)

For the implementation of the RIS3, the region uses several policy instruments to foster the process of smart specialisation for instance with the open innovation call. Instead of focusing on an individual innovation process, the open innovation call focuses on integrated initiatives that generate related innovation processes in order to improve the innovation ecosystem. The call is addressed to businesses

and knowledge centres which want to cooperate in order to develop initiatives that are capable of generating a series of related innovations, which together can become economic strengths of the Northern Netherlands.

The strategy of the Northern Netherlands is focused on the ambition to tackle the four societal challenges. However, during the interviews with employees from SNN it became clear that the region also faces a number of challenges related to the implementation of the innovation strategy. The Northern Netherlands Alliance believes that smart specialization should be a continuous process in which an innovative environment will be created, but it is a major challenge to keep everyone involved and motivated during the process of developing this innovative ecosystem. And even though the Northern Netherlands has an overrepresentation of SMEs in the economy with more than 95%, especially these SMEs have limited innovative capacities and are cautious when it comes to investments in innovation as we saw in table 2. At the same time also the government is holding back in supporting risky projects of SME's or public-private partnerships.

Attitudes towards cross-border collaboration

By broadening the scope of the regional innovation strategy, the region hopes to find the solutions for the creation of an innovative ecosystems and the societal challenges beyond their regional borders. Cross-border collaboration should be used to exchange best-practices and to connect environments across borders in order to create multi-regional ecosystems with connected value-chains and global pipelines to actors outside the region. Therefore, one of the cross-cutting themes of the Northern Innovation Agenda (2014-2020) is the internationalisation of the region (Taskforce RIS3 Noord-Nederland, 2015). It is assumed that generating more export contributes to the economic development of the region and that connecting to external knowledge helps to develop new products and services. As shown in the chapter about the European Interreg program (chapter 3), the Northern Netherlands is already actively collaborating within the European Union.

The innovation agenda of the Northern Netherlands is focusing on the collaboration between SMEs of the Northern Netherlands and Northern Germany. In addition, the Northern Netherlands should select other regions or networks for collaboration on the European or global level which are interesting for the development of solutions to the societal challenges, cooperation in EU-programs or as a market for products and services from the Northern-Netherlands. In order to achieve these goals, knowledge institutions and large should give SMEs access to their international networks. Another aim of the innovation agenda was to develop a joint internationalisation strategy for the three northern provinces with a special focus on the relationship between innovation and internationalisation, however this strategy has not yet been drawn up.

5.2. German innovation system

Germany is a country which is mainly driven by the creation of knowledge and technologies and characterized by broad fields of research and development, which makes it one of the most research-intensive and innovative economies in the world (OECD, 2018). German businesses are pioneers in the development of innovative products and "Made in Germany" internationally represents high quality standards. The Federal Government of Germany is aware of their economically strong position within Europe and sees itself as a driving force of the European research area (BMBF, 2014). One of their main concerns is to maintain their strong competitive position in the face of several societal and economic challenges.

The Federal Republic is actively supporting the internationalisation of science and research and aims to achieve four specific goals.

- **Strengthening research cooperation**

  German researchers should cooperate more intensively with the world's best scientists; Germany should be home to the best scientists and students from all over the world.
- **Development of innovation potential**

  German businesses should secure and expand cooperation with the leading and emerging high-tech sites and research centres of the world
- **Strengthening cooperation with developing countries**

  To improve education and research in developing countries, scientific and technological cooperation and development should be better coordinated
- **International responsibility to tackle societal challenges**

  Germany wants to use its research and innovation potential to solve global societal challenges (BMBF, 2018).

To achieve these goals, Germany wants to improve the mobility of scientific staff, international collaboration in research programs and an internationally coordinated research policy.

In addition to the innovation policies of the Federal Republic of Germany, the states carry out a large number of region-specific research-, technology- and innovation policy measures. The federal structure of Germany allows the 16 federal states to develop and use their specific regional capabilities, resources and infrastructures in regional innovation policies. The German Basic Law gives the states considerable say in R&D policy. This is particularly the case for higher education policies where each state independently enacts its own legislative framework (European Commission, 2018), in contrast to the Netherlands, where education policy is determined by the national government.

Regional Innovation Strategies for Smart Specialisation in Germany

Several studies (Kroll et al., 2014; Camagni & Capello, 2013) have shown that the challenges arising from the RIS3 agenda are less pronounced in Germany compared to southern and eastern European member states, which still have to develop the institutional basis and in which participatory processes partly conflict with regional administrative traditions. In many German states, like for example Bavaria and Lower Saxony active industrial and technological policies have played a central role for many decades (Kroll & Stahlecker, 2015). Since the reunification of Germany, also the eastern states have made efforts to stimulate the creation of innovative clusters within their region.

The results of the policy analysis of the RIS3 of Bavaria, Berlin-Brandenburg Lower Saxony and Saxony-Anhalt are described on the following pages.

5.2.1. Bavaria

Regional context

In terms of surface area, Bavaria is the largest state of Germany and is an economically strong region located in the south of Germany. It is home to globally operating firms, like BMW and Siemens, and has a dense network of SMEs, trade- and service firms. The driving force behind the Bavarian economic development is the manufacturing industry as the share of industrial employment is higher compared to the German average (BMWI, 2016). Moreover, the Bavarian services sector is highly competitive, especially in the urban areas such as Munich and Nuremberg. As a state, Bavaria produces about 18% of the total German GDP (European Commission, 2018), GDP per capita was €43.100 which is by far the highest of all selected regions. In terms of private R&D investment, Bavaria also performs very well as 80% of all R&D investments is spent by the business sector. An important contribution to R&D also comes from the multiple research institutes in the region (9 public and 7 private universities). In addition, large German non-university research institutes such as Max Planck and Fraunhofer have their headquarters in Munich.

Economic activity is mainly concentrated around the urban areas in Bavaria. Along the Czech border the Bavarian economy is less developed, GDP per capita in this area is about 20 per cent lower than the Bavarian average resulting from in general lower level of employment and citizens are often employed in declining sectors such as the textile, ceramic and glass industry. The rural border regions have a relatively low population density and due to distance to main infrastructure network these areas have major locational disadvantages (BMWI, 2016). Moreover, the rural areas face a demographic change and can be seen as contracting and aging regions, however this pattern can be observed in many European rural areas.

R&D priorities

Bavaria's RIS3 is in fact the innovation strategy drawn up as a collaboration between various ministries of the Bavarian government in 2011. For the ERDF-program period 2014-2020 the region did not redevelop the strategy as they saw Smart Specialisation as a confirmation of how the region have been pursuing innovation policies for decades (European Commission, 2018) rather than a new approach. The Ministry of Economics, Infrastructure, Transport and Technology of Bavaria is responsible for the innovation strategy in the first place but the innovation strategy of Bavaria has been drawn up in collaboration with other ministries, especially with the Ministry of Science, Research and Arts. External

organisations, involved in the process of developing the innovation strategy, were Bavarian business representatives from for instance the chamber of commerce, the association of the Bavarian economy and also representatives of science (European Commission, 2018).

The main priority of the Bavarian innovation policy is to secure their top position as innovation leader in Germany as well as in Europe and the World. Moreover, Bavaria wants to increase their R&D intensity from 3,2% to 3,6% by 2020. In order to achieve this, six main goals have been formulated by the Bavarian state government, namely:

1. Strengthen social awareness of science and research
2. Optimizing the framework for research, technology and innovation
3. Promote the competitiveness and growth of companies at all levels
4. Aligning policy instruments for research, technology and innovation in a regionally balances manner
5. Strengthen Bavaria's competition for EU and federal funds through stronger cooperation
6. Thematic priorities for research and technology policy

The fifth goal relates to the strengthening of cooperation between universities, universities of applied sciences and non-university research institutions within Bavaria rather than the collaboration with other regions outside Bavaria.

The Bavarian government argues that they do not have the preferential information that could justify a narrow selection of a few fields of specialisation in research and development as they believe that scientific institutions should operate as broadly as possible. But on the other hand limited financial resources forces the region to define priority areas, especially in the predominantly publicly funded academic research. Therefore, Bavaria will focus on technology fields, which are of great importance to solve particular societal challenges, the growth of businesses and the creation of jobs in the region. In the coming years Bavaria will concentrate on these fields:

- Life Sciences, especially biotechnology and system biology
- Information- and communication technologies
- Efficient production technologies, mechatronics, automatization and robotics
- New materials, intelligent materials, nano- and microtechnology
- Clean Tech – resources preserving energy-, transport- and environmental technologies, renewable resources (i.e. biofuels), e-mobility
- Innovative, technology-based services

Attitudes towards cross-border collaboration

In the Bavarian innovation strategy, cross-border collaboration is not directly mentioned, therefore one might argue that the Bavarian economy is rather closed towards cross-border collaboration. However, the Bavarian government is also engaged in cross-border networks especially with bordering regions in the Czech Republic and Austria. The Bavarian government is also part of a global network with seven regions from four different continents (Bavaria, Georgia (USA), Upper Austria, Quebec (Canada), São Paulo (Brazil), Shandong (China) and Western Cape (South Africa)). The aim of this network is to strengthen the global economy, scientific and social collaboration in order to solve the challenges of globalisation and to take advantage of accompanying opportunities. Moreover, the Bavarian Ministry of Economic Affairs organizes delegation trips to help Bavarian businesses to find contacts in countries with great economic potential. In November 2018, the delegation will visit the Netherlands. Their main destinations are Rotterdam, Eindhoven, Utrecht and Amsterdam. The content of this trip is based on 'Smart Technologies and Applications for Logistics, Port, Circular Economy, Energy, Bio/Chemistry and Refinery' (STMWI Bayern, 2018). The Northern Netherlands is currently not collaborating with Bavaria within one of the European Interreg programs.

The innovation strategy of Bavaria is primary defined from an internal approach. However, on their governmental website about European policies, the state government argues that many of the societal challenges (e.g. migration crisis, fight against terrorism or ongoing globalisation) can only be solved if European Regions cooperate. The government believes that cooperation within or outside the institutional framework of the European Union requires both solidarity and a shared sense of responsibility. Because without the willingness to follow up agreements and rules, Europe would fall back into nationalism (Bayern, 2018). The region is committed to an honest European political dialogue about the common currency and an effective cooperation for internal and external security. Less attention is paid towards collaboration about innovation. For the upcoming funding period from 2021-2027, the Bavarian state government defined its position on the European development policies in 2016. Their main concern is that EU structural policies should remain open to all regions of Europe, also for the more developed regions such as Bavaria because well-developed regions can operate like 'locomotives' for less-developed regions. On the other hand, also in developed regions there are still regional disparities which need to be reduced in order to create equal living standards throughout the country. In their position paper 'Regions4Cohesion', Bavaria attaches value to strengthening cross-border collaboration, since the added value of the European territorial cooperation is particularly visible. Therefore, opportunities for collaboration between regions from two or more countries need to be broadened and embedded. A better adapted implementation process would allow to better address Europe's largest strategic challenges (Bayern, 2016).

5.2.2. Berlin-Brandenburg

Regional context

Berlin and Brandenburg are actually two separate federal states, but the two regions decided to join their innovative forces back in 2006 by developing a shared regional innovation strategy, called innoBB. The capital region of Germany aims to secure the region's innovation capacity and strengthen their international competitiveness by the creation of cross-state clusters.

In total, almost 5 million people live in the region, from which 3,47 million live in the capital city Berlin (Eurostat, 2015). Since the city was divided from 1961 to 1989, many large companies, for instance Lufthansa, Siemens and Deutsche Bank, moved their head offices away from the capital city to other parts of the country. Resulting in a stagnation of the regional economy during the cold war. Therefore, Berlin was structurally weak for many decades. After the reunification of Germany in 1990, the economy has caught up rapidly and is now one of the European cities with a dynamic and innovative business ecosystem and many start-ups (European Commission, 2018) with R&D spending (3,5%) well above German (2,8%) and European average (2%)(Eurostat, 2015). However, the researchers are still very dependent on public funding and patents are mainly requested by a high number of public research institutes in the capital city. In total Berlin has four academic universities, in addition the state Brandenburg has three universities. To this we can add another eleven universities of applied sciences and several private research institutes (e.g. Fraunhofer an Max Planck institutes).

Comparing the three pillars of the EQI (quality, impartiality and corruption) it is striking that Berlin is ranked particularly low on the quality pillar. The quality pillar investigates the quality of education, health care and law enforcement. An explanation for this performance could be the high unemployment rate in Berlin. Despite the fact that in recent years the number of jobs (supply) in Berlin has risen, also the demand for jobs has grown. On the one hand, because more people are willing to work and, on the other hand, because also Berlin attracts employees from other regions. Resulting in a weaker decline of the unemployment rate compared to other German regions. Also an above average share of unemployed people in Berlin rely on Hartz IV (German unemployment benefit paid after the first 12-18 months of unemployment), which is usually an indication of extended unemployment or lack of working experience. About half of the unemployed have no vocational training and many of those who have undergone vocational training wish to pursue occupations in which the chances of getting a job are low or are in decline. This also partly applies to (young) people

in academic occupations, especially for social sciences and artists. Obviously, for these groups Berlin works like a magnet, however the opportunities for employment are (still) insufficient (DIW, 2011).

R&D priorities

The strong collaboration of the two states started already in 2006 with their program 'Capital Region Berlin-Brandenburg'. The strong innovative position of the German capital city is used to further develop the broader region including Brandenburg. The cooperation is based on the idea that functional regions and their interdependencies do not stop at regional borders and the creation of this cross-border network involved citizens, associations, municipalities and politicians. The goal of InnoBB is to increase the synergies in the entire region, to expand the science and research landscape and to increase collaboration between science and businesses.

Main emphasises in their RIS3 is on the development of cross-state clusters. The states have designated five clusters, namely:

- Transport, mobility and logistics
- Healthcare
- Optics and photonics
- Energy technology
- ICT, media and creative industries

In addition, the state Brandenburg decided to independently focus on three additional clusters (food and nutrition industry, synthetic materials & chemistry and metal).

From the interview it can be concluded that collaboration within InnoBB takes place at different levels. Within the five clusters partners meet regularly to discuss the developments within a specific cluster. In addition InnoBB includes the co-called coordination circle (Koordinierungskreis) in which the results and impact monitoring of the innovation strategy takes place. And the working group innovation strategy has monthly meetings to make strategic decisions for InnoBB. In this group the managing directors of the economic development agencies and the heads of the ministries of Berlin and Brandenburg are involved. Hence, the two regions are engaged to collaborate actively and on a regular basis to strengthen the innovative capacities of the entire region.

The joint innovation strategy was developed in 2011, currently the regions are revising and updating their strategy. Also for the upcoming funding period 2021-2027, the regions want to submit a joint strategy at the European Commission. InnoBB embraced the concept of smart specialisation because it forced the region to concentrate on their strengths and challenges. During the interview it became clear that the region is convinced that smart specialisation is becoming even more important in the near future. The clusters which have been chosen in the current strategy are still very broadly defined,

therefore in the upcoming strategy Berlin and Brandenburg want to narrow down these clusters and focus on individual fields within a cluster in order to specialize even further and to create competitive advantage.

Attitudes towards cross-border collaboration

A central goal of the innovation strategy is to strengthen the international competitive position. Instead of an internal approach, Berlin-Brandenburg recognizes the opportunities of external networks and clusters. As such the region wants to expand the systematic integration of EU funding structures.

Also the state governments encourages researchers and entrepreneurs to collaborate across borders. For example within the ProFIT program of Berlin, the state government opened a joint call for R&D and innovation projects in the fields of optics and photonics with the Foundation for Support of Research and Innovation in Santa Catarina (Brasil). This cooperation project shows that regions do not necessarily need to be at close spatial proximity if two regions are able to collaborate within a specific cluster. However, the region also recognizes that being at close proximity can be advantageous because daily contacts are easier to maintain.

5.2.3. Lower Saxony

Regional context

Lower Saxony is one of the German states located in the North-West of the country. Almost 10% of the German population lives in Lower-Saxony but due to its large surface area, the state is sparsely populated compared to German average (166 inhabitants/km^2 German average: 229 inhabitants/km^2). Inhabitants are mostly employed in services, industry and agriculture and the regional economy around the subregion Braunschweig is mainly dominated by the automotive industry producing large number of cars and automotive parts. For instance Volkswagen's largest factory plant and head office are located in Wolfsburg.

In terms of R&D investments, Lower Saxony performs quite well. In 2015 2,83% of GDP was spent on R&D from which 1,92% originates from private investments. The majority of R&D expenditure is spent around the cities Hannover, Braunschweig and Wolfsburg due to the automotive industry, this area is also known as the 'Metropolregion'. In addition a large number of universities and universities of applied sciences contribute to research in the fields of the important sectors of Lower Saxony.

Although there are large companies located in Lower Saxony, the regional economy is characterized by a high number of SMEs, 99,7% of all companies are SMEs offering jobs to 72% of all employees (European Commission, 2017). Especially these SMEs lack behind in terms of R&D spending and employment which is currently a weakness of the region (Niedersächsiche Staatskanzlei, 2014).

R&D priorities

Due to an administrative reform in 2004, Lower Saxony was divided into four subregions: Braunschweig, Lüneburg, Weser-Ems and Leine-Weser. The aim was to reduce bureaucracy in the entire public sector.

Next to the RIS3 of the state Lower Saxony, Weser-Ems developed its own RIS3 as a subregion. Until today Weser-Ems has no formal regional authority, instead the 17 Landkreise and Kreisfreie Städte established an coordination group to take charge of the development of the region, ensure continuity and create common policies, for instance, the RIS3. Weser-Ems made an early start with the development of their RIS3 and decided to focus on three priority areas:

- Maritime sector
- Bio-economy

- Energy

The other subregions did not develop their own innovation strategy, instead these regions are part of the innovation strategy of Lower Saxony. The RIS3 of the state Lower Saxony was published in 2014 and is based on a comprehensive analysis of the strengths, weaknesses, opportunities and threats of the region and the state government organised a series of discussion sessions with several regional stakeholders. Their analysis resulted in the selection of seven priority areas:

- Mobility economy
- Maritime economy
- New materials and manufacturing
- Digital and creative economy
- Agriculture and food industry
- Energy industry
- Health and social industry

Lower Saxony focuses on six horizontal strategies to improve the conditions for innovation in the region: The expansion of skilled labour and the number of start-ups, strengthening innovation potential in rural areas, forcing an ecologically responsible structural change, use of diversity and equal opportunities as well as the development of cross-border and international knowledge networks.

Lower Saxony applied the concept of smart specialisation to their innovation strategy, however the state government is also convinced that one cannot predict and determine in which areas firms and knowledge institutes should specialize, as it is not possible to foresee the future. In order to fund also those projects outside the seven priority areas of the RIS, Lower Saxony introduced annually funding calls at which firms and knowledge institutes which are not necessarily part of one priority area are able to apply for subsidies. The public-owned NBank is responsible for advising customers and approving funding applications for the funding programs of the state, federal republic and European Union. As the development bank of Lower Saxony, the NBank supports the state in its structural and economic policy tasks. In addition to the NBank, the innovation centre Lower Saxony (Innovationszentrum Lower Saxony GmbH) is assigned to provide information about technological and innovation trends and priorities which are relevant for Lower Saxony. Moreover, they support the state government in the development and definition of innovation policies.

Attitudes towards cross-border collaboration

Lower Saxony is a bordering region of the Northern Netherlands, therefore Lower Saxony already is an important political ally on European issues and cross-border cooperation. The Northern-Netherlands and Lower Saxony collaborate actively within the Interreg A program Deutschland-Nederland. The

aims of these cooperation program are described in the cooperation program “Interreg Deutschland-Nederland”. The main objectives are to increase innovation in the border regions and to remove the barriers which are created by the border (Interreg Deutschland-Nederland, 2014). Both regions are also part of the Interreg B North-Sea region.

Part of the innovation strategy of Lower Saxony to further develop cross-border and international knowledge networks. Although Lower Saxony is involved in numerous international knowledge networks, there are still many SME’s and craft companies which have difficulties to integrate in the cross-border knowledge networks and are therefore not able to profit from cross-border knowledge flows (Niedersächsische Staatskanzlei, 2014). Lower Saxony has a particular interest to develop the cross-border knowledge networks, especially with their national and international neighbours (including the Northern Netherlands). Particularly for the Weser-Ems region, the active collaboration in innovation systems with the Netherlands holds high potential. In this context, Lower Saxony is aiming at building stronger networks between intermediary institutions of Lower Saxony and partner organizations from abroad.

5.2.4. Saxony-Anhalt

Regional context

Saxony-Anhalt is located in the central-eastern part of Germany and was home to a population of 2,2 million inhabitants in 2015 (Eurostat, 2015). The state Saxony-Anhalt was reintegrated again after the reunification of Germany in 1990 which resulted in an extensive transformation process of the economy. Due to considerable investments in the modernization of existing and new facilities and infrastructure in Saxony-Anhalt, the industry in Saxony-Anhalt has become the engine of economic growth, with above average employment in manufacturing (28,3%, national average: 27,6%)(BMWI, 2016). Also logistics, renewable energy and the chemical industries are the key sectors of the regional economy. Despite an upward trend of the regional development, the region lags behind in investment in Research and Development and is still very dependent on public investments and European funding. In 2013, only 29% of investments in R&D were conducted within private businesses, which is considerably low compared to the German average of 67 % (European Commission, 2018). One of the main reasons for this low performance is that large companies have their head offices outside the region, which is also the case in the Northern Netherlands. Also, the economy in Saxony-Anhalt is dominated by SME's with low efforts in R&D.

R&D priorities

Despite low investments in R&D, Saxony-Anhalt has an ambitious strategy as the region wants to become an European innovation leader by 2020. The development of the regional innovation strategy of Saxony-Anhalt was designed as an iterative, multi-stage process which was coordinated by two companies. In line with the bottom-up approach of smart specialisation, important economic and social partners, affected stakeholders and experts were involved in the base of evidence study. In addition to the consultation of Q4 stakeholders, an online public consultation process as well as a consultation in the political sphere took place in 2012. The questionnaires were concerned with questions about goals and visions about possible thematic priority areas for future support and the needs and challenges prevailing in these potential priority areas. As a result of this process, five priority areas have been appointed by Saxony-Anhalt, based both on empirical analyses and on the results of the consultation process.

- Energy, engineering, resource efficiency
- Healthcare
- Mobility and logistics

- Chemistry and bioeconomy
- Food and Agriculture

In addition, Saxony Anhalt focuses on the cross-sectional areas of ICT and creative industries.

Attitudes towards cross-border collaboration

The Northern Netherlands Alliance and Sachsen-Anhalt are currently collaborating within the Interreg Europe project BeyondEDP.

For the implementation of the innovation strategy, Saxony-Anhalt appointed twelve guidelines in their innovation strategy. One of the guidelines of the regional innovation strategy of Saxony-Anhalt is the internationalisation and Europeanization of innovation policies of the state Saxony-Anhalt. More specifically, the region aims to use inter-regional collaboration for networking, innovation and strengthening the knowledge-based economy. But also for the identification of their own innovation policy priorities in the European context and as a starting point for (foreign-) economic activities. In addition to the RIS, Saxony-Anhalt came up with an specific policy for European and international objectives of the state government for the period 2016 – 2021. The state government realizes that the majority of international contacts are instantiated and supported directly by businesses and associations, without interference of the government itself. However, Saxony-Anhalt attaches great importance to the involvement of political representatives, because political visits abroad can contribute to the emergence and development of cross-border linkages and are able to open doors in the collaborations on economic, cultural and social level but also in the fields of knowledge and research (Sachsen Anhalt, 2016).

5.3. Discussion

In this research a comparative analysis of the regional innovation strategies of the selected regions have been carried out. Previous subchapters described the regional context, R&D priorities and attitudes towards cross-border collaboration of each region. In this section the outcomes will be discussed and the main differences between the German regions and the Northern Netherlands will be described, the main outcomes will be summarized in a table for each of the three topics. Moreover, this section examines whether there are opportunities for future collaborations between the Northern Netherlands and the German regions.

Regional context

Each region has its own historical and economic background and are currently in a different stage of economic development. Both the Northern Netherlands and Saxony-Anhalt still face high unemployment and low investments in innovation by the private sector, mainly caused by the fact that the economy is characterised by a high number of SME's which often do not have the financial resources to invest in innovation. Moreover, both regions have to deal with the relocation of young adults to the urban areas of the country, resulting in an ageing population. In Berlin-Brandenburg it is striking that the region performs above average when it comes to R&D spending, however the percentage invested by the private sector remains low. During the interview it became clear that the economy of the capital city Berlin is characterized by a high number of start-ups which need governmental support to grow. Larger and globally operating companies with high efforts in R&D are located in other urban cores like Hamburg, Munich or Frankfurt. Both Bavaria and Lower Saxony perform well when it comes to innovation, an important factor in these regions is the presence of globally operating firms with high efforts in R&D and which contributed to the emergence of innovative clusters.

Table 3 summarizes the main differences between the selected regions related to research and development. The degree of importance of R&D for the private and public sector is derived from figures about R&D spending as a percentage of GDP (table 2).

Table 3: Comparison regional context related to R&D

Regional context related to R&D	**Northern Netherlands**	**Bavaria**	**Berlin - Brandenburg**	**Lower Saxony**	**Saxony Anhalt**
Importance of R&D for the private sector	Low	Very high	Berlin: high **Brandenburg: low**	High	**Low**
Importance of R&D for the public sector	High	**High**	Very high	**High**	**High**
Employment in R&D	Low	High	High	High	**Low**
Share of SMEs in total working population	High	**High**	Berlin: low Brandenburg: **high**	Low	**High**

As table 3 shows, the Northern Netherlands has overlap with Saxony Anhalt. Both regions face similar challenges in terms of unemployment, ageing population and low investments in R&D. These similarities could lead to collaboration by exchanging best practices to solve these societal challenges together.

R&D priorities

The selected regions in this research operate under widely varying conditions. Both in terms of the performance of the respective regional innovation systems but also in terms of the financial resources of the regions in order to promote regional innovation. The extent to which the concept of smart-specialisation has been embraced by the regional governments also differs across the regions. In the Northern Netherlands, stakeholders have been very engaged in the process of developing the RIS, however during the implementation of the strategy it turned out to be challenging to keep the stakeholders and especially the entrepreneurs involved and motivated. Berlin-Brandenburg is still very active in further developing their strategy and has regularly meetings to discuss the progress of the capital region. In their strategy, the region focuses on the development of innovative clusters. Berlin-Brandenburg is currently working on the development of the upcoming strategy in which they want to narrow down these clusters. The Bavarian government saw smart specialisation like a confirmation of how the region have been pursuing innovation policies for decades and did not redevelop their strategy for the current funding period. As Bavaria has a leading position within Europe and the World, their strategy is mainly focused on how they can remain their position. Saxony-Anhalt has an ambitious strategy and want to become an innovation leader by 2020. Considering the fact that the region started an extensive transformation process of the economy after the reunification in 1989, the economy has improved considerably in recent years. In contrast to Berlin-Brandenburg, where two regions joint their innovative capacities and defined a shared innovation strategy, Lower Saxony have been divided into smaller regions. Apart from the strategy of Lower Saxony's government, the region Weser-Ems

(bordering to the Northern-Netherlands) has defined an individual strategy. Obviously, smart specialisation has in each region led to use their own approach to stimulate businesses and knowledge institutes to innovate.

The Northern Netherlands has selected five key clusters which distinguish the region and contribute to solve the four societal challenges of the Northern Netherlands. The key clusters are shown in table 4. The table shows whether related clusters are also selected by the German regions. However, the specific name of a cluster might differ. For instance the Northern Netherlands focuses on the development of the 'Healthy Ageing' cluster. Lower Saxony has selected the cluster 'Health and social industry' and in Saxony Anhalt it is called 'Healthcare'.

Table 4: Comparison key clusters of the Northern Netherlands and the selected regions

Key clusters of the Northern Netherlands	**Bavaria**	**Berlin-Brandenburg**	**Lower Saxony**	**Saxony Anhalt**
Agrifood				
Energy				
Healthy Ageing				
High Tech				
Smart (Sensor) Systems and Materials				
Water Technology				

As table 4 shows, the key clusters of the Northern Netherlands overlap some of the selected clusters of the German regions. Every region is dedicated to focus on clusters related to energy and health. Both Lower Saxony and Saxony Anhalt specialize in Agrifood which is an important sector for the Northern Netherlands. Although there is overlap within the selected clusters, the clusters are still very broadly defined and does not directly mean that collaboration within a cluster will make sense. To identify the position within the value chain and the opportunities for collaboration, additional research is necessary.

Attitudes towards cross-border collaboration

A key element of this research is cross-border collaboration. Currently, extensive cross-border collaboration of the regional government of the Northern Netherlands mainly occurs around the border regions with Germany. Especially because the Interreg program of the European Regional Development Fund focuses on the development of cross-border networks. For this research it has been investigated which role cross-border collaboration plays in the different innovation strategies of the regions. Each region has included a section on collaboration in their strategy, however for example in

Bavaria, the region focuses on stimulating collaboration between organisations within the region instead of collaboration across regional borders. Whereas for instance the regional government of Saxony-Anhalt developed a specific Europe strategy as an addition to their innovation strategy. The regions wants to use inter-regional collaboration to strengthen the growing knowledge-based economy. Overall it is striking that regions which are well-developed and invest systematically in innovation (Bavaria and Lower Saxony) defined their innovation strategy from an internal approach in which the regional government wants to protect the competitive position of the region. Whereas regions which are less-developed in terms of private R&D spending (Berlin-Brandenburg, Saxony-Anhalt and the Northern Netherlands) attach more value towards cross-border collaboration and are defined from an external approach. The main differences are summarized in table 5. Again in terms of attitudes towards cross-border collaboration, the Northern Netherlands shows overlap with Saxony Anhalt.

Table 5: Comparison of the attitudes towards cross-border collaboration

Attitudes towards cross-border collaboration	**Northern Netherlands**	**Bavaria**	**Berlin-Brandenburg**	**Lower Saxony**	**Saxony Anhalt**
Priority of collaboration in RIS3	High	Medium	**High**	Medium	**High**
Collaboration focuses on:	Regions outside the Northern Netherland	Collaboration between firms and research institutes within Bavaria	Collaboration within the capital region but also across regional and national borders	**Stimulating SMEs to collaborate across borders**	**Regions outside Saxony Anhalt**
Internal/external approach for cross border collaboration in RIS3	external	internal	Internal/external	Internal/external	**external**

From this chapter it became clear that the Northern Netherlands and Saxony Anhalt show institutional proximity. There are different starting points to expand the institutional collaboration with Saxony Anhalt.

6. Conclusion

This study has attempted to examine the influence of institutions on cross-border collaboration between the Netherlands and Germany. In this chapter the main outcomes of this research will be concluded.

The literature study has shown that on the one hand, the presence of an innovative cluster is important for the creation of new knowledge and technologies within a region. Therefore, geographical proximity is seen as a major advantage for successful collaboration. On the other hand other forms of proximity influence the outcomes of collaborations and can be seen as a substitute for geographical distance. During this research particular attention is paid to the role of institutional proximity in cross-border collaboration.

One example of formal institutions is the regional innovation strategy. Innovation strategies have been implemented for decades, however these policies were often spatially blind and a one-size fits all approach was often used. Since the current funding period from 2014-2020 of the European Union, a new approach to innovation policies is introduced, namely smart specialisation. The aim of smart specialisation is to reduce differences between regions and to ensure structural growth across Europe by enabling regions to turn their needs, strengths and competitive advantage into marketable goods and services. Developing a regional innovation strategy for smart specialisation was set as a precondition to receive European subsidies from the Regional Development Fund. The regional innovation strategy have been used as a starting point of the empirical study, where necessary regional stakeholders have been consulted for additional information about the regional innovation policies.

First of all the regional context of each region have been described. From this it can be concluded that whether the private sector is active in the field of innovation seems to depend to a large extent on whether large globally operating companies are present in the region. This outcome is in line with theory as these large firms contribute to the creation of innovative clusters and also attract new businesses. In both Lower Saxony and Bavaria, large companies for instance in the automotive industry are present which invest heavily in R&D and are to a lesser extent dependent on public funding as they have the financial resources to innovate. In contrast to these economically strong regions, the Northern Netherlands, Saxony-Anhalt and Berlin-Brandenburg are characterized by the presence of many SME's which are more dependent on public funding as they do not always have the financial resources and innovation involves high risks.

After the analysis of the regional context, the R&D priorities of each region have been described. Moreover, Because of Smart Specialisation, regional governments started to collaborate stronger with businesses, science and the civil society to draw up a joint regional innovation strategy. In all regions,

many stakeholders were involved in the process of developing the RIS3 through the entrepreneurial discovery process. However, the extent to which the regions have embraced and implemented the idea of smart specialisation differs. Moreover, it is also striking that the priority areas of the regions are still broadly defined and many regions have chosen for example 'Energy' or 'Health' as a form of specialisation, therefore it could be questioned how 'special' and place-based these strategies are if all regions are still engaged to specialize in the same fields. Overall, the strategies do not differ very much from each other because within Europe, we all have to deal with somehow the same challenges. For the upcoming funding period it is important for the Northern Netherlands but also for other European regions to bring more focus to the innovation strategy and narrow down the fields of specialisation in order to create a distinctive character.

Although cross-border or inter-regional collaboration plays an important role in almost all innovation strategies, the regions are not very specific about how do are planning to get involved in cross-border networks. An exception is Saxony-Anhalt, the region developed a specific policy for internationalisation of the region. From this research it has become clear that based on the regional innovation strategy, different regions have different attitudes towards cross-border collaboration. It is striking that regions in which especially private actors are heavily investing in research and development, less value is attached in the innovation strategy towards collaboration outside their regional borders and their strategies are more focused on maintaining and protecting their competitive position in the national and international context. Their strategies are primarily defined from an internal perspective. Whereas regions which lack behind in terms of investments in R&D are more oriented towards cross-border collaboration and are more open to the opportunities of cross-border collaboration. Overall, it became clear that every region realizes that cross-border collaboration offers opportunities and that it is not possible to tackle the societal challenges alone.

6.1. Limitations

Although there is a growing recognition among scholars that institutions do matter for regional development, empirical studies about institutions are rarely available. This research attempted to investigate the role of institutional proximity in cross-border collaboration. However, this research is limited to the institutions involved in the process of regional innovation strategies which is only a very small part of the whole institutional setting of a region. One of the initial intentions of this research was to designate one region for future collaborations. On many fields Saxony Anhalt has overlap with the Northern Netherlands. However, during the research it became clear that is not feasible to select one specific region because the outcomes of cross-border collaboration are also influenced by other factors and forms of proximity which were not taken into account during this research.

Nowadays, the institutional setting is very complex which makes is difficult to predict the outcomes of a collaboration solely based on the regional innovation strategies beforehand. Moreover, it is quite difficult to grasp the subjective factors influencing cross-border collaboration because different stakeholders within a region have different opinions about why and how regions should collaborate. Many stakeholders are involved in the development and implementation of a regional innovation strategy and it is part of a political process. Therefore, people do sometimes not immediately have an opinion or are reluctant to express their opinion about cross-border collaboration and their attitude depends on their position and experiences within the state government. For example, some respondents worked within a Interreg A program in which bordering regions collaborate. Therefore, collaboration with, for example, the Northern Netherlands within this program was excluded in advance because the geographical distance is too large and the regions did not share a border. Having a shared border is a prerequisite for the Interreg A program and a collaboration does therefore not fit in the institutional framework.

Within this research four regions were selected. Afterwards it would have been useful to select less areas to capture the institutional setting in more detail. Furthermore, due to geographical distance, it was not possible to meet the interviewees in person and the interviews were conducted either conducted by e-mail or by telephone. Although the interviews provided additional information to this research, it is easier to have a conversation is real life.

Overall, this research has an explorative character and gives insights in the differences between the selected region. Further research is necessary to determine how the different regions are complementary to each other and on which fields future cross-border collaboration would be useful.

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8. Appendix

8.1. List of interviewees

8.2. Consulted sources to answer research questions

Main research question: *How does the regional innovation strategy for smart specialisation (RIS3) influence the outcomes of cross-border collaboration between the Northern-Netherlands and German regions?*

To answer this question three sub questions have been formulated.

Subquestion 2:

What are the research and development priorities of the selected regions?

- Regional Innovation Strategy for Smart Specialisation (RIS3)
- S3 Platform
- Interviews: questions about the process of developing the RIS3, role of the interviewee in the process, opinions about smart specialisation, e.g.:
    - How did you participate in formulating the regional innovation strategy of the current funding period of regionXXX?
    - To what extent has the concept of smart specialization continued to prevail after the formulation of the innovation strategy in regionXXX?
    - Are there any challenges regionXXX encounters in the implementation and development of the innovation strategy?
    - Do you think that smart specialization will also play a key role in the next funding period from 2021?
    - Who is responsible for applications and grants of national and European funding in regionXXX?

Subquestion 3:

Which value is attached towards cross-border collaboration in the RIS3 of the selected regions?

- Analysis of policy documents, which role does cross-border collaboration play in the RIS3
- Consultation of the websites of the regional governments
- Interviews: questions about attitudes towards cross-border collaboration with foreign and bordering regions, e.g:
    - Which regions is regionXXX currently working intensively together within Europe?
    - How does the state government encourage small and medium-sized enterprises to cooperate internationally?

- Do you believe that successful cross-border collaboration is also possible if the geographical distance between regions is larger?
- Do you think that a cross-regional collaboration is also useful for regions with greater distance from each other and with which purpose should they collaborate?