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## Investigating Cross-Border Activities in the EUREGIO: A Company-Level Cluster Theory Approach

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# Abstract

Cross-border cluster theory and regional innovation systems theories are relatively understudied branches of cluster theory. Where Porter's cluster theory, as well as Etzkowitz and Leydesdorff's triple helix (TH) theory, and Regional Innovation Systems (RIS) theories by multiple authors are well-defined at a national level, these theories' cross-border applications are lacking.<sup>1</sup> This research adds onto cross-border cluster theory by analysing what motives companies in the EUREGIO have for engaging in a range of hypothesised cross-border activities. A method involving a study of the EUREGIO and four case studies conducted through interviews at technology companies is used to test a hypothesised model and theoretical framework. It is observed that there is a general understanding of the benefits, and a positive attitude towards cross-border activity and collaboration within the EUREGIO. Furthermore, most of the interviewed companies are indeed engaged in a set of cross-border activities, generally for sales, innovation and productivity reasons. It is argued that the motives companies have for engaging in these activities relates to Porter's originally proposed benefits of cluster theory.<sup>2</sup> The managerial conclusion of this research is that engaging in cross-border activity can be rewarding for companies able to overcome the persisting language and cultural barrier in the EUREGIO. Nevertheless, engaging in certain cross-border activities does have to align with the company's goals and strategy.

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<sup>1</sup>See Porter, 1998; triple helix theory by Etzkowitz and Leydesdorff, 1995; and RIS studies such as Autio, 1998; and Cooke, 2002.

<sup>2</sup>See Porter, 1998, pp. 81–84.

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# List of Abbreviations

Abbreviation	Full meaning	Page first mentioned
CB	Cross-Border	32
CBRIS	Cross-Border Regional Innovation System	19
EU	European Union	24
FDI	Foreign Direct Investment	28
MOU	Memorandum of Understanding	45
MNE	Multinational Enterprise	28
NIS	National Innovation System	11
RIS	Regional Innovation System	1
TH	Triple Helix	1

# 1 Exploring Clusters in the EUREGIO

Since before the start of the 20<sup>th</sup> Century, researchers have been studying the effects of geographical proximity on the competitive advantage of industries. Especially during the past decades, some prominent theories have been published.<sup>3</sup> The most notable of these is Porter's "cluster theory", which has even become the generally accepted name of the research field.<sup>4</sup> In a nutshell, cluster theory describes how a network of factors leads to several benefits: Productivity, innovation, and business formation.<sup>5</sup>

Other theories each have their unique perspectives on the topic of cluster theories, sometimes even extending it to a slightly different area or level of study. Some of these other well-known theories are "triple helix" (TH) and "regional innovation systems" (RIS) theory. Where Porter's theory focuses on a cluster's competitive advantage, TH and RIS theory focuses on the innovation system of the entire region surrounding and including these clusters.

An upcoming but still understudied branch of these cluster and regional innovation studies is their application to cross-border contexts.<sup>6</sup> These regions consist of two or more bordering nations, characterised by their own cultures, languages, and other factors. These differences add to the complexity of applying ordinary cluster theory to these regions. Nevertheless, literature has pointed out the benefits that a cross-border environment might have for cluster development.<sup>7</sup> Although some cross-border cluster and innovation systems theories exist, more research is required.<sup>6</sup>

This thesis explores whether cross-border cluster theories hold when analysed from an empirical company perspective, and to uncover the potential benefits and barriers of cross-border activities. To keep the scope of this research focused, the EUREGIO cross-border region is analysed. In doing so, the research questions that are answered are: (1) What cross-border activities are companies in the EUREGIO engaged in? And (2) what motives do companies in the EUREGIO have for engaging in cross-border activities?

The first half of this thesis covers an extensive literature review of cluster theory, cross-border clusters and international firms. This literature is gathered in a single theoretical framework. The method followed includes a series of interviews in a case study on the EUREGIO itself, as well as four selected companies. The qualitative empirical data is then analysed, discussed and concluded, providing answers to the research questions. Besides its theoretical contribution, managerial advice for companies and governing organisations is given to aid the development of the EUREGIO as a cross-border regional innovation system.

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<sup>3</sup>See Bekele and Jackson, 2006, pp. 2–6; and also Rohde, 2016, pp. 338–358.

<sup>4</sup>See Porter, 1990; and also Porter, 1998.

<sup>5</sup>See for example Porter, 1998.

<sup>6</sup>See Rohde, 2016, p. 347.

<sup>7</sup>See Zashev, 2012, pp. 203–204.



# 2 Literature Review

## 2.1 Clusters

### 2.1.1 Cluster Theory

#### 2.1.1.1 A Brief History of Cluster Theory

The foundations of cluster theory can be traced back to 1890, when Alfred Marshall published research about regional agglomerations and benefits that arose because of this.<sup>8</sup> Despite the term 'industry cluster' not being used to describe this geographical agglomeration yet, Marshall's concepts are similar in describing the benefits of companies being located in the same region. Marshall refers to the term 'localised industry' which is simply "an industry concentrated in certain localities", that according to Belussi can turn into a more complex 'industrial district'.<sup>9</sup>

Belussi explains that Marshall pointed out firms localised in this more evolved 'industrial district' will enjoy several advantages: Hereditary skill, growth of subsidiary trades, use of highly specialised machinery and a local market for specialised skill, as well as the two, by Belussi deduced, benefits; industrial leadership and the introduction of novelties.<sup>10</sup> As described by Schiele (2022), Krugman (1991) further narrowed Marshall's identified benefits down to three privileging mechanisms: (1) a better-educated labour force, (2) a larger ability to enhance efficiency through outsourcing and (3) the occurrence of technology spillover through high interaction between actors.<sup>11</sup> Marshall also found that these 'industrial districts' were home to both competitive and cooperative natures between firms, a point that Porter also strongly defended much later in his cluster theory.<sup>12</sup> In a literature review on cluster theory, Rohde (2016) points out other notable research by Weber (1929) who "considered agglomeration economies as a driving force for the choice of location for industries"<sup>13</sup> Weber found that these agglomerations in turn lead to transportation savings.<sup>14</sup>

It took almost 100 years before the next large contributions to cluster theory were published around the same time in Italy and France.<sup>15</sup> Italian researcher Becattini discovered regional agglomerations in the form of 'one-product towns' which were called 'industrial districts' in Italy.<sup>16</sup> These districts showed that they were more successful than isolated competitors, sup-

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<sup>8</sup>See Bekele and Jackson, 2006, pp. 2-3; and also Schiele, 2022, p. 413; referring to the original work by Marshall, 1961 [1890].

<sup>9</sup>See the analysis of Marshall's work by Belussi and Caldari, 2008, p. 336.

<sup>10</sup>See the derivations of Belussi and Caldari, 2008, p. 337.

<sup>11</sup>Also see Schiele, 2022, p. 413; summarising mechanisms presented by Krugman, 1991.

<sup>12</sup>See Belussi and Caldari, 2008, p. 338; and also Porter, 1998, p. 79.

<sup>13</sup>Rohde, 2016, p. 339; referring to Weber, 1929.

<sup>14</sup>See Bekele and Jackson, 2006, p. 4; and also Rohde, 2016, p. 339.

<sup>15</sup>See Schiele, 2022, p. 413.

<sup>16</sup>See Schiele, 2022, p. 413.

posedly because of their geographical coexistence. At the same time, the French 'filière' and 'innovative milieu' literature was developed. This was called the 'innovative milieu' approach and, just like Marshall's work, argued that both collaboration and competition were present in these innovative regions.<sup>16</sup>

In 1990, Michael E. Porter's work 'The Competitive Advantage of Nations' was published. This well-known and respected work explains by means of a diamond structure, what underlying factors cause a nation to be competitive and innovative.<sup>17</sup> Porter (1990) elaborates that four factors "individually and as a system" enable competitive advantage and innovation: (1) Factor conditions, (2) demand conditions, (3) related and supporting industries and (4) firm strategy, structure and rivalry.<sup>18</sup> These four factors, as well as how Porter's diamond functions as a whole, are discussed in more detail in section 2.1.1.3.

Porter continued his work on cluster theory and in 1998, he published another extensively-cited work called 'Clusters and the New Economics of Competition'. In line with his previous work, Porter defines clusters as "geographic concentrations of interconnected companies and institutions in a particular field" and explains once again that the underlying actors such as suppliers and institutions together form the cluster.<sup>19</sup> Case studies of for example the California wine cluster and the Italian leather fashion cluster are used to provide insights into how these clusters function. Porter builds on his theory by claiming that clusters increase competitiveness by increasing productivity, a higher rate of innovation and promoting the formation of new businesses.<sup>20</sup> Porter's works are commonly referred to as the most influential works regarding cluster theory and are still applicable today. Nowadays, industry clusters and the importance of the geographical location of firms are still being researched extensively.

### **2.1.1.2 Cluster and Regional Innovation Models: Porter, Triple Helix, and RIS**

Throughout recent history, multiple theories and models for clusters have been published, as the brief history above describes. The theories all have their individual takes on regional agglomeration and clusters and emphasise different points than others. Fundamental in all theories is that the common geographical locations of the actors is the enabling factor for all of the occurring phenomena. Meaning that all the described effects only happen because firms, suppliers and other actors are located near one another. Multiple cluster and regional innovation theories exist and all have their unique perspectives that can be useful in certain scenarios.

As stated in the above paragraphs, Porter's cluster theory is still regarded as one of the most relevant theories.<sup>21</sup> Porter's cluster theory focuses on how competitive advantage through benefits such as innovation, productivity and entrepreneurship can be obtained by companies

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<sup>17</sup>See Porter, 1990, pp. 73–93.

<sup>18</sup>See Porter, 1990, p. 77.

<sup>19</sup>See Porter, 1998, p. 78.

<sup>20</sup>See Porter, 1998, pp. 80–84.

<sup>21</sup>See Rohde, 2016, p. 339.

in clusters.<sup>22</sup> Furthermore, his diamond model is a clear model that simplifies interactions between actors to visualise how a cluster can lead to competitive advantage. At its roots, Porter's diamond model describes a cluster from an industrial point of view. Interactions between companies, suppliers, buyers and other institutes are described as economic relations, boosting competitive advantage due to mutual benefits.

An alternative model that has received attention and is also still used frequently today is the 'triple helix' model. The model was first introduced by Henry Etzkowitz and Loet Leydesdorff in 1995.<sup>23</sup> The model describes how the ever-changing characteristics and roles of universities, governments and industries, in a regional context, can lead to innovation. In comparison with Porter's cluster theory, the triple helix model's perspective on cluster theory is more focused on the trilateral interaction between the involved actors, instead of the benefits that arise because of these interactions. Interactions are argued to be the driving mechanism for innovation in the triple helix theory. The interactions with universities especially are regarded as essential in innovation, due to society becoming more knowledge-based.<sup>24</sup>

A third relevant theory is the regional innovation systems (RIS) theory. Many regional innovation studies have tried to create a theoretical framework since the 1990s. An insightful model was first introduced by Erikko Autio in 1998 and quickly adapted by well-known RIS-contributing author Philip Cooke.<sup>25</sup> The RIS model proposed by Autio shows a complex system of actors that relies on two fundamental processes: An innovation-promoting exchange of knowledge and resources between knowledge-generating and exploiting organisations, and an interacting influence by external organisations.<sup>26</sup> Similar to the triple helix theory, RIS focuses on the interactions occurring in a regional context that lead to innovation and is also focused mainly on knowledge transfer. Other large contributors, especially to the cross-border application of RIS (CBRIS) are Lundquist and Trippel (2009).<sup>27</sup>

Porter's theory is referred to as cluster theory, while the triple helix and RIS theories are regional innovation system theories. It can be argued that the difference between the concepts of 'cluster' and 'regional innovation system' is small, although there are some notable differences.<sup>28</sup> Coenen, Moodysson and Asheim agree with this and explain that the difference lies in 'cluster' referring to a specific sector, while RIS is a more general innovation- and knowledge-focused system underlying multiple sectors.<sup>29</sup> Secondly, a distinction pointed out by Coenen et al. is that a cluster has a "fuzzy" geographical specification, which may be within a region, country, or even multiple countries, while RIS specifically relates to a 'region'.<sup>30</sup> Thirdly, The

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<sup>22</sup>See Porter, 1998.

<sup>23</sup>See Etzkowitz and Leydesdorff, 1995, pp. 14–19.

<sup>24</sup>See the arguments by Etzkowitz and Leydesdorff, 2000, p. 109.

<sup>25</sup>See the model by Autio, 1998, p. 134; and RIS contributions by Philip Cooke such as in Cooke, 2002.

<sup>26</sup>See the model first proposed by Autio, 1998, p. 134.

<sup>27</sup>See Lundquist and Trippel, 2009; and also Lundquist and Trippel, 2013.

<sup>28</sup>See Rohde, 2016, p. 340.

<sup>29</sup>See Coenen et al., 2004, pp. 1004–1005.

<sup>30</sup>See Coenen et al., 2004, p. 1005.

triple helix theory and RIS describe a system of relations between different organisations and actors leading to innovation, while Porter's cluster theory states that these relations lead to competitive advantage.

Despite these differences, the resemblance between all three models is significant, as even Porter himself describes that innovation - the fundamental benefit of RIS and triple helix theory - is one of three main benefits that clusters enjoy.<sup>31</sup> Therefore, all three systems are strongly correlated. Because they focus on relations between multiple forms of organisations and actors within a specific area, these theories can be used in combination with each other.

A common reason why these three specific theories are chosen as a theoretical base for this research is that they are well-known, well-researched, and most importantly, each has its cross-border application. Therefore, they serve as a solid and holistic theoretical framework, consisting of multiple perspectives. Besides this common reason, each theory is also chosen for its specific reasons. Porter's cluster theory is chosen as it is arguably the most renowned of the three, and is written from an industrial perspective. Since this research aims to analyse cross-border activity from a company perspective, Porter's industrial perspective on cluster theory is predicted to be highly valuable.

Triple helix theory and RIS theory focus on interactions between different actors in a cluster/regional innovation system and the consequential benefits of these interactions. This focus matches the research purpose of this thesis: Exploring different cross-border activities and companies' motives for engaging in them. Cross-border activities are expected to commonly take the form of some type of interaction with a party from across the border, whether this is a company, institution, supplier or another type of actor. Moreover, it is hypothesised that the benefits discussed by the cross-border applications of Porter's theory, triple helix and RIS theories are all closely related to companies' motives for engaging in cross-border activities. Porter's cluster theory, the triple helix model and the regional innovation system theory are each elaborated in more detail in sections 2.1.1.3, 2.1.1.4 and 2.1.1.5 below.

### **2.1.1.3 Porter's Cluster Theory and the Diamond of Competitive Advantage**

Michael E. Porter originally worked on developing an understanding of competitive advantage in his work "The Competitive Advantage of Nations" (1990) and works prior to this. However, through the many case studies he conducted to understand international competitiveness, he found that "a nation's competitiveness depends on the capacity of its industry to innovate and upgrade".<sup>32</sup> He goes on to explain that a "forward-looking, dynamic and challenging" home environment leads a nation's success in a certain industry, which is in contrast to prior knowledge about driving factors of competitiveness.<sup>33</sup> According to Porter, the reason why companies excel is because of innovation.

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<sup>31</sup>See Porter, 1998, p. 80.

<sup>32</sup>Porter, 1990, p. 73.

<sup>33</sup>Porter, 1990, p. 74.

Porter's methodology to investigate competitive advantage included a four-year study of ten large economies around the world, with a team of more than 30 researchers.<sup>34</sup> The depth of study Porter used was unparalleled in previous research into competitive advantage - and thus also industry clusters - and relied heavily on empirical data. This data along with his decades of other works forms a strong foundation to support his industry cluster theory and is the reason why Porter's theory is still relevant today.<sup>35</sup>

Although Porter mentioned clusters in "The Competitive Advantage of Nations" (1990), the focus was on his diamond model.<sup>36</sup> By using the gathered empirical data, Porter found four attributes, operating individually and as a system: (1) Factor conditions, (2) demand conditions, (3) related and supporting industries and (4) firm strategy, structure and rivalry.<sup>37</sup> Together, these factors comprise the 'diamond of competitive advantage' shown in figure 2.1. Regarding clusters and the diamond of competitive advantage, Porter originally argued that "the diamond creates an environment that promotes *clusters* of competitive industries".<sup>38</sup> Next to these four main variables the roles of the two variables 'chance' and 'government' are also argued to be important and added to the framework.<sup>39</sup> However, these are not included in the diamond model. In the next paragraphs, each of the four main attributes is discussed individually.

The first of Porter's attributes is an industry's *Factor Conditions*. This category states that a nation's competitive advantage increases with the presence of factor conditions such as a good labour pool, infrastructure, natural and physical resources and geographical location.<sup>40</sup> Porter argues that industries that best deal with the factor conditions they are given, and create new factor conditions to suit the industry are able to be successful.<sup>41</sup> Other factors such as for example highly specialised *Supporting Industries* can generate the factor conditions (highly educated workforce) necessary for the success of the industry as is shown by the interaction between the attributes in Porter's diamond.<sup>41</sup>

The attribute *Demand Conditions* entails the importance of the market surrounding the industry. Even in the ever-more globalising economy of 1990, Porter underlines the importance of the local market, which gives an industry "clearer or earlier" feedback to consumer demands.<sup>42</sup> In line with Porter's book, Schiele elaborates that customers surrounding the industry must be "trend-anticipating" and "sophisticated", understanding of international trends and innovations, so they will pressure industries into innovating and upgrading their products.<sup>43</sup>

*Related and Supporting Industries* that operate internationally should, according to Porter

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<sup>34</sup>See Porter, 1990, p. 76.

<sup>35</sup>See Sölvell, 2015, p. 479.

<sup>36</sup>See Porter, 1990, p. 83; and also Sölvell, 2015, p. 472.

<sup>37</sup>See Porter, 1990, pp. 77–84.

<sup>38</sup>Porter, 1990, p. 83.

<sup>39</sup>See Porter, 1998, pp. 84–85; and recent assessment Bouchra and Hassan, 2023, p. 134.

<sup>40</sup>See Porter, 1990, p. 77; and more recent analysis by Bouchra and Hassan, 2023, pp. 134–135.

<sup>41</sup>See Porter, 1990, pp. 77–79.

<sup>42</sup>See Porter, 1990, pp. 79–80.

<sup>43</sup>See Schiele, 2022, pp. 414–415.

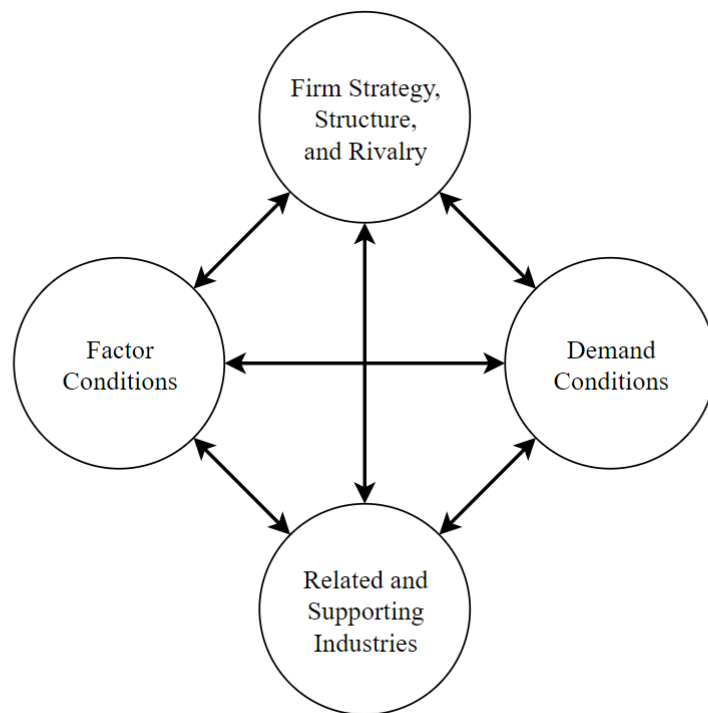


Figure 2.1: Porter's diamond of competitive advantage  
Source: Porter, 1990, p. 77

(1990), be present around the industry, to promote cost efficiency and, more importantly, innovation.<sup>44</sup> Logically, lower logistic costs and faster delivery times are possible through local suppliers that do not need to transport products across large distances. However, a more valuable innovation effect arises from "short lines of communication, quick and constant information, and an ongoing exchange of ideas and innovations".<sup>45</sup>

Lastly, there is the attribute *Firm Strategy, Structure, and Rivalry*, which explains how it is essential for companies to adopt strategies and structures that suit the surrounding environment. A company must be able to successfully act upon the other factors of the diamond without being limited by the organisation of the company itself. This attribute also takes into consideration the rivalry that should be present, in order to force industries to continuously innovate and upgrade, which in turn leads to international competitiveness and success See Porter, 1990, pp. 81–83.

Porter's work from 1990 was originally focused on understanding the competitive advantage of nations and not necessarily researching cluster theory, which in essence was only a discovered mechanism that could explain his findings. However, in 1998 Porter's article 'Clusters and the New Economics of Competition' was published, which was focused fully on clusters, illustrated by detailed examples such as the California wine cluster and the Italian leather fashion cluster. In this paper, Porter states that clusters promote both competition and cooperation simulta-

<sup>44</sup>See Porter, 1990, pp. 80–81.

<sup>45</sup>See Porter, 1990, p. 80.

neously,<sup>46</sup> and provides his definition of clusters. Although there are some disagreements in defining clusters, Porter's definition is often used.<sup>47</sup>

"Clusters are geographical concentrations of interconnected companies and institutions in a particular field. Clusters encompass an array of linked industries and other entities important to competition." (Michael E. Porter, 1998, p.78)<sup>48</sup>

The key takeaway from 'Clusters and the New Economics of Competition' is Porter's extension of his cluster theory. In 1990, Porter introduced his model showing which factors individually and together in an operating system can lead to a competitive industry.<sup>49</sup> Now, in 1998, he claims that clusters provide three benefits to competition:

Firstly, clusters increase the *productivity* of companies in the cluster's area.<sup>50</sup> Due to the high amount of competition, companies are forced to become more efficient to stay ahead of the competition. This requirement to become more productive is met by the presence of the right factor conditions and supporting institutions typical for a cluster. Some examples are a specialised workforce that can improve productivity through a higher rate of specialisation, or the possibility of outsourcing work that is tedious for one company to another company that excels at it.<sup>51</sup>

Secondly, the level of *innovation* is higher in clusters than for standalone firms. As is also explained above, sophisticated local buyers force companies in clusters to better anticipate the latest trends as they must meet the industry's newest demands in order to stay relevant. In line with Porter's claims, Schiele explains that in clusters, innovation occurs because (1) there is an incentive for it, and (2) the required partners for innovation are present.<sup>51</sup> Another article by Schiele, referring to empirical data from case studies at the Banca d'Italia and Mediobanca, underlines that rates of innovation and productivity indeed seem to be higher in clusters.<sup>52</sup>

The third benefit of clustering Porter describes is the *formation of new businesses*. In a cluster, the highly specialised and trend-anticipating industry leads to innovative ideas being created and pursued more easily than for standalone firms. Furthermore, high startup risks that often form a barrier for newly forming businesses are considerably reduced in clusters. Porter explains that necessary assets and inputs are present and "waiting to be assembled into a new enterprise".<sup>53</sup>

In general, Porter's theory points out that the presence of challenging conditions leads to innovation and in turn success of a capable industry. Another point Porter makes is that clusters are part of a positive feedback loop: The formation of these new businesses adds to

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<sup>46</sup>Porter, 1998, p. 79.

<sup>47</sup>See Rohde, 2016, p. 339.

<sup>48</sup>Porter, 1998, p. 78.

<sup>49</sup>See Porter, 1990, pp. 73–93.

<sup>50</sup>See Porter, 1998, pp. 81–83.

<sup>51</sup>See Schiele, 2022, p. 416.

<sup>52</sup>See the case studies summarised by Schiele, 2008, p. 31.

<sup>53</sup>See Porter, 1998, p. 84.

the growth of the cluster, promoting new cooperation and competition, keeping the business environment healthy.<sup>54</sup>

Although Porter's cluster theory is one of the most influential works on the topic, it has received its share of criticism. Researchers have pointed out that the empirical data is sometimes inconsistent, and that supporting arguments are based on "success stories" instead of empirical data.<sup>55</sup> An example of research conflicting with Porter's theory about industry clusters promoting competitive advantage was found in the metalworking sector in the USA by researcher Stephen Appold, where regional agglomeration could not be linked to a higher competitive advantage.<sup>56</sup> Another point of critique is Porter's level of analysis, which does not include managerial aspects, but regards entire industries as the basic unit of analysis.<sup>57</sup> Besides this, when looking at the model and as stated by critical researchers such as Alan Rugman, the model arguably involves "predictive" factors and a "certain lack of originality".<sup>58</sup> However, giving credit where due, Rugman also states Porter's diamond has "exactly the correct perspective by its focus on the strategies of firms rather than nations".<sup>58</sup>

#### **2.1.1.4 The Triple Helix Model: A Trilateral Innovation System between Universities, Governments and Industries**

Even though Porter's diamond model of competitive advantage is the most widely accepted model for industry clusters, this certainly does not mean it is the only model that can prove effective. Another model was proposed in 1995 by Henry Etzkowitz and Loet Leydesdorff who named it the "triple helix" model.<sup>59</sup> The triple helix model pictures the changing roles of universities, industries and governments, focusing on the dynamic relations between them.

While Porter's cluster theory originated from a model that was intended for understanding competitive advantage, the triple helix model was created as a theoretical framework and model for regional (and national) innovation. The basic model shows a simple trilateral relation between the three institutions where the interactions occurring between them together promote innovation, depicted in figure 2.2a.<sup>60</sup> Although at first glance the model shows an equal relationship, it is important to realise that Etzkowitz and Leydesdorff argue that universities have the most important role in promoting innovation in their system. Their reasons for this are that we are moving more and more towards a knowledge-based society, and naturally, universities are the institutes providing this knowledge.<sup>61</sup>

At the very start of their 1995 paper, Etzkowitz and Leydesdorff mention that universities

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<sup>54</sup>See Porter, 1998, p. 84.

<sup>55</sup>See Bekele and Jackson, 2006, pp. 14–15.

<sup>56</sup>See the research paper by Appold, 1995, pp. 27–54.

<sup>57</sup>See Schiele, 2022, p. 417.

<sup>58</sup> Rugman and D'cruz, 1993, p. 21.

<sup>59</sup>See the workshop proposal by Etzkowitz and Leydesdorff, 1995, pp. 14–19.

<sup>60</sup>The figure is adapted from Etzkowitz, 2003, p. 302.

<sup>61</sup>See Etzkowitz and Leydesdorff, 2000, p. 109.



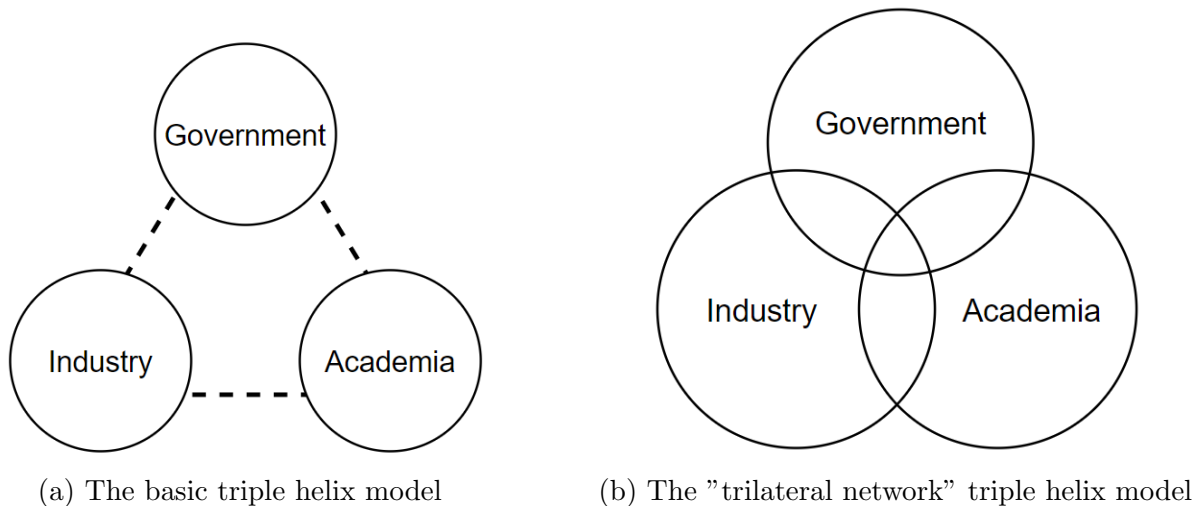


Figure 2.2: Two depictions of the "Triple Helix Model"  
 Source: Etzkowitz, 2003, p. 302

and industry are "assuming tasks that were formerly largely the province of the other".<sup>62</sup> The authors saw that universities and industries were taking on roles of each other. An example given is the birth of innovation-incubator offices at universities to engage in entrepreneurial activities, while typically, this type of innovation was thought to happen in industrial institutions specifically. Furthermore, Etzkowitz and Leydesdorff state that also the government's function is changing, in "apparently contradictory directions", as they subsidise universities' traditional educational function on the one hand and nudge them to become more economically interesting on the other.<sup>62</sup> The same contradictory changes have been found in the government's relation with industries, as in some countries they are becoming more involved and in others less so.<sup>62</sup>

Etzkowitz and Leydesdorff published an adaptation of their model for their triple helix theory that shows the overlapping trilateral network between the three actors (Figure 2.2b).<sup>63</sup> According to the triple helix theory, hybrid organisations now exist that have functions and goals that are not anymore typical of only one actor. More specifically, according to Etzkowitz and Leydesdorff in their first article on the topic: "We are witnessing the transformation of the role of state in academia, the role of corporations in innovation and of the university in the economy". These constant developments of the two-dimensional trilateral system, depicted over a third dimension such as 'time', create the three-dimensional helix that the model is named after.<sup>64</sup> This is what makes the triple helix model unique: It shows the relations between the organisations involved in an innovative cluster progressing and changing because of the effects of another dimension, such as time or globalisation.

Recent extensions of the triple helix model are the quadruple helix model and even the quintuple helix model. The quadruple helix model argues that along with university, govern-

<sup>62</sup> Etzkowitz and Leydesdorff, 1995, p. 14.

<sup>63</sup>The figure is adapted from Etzkowitz, 2003, p. 302.

<sup>64</sup>For an illustration of the triple helix see Etzkowitz and Leydesdorff, 2000, p. 112.

ment and industry, a fourth factor 'civil society' is important in the system. Ever-changing characteristics within civil society that influence the other three factors' behaviour are for example the public, media, culture, values and lifestyle, elaborated by Carayannis and Campbell.<sup>65</sup> Extensions on the quintuple helix and even higher orders have been proposed as well.

The triple helix model is often referred to as an innovation system. The reason for this is that it explains the dynamic relationship between universities, governments and industries and how this interactive system leads to innovation. However, as the trilateral interaction leads to common innovative outcomes for all three involved parties, the triple helix theory is in essence a cluster theory. This is in accordance with Porter's cluster theory, as he states innovation is one of the three main beneficial clustering effects.<sup>66</sup> Moreover, Carayannis and Campbell commonly refer to triple helix systems as 'knowledge clusters', which they describe to be regional or national clusters with a healthy innovative environment consisting of both cooperation and competition, which is in line with Porter's definition of an industry cluster.<sup>67</sup>

A recent case study using the triple helix model in analysing the China International Nanotech Innovation Cluster shows how the triple helix model can be a useful tool in analysing a cluster.<sup>68</sup> Cheng, Liu, Fan, Yan and Ye elaborate on the relations between the regional government, university and industry, and study the effect of China's globalisation on these relations. They discover that the multi-sectoral cooperative system has led to regional investments, advancements and growth of the nanotechnology industry.<sup>69</sup> By making use of the triple helix model, they were able to include a dynamic variable (globalisation) to study the changes in the system, something that would not be possible with a static model such as Porter's diamond.

The triple helix model has also received its share of criticism over the years. Authors such as Phil Cooke (2005) and, more recently, Yuzhuo Cai (2015) have claimed that the triple helix model has failed to address contextual factors surrounding the model.<sup>70</sup> Moreover, Cai states that the model was developed based on Western "successful innovation stories", and therefore the framework has not sufficiently been developed to suit the contexts of developing nations.<sup>71</sup>

#### **2.1.1.5 The Regional Innovation System: Regional Innovation through Knowledge Generation and Exploitation**

Besides Porter's diamond and the triple helix model, a third approach that tries to understand regional innovation and clustering systems is the regional innovation systems (RIS) approach. Since the early 1990s, RIS studies aim to create an analytical framework for innovation mecha-

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<sup>65</sup>For an illustration of the quadruple helix see figure 2 Carayannis and Campbell, 2009, p. 207.

<sup>66</sup>See Porter, 1998, p. 83.

<sup>67</sup>See Carayannis and Campbell, 2009, p. 222; And Porter's argument supporting coexisting competition and cooperation in Porter, 1998, p. 79.

<sup>68</sup>See the case study by Cheng et al., 2019, pp. 272–289.

<sup>69</sup>See Cheng et al., 2019, p. 285.

<sup>70</sup>See Cooke, 2005, pp. 1130–1131; And also the criticism by Cai, 2015, p. 301.

<sup>71</sup>See Cai, 2015, p. 301.

nisms occurring within regional economies.<sup>72</sup> The RIS approach is closely related to literature about national innovation systems (NIS), which had been extensively researched prior to the emergence of RIS. Among others, authors such as Cooke, Gomez Uranga and Etxebarria (1997) argue that NIS studies that tried to model innovation processes within an entire nation were too complex and diverse to be generalised.<sup>73</sup> Thus, RIS limits the boundaries of innovation systems to a single region, linking it more closely to industry clusters.

Cooke et al. relate their exploration of regional innovation systems to "from a systems perspective, Porter's most interesting, but rather neglected, insight" which is that "cooperation is the key to much of the success of accomplished clusters".<sup>74</sup> This cooperative aspect is what Cooke et al. base their take on RIS on. Companies that are able to make use of regional cooperative practices will benefit from a competitive advantage.<sup>75</sup> Doloreux and Parto add to this that if companies base their "competencies and learning processes" on "localised capabilities such as specialized resources, skills, institutions and share of common social and cultural values", they will experience a regional competitive advantage.<sup>72</sup>

Regional innovation systems are based on three elements: actors, networks and institutions.<sup>76</sup> Actors interact regionally with each other in a certain network while institutions provide resources and options necessary for the system's operation. Back in 1997 when the regional innovation system approach was still poorly researched and defined, Cooke et al. predicted RISs likely include firms acting as customers, suppliers or partners for other firms, knowledge centres and academic institutions, and a multitude of overarching structures of business associations and governmental departments.<sup>75</sup> Above all Cooke et al. claim that the actors need to behave in an "associative" manner, meaning there is two-way interaction in innovation-stimulating processes.<sup>75</sup>

The complicated system of actors in RISs can be better visualised by means of a model that shows the conceptualised interactions between actors. One relevant model was first introduced by Erkkö Autio in 1998, was adapted almost one-to-one by Cooke (2002) and even more recently still shown to be a relevant model through the adaptation of Stuck, Broekel and Revilla Diez (2015).<sup>77</sup> Figure 2.3 shows the structure of a regional innovation system as described above.

As figure 2.3 shows, RIS is closely linked to knowledge network structures. As is also shown in the model, a clear division is made between knowledge generation actors and knowledge application actors. The first refers to institutions such as universities, technology transfer organisations or other research and knowledge-providing companies. In an RIS approach, these actors provide the regional industry with knowledge.

The knowledge application subsystem in the top part of the RIS model refers to mainly

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<sup>72</sup>See Doloreux and Parto, 2005, p. 134.

<sup>73</sup>See Cooke et al., 1997, p. 475.

<sup>74</sup>Cooke et al., 1997, p. 484; Also see the original work by Porter, 1990, pp. 73–93.

<sup>75</sup>See Cooke et al., 1997, p. 484.

<sup>76</sup>Asheim et al., 2019, See the introduction chapter.

<sup>77</sup>Original by Autio, 1998, p. 134; adaptation by Cooke, 2002, p. 137; and also Stuck et al., 2015, p. 3.

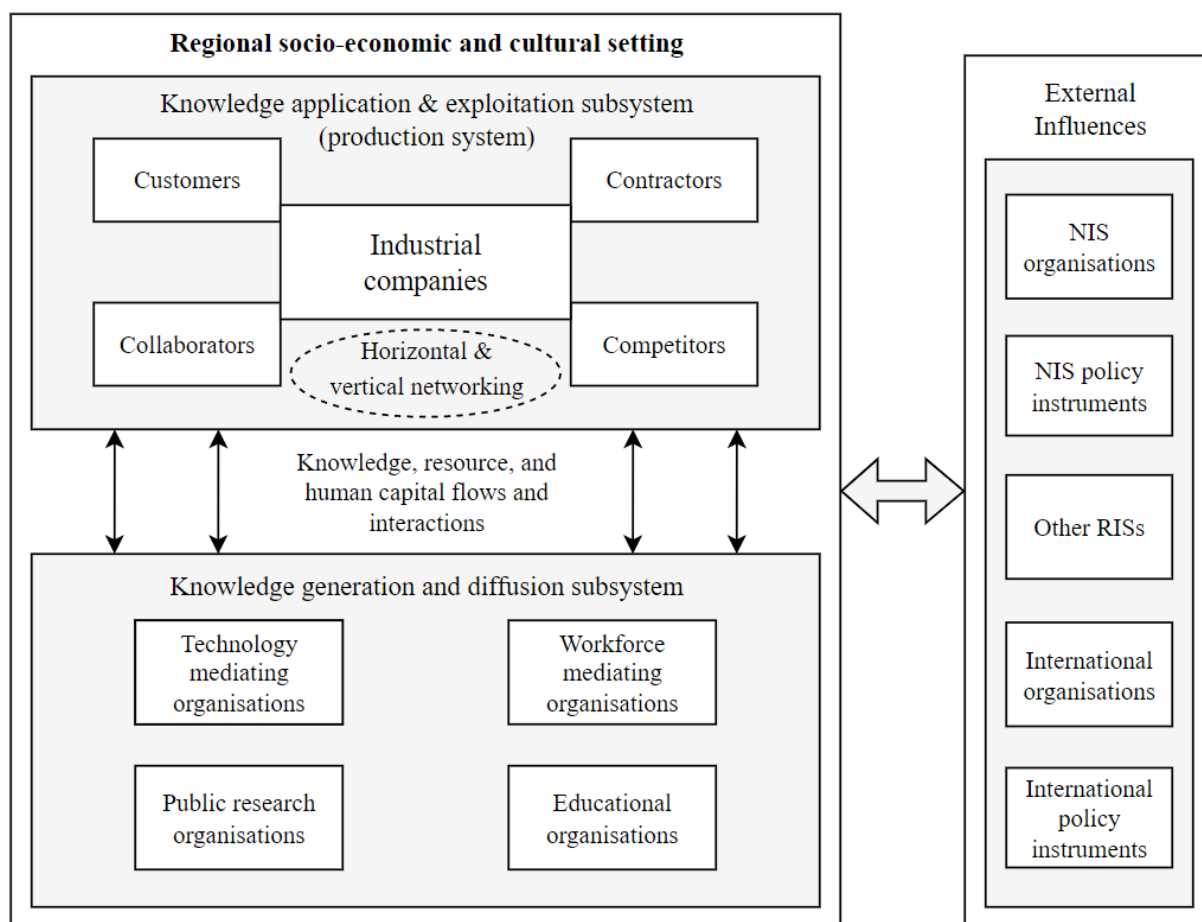


Figure 2.3: Model of a Regional Innovation System (RIS)

Source: Autio, 1998, p. 134; Cooke, 2002, p. 137; Stuck et al., 2015, p. 3

companies and organisations in an industry that conduct business with other actors being the 4 C's: Customers, contractors, collaborators and competitors. Autio originally described a network consisting of horizontal interactions between companies and their competitors and collaborators, and vertical interactions between companies and their customers and contractors.<sup>78</sup>

Cooke et al. underline in their 1997 paper that knowledge transfer and "learning" is closely linked with innovation as there "can be no change without previous learning".<sup>79</sup> Therefore knowledge transfer between knowledge generation- and application organisations is one of the fundamental mechanisms of the RIS approach. The other fundamental mechanism that can be identified from figure 2.3 is the interaction between extra-regional actors and the knowledge generation application system. These external influences coming from other RISs, the overarching NIS or international organisations "mainly take the form of policy interventions, funding and subsidies for innovation, technology inputs ... and knowledge, resource and human capital flows from outside the RIS".<sup>80</sup>

In general, in comparison to Porter's diamond and the triple helix model, the RIS approach

<sup>78</sup>See the model elaboration by Autio, 1998, p. 134.

<sup>79</sup>See Cooke et al., 1997, pp. 484–485.

<sup>80</sup>Autio, 1998, p. 135.

is more focused on the transfer of knowledge and resources between knowledge application and knowledge generation systems, which according to RIS theory promotes innovation.<sup>81</sup> External parties influence this interacting system through multiple mechanisms described above. Despite the differences in models describing clusters and regional innovation systems, they can be used separately or even in combination with each other to ensure multiple perspectives are covered.

## 2.1.2 Cross-Border Clusters

### 2.1.2.1 Cross-Border Clusters: Definitions, Advantages and Challenges

Porter's cluster theory, the triple helix model and the regional innovation system theory all agree that innovation and other arising benefits are the result of interactions between multiple actors within a geographical region. Especially in the last decades, regions within a single country were chosen for analysis without further thought. Only recently have cluster theory and regional innovation studies in cross-border regions gained traction. Rohde's 2016 literature review resulted in the observation that there is considerably less research into cross-border clusters than regional clusters.<sup>82</sup> Nevertheless, multiple cross-border applications of the classic cluster theories have been around for some time. Some of these include: The double diamond model, the double triple helix model and cross-border regional innovation systems. These models are separately discussed in detail in sections 2.1.2.2, 2.1.2.2 and 2.1.2.4.

What separates cross-border cluster theory from ordinary cluster theory, naturally, is the specific location in a region involving a border. Such a 'cross-border region' can be defined in several specific ways, but perhaps keeping it general to suit a broad range of locations is best. Karl-Johan Lundquist and Michaela Tripl's central work in cross-border RIS uses one very general definition of a cross-border region: "An area consisting of adjacent territories belonging to different nation-states".<sup>83</sup> Likewise, in this thesis, a cross-border region refers to the cross-border region between two nations or countries. However, it must be noted that this does not mean that cross-border interaction between two same-nation regions cannot provide useful insights, as they might also have significantly different national identities, such as was shown by Wang, Chandra, Du, Ding and Wu in the case of Hong Kong and Shenzhen.<sup>84</sup>

A widely used definition of an industry cluster is Porter's definition: "Geographic concentrations of interconnected companies and institutions in a particular field".<sup>85</sup> Extending this definition to a cross-border region according to Lundquist and Tripl's definition would then give us the following (the latter part describing a cross-border region):

"Cross-border clusters are concentrations of interconnected companies and institu-

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<sup>81</sup>See Cooke et al., 1997, pp. 484–485.

<sup>82</sup>See Rohde, 2016, p. 342.

<sup>83</sup>See Lundquist and Tripl, 2013, p. 452.

<sup>84</sup>See Wang et al., 2021, pp. 2–11.

<sup>85</sup>See Porter, 1998, p. 78.

tions in a particular field, that are geographically located in an area consisting of adjacent territories belonging to different countries”<sup>86</sup>

One of the most commonly studied cross-border regions is the Øresund region, consisting of Copenhagen, Malmø and the famous bridge connecting the two cities.<sup>87</sup> The cross-border regional innovation system in this region has attracted the attention of a considerable number of researchers and is a prime example of a cross-border region. One cross-border cluster in this region is the Medicon Valley biotechnology cluster. The Øresund region and specifically the clustering-activity discovered in this region is discussed in more detail in section 2.1.2.5.

But what makes these cross-border regions so worthwhile to study? The answer to this question lies in the unique conditions characterising these regions, which when dealt with adequately, can be turned into competitive advantages. Lundquist and Trippel elaborate that “there is a widespread agreement in the academic literature that in the emerging globalized knowledge economy the long-term competitive strength of these areas” - cross-border regions - “will rest on their capacity to create an integrated innovation system”.<sup>88</sup>

As stated above, the following sections discuss the double diamond, the double triple helix, and the cross-border RIS models, which all relate to cross-border clusters and innovation systems. As stated in section 2.1.1.2, Porter’s cluster theory describes clusters from an industrial, and economic perspective, leading to competitive advantage through productivity, innovation and new business formation. Triple helix theory and RIS describe a system of relations in which these interactions lead purely to innovation. This difference also translates to the cross-border extensions of these theories, where the fundamental perspectives are slightly different. However, as also defended in section 2.1.1.2, all three models are strongly correlated and their unique perspectives may even prove useful.

### **2.1.2.2 The Double Diamond Model: A Cross-Border Extension of the Diamond of Competitive Advantage**

Shortly after Porter’s original publication of the diamond of competitive advantage, Alan M. Rugman and Joseph R. D’Cruz criticised the model for not suiting “small, open, trading economies” such as Canada.<sup>89</sup> Besides Canada, the model was assessed for other export-dependent countries such as New Zealand and South-Korea, where it was also found to be ineffective.<sup>90</sup> Also for the European case, Rugman and D’Cruz state that the model is ineffective due to the open international trading economy, where small European countries trade internationally without much interference.<sup>91</sup>

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<sup>86</sup>Definition is based on Porter, 1998, p. 78; and also Lundquist and Trippel, 2013, p. 452.

<sup>87</sup>For an example of a study into the Øresund region see Mikhaylov, 2013a, pp. 5–7.

<sup>88</sup>Lundquist and Trippel, 2013, p. 451.

<sup>89</sup>See the paper by Rugman and D’cruz, 1993, pp. 17–39.

<sup>90</sup>See the criticism by Rugman and D’cruz, 1993, pp. 18–19; for the New Zealand and South-Korean cases specifically see Cartwright, 1993; Cho and Cho, 1991.

<sup>91</sup>See Rugman and D’cruz, 1993, p. 19.

Rugman and D’Cruz continue to explain what is, according to them, a serious flaw in Porter’s model. He states that Canada’s (and other nations’) multinational activity does not fit into either of the four factors of Porter’s diamond.<sup>92</sup> Most of Canada’s MNCs operate in the USA as well, and vice versa, which explained by Rugman and D’Cruz is largely contributed to by the Canada-USA Free Trade Agreement.<sup>92</sup> Because of this, Rugman and D’Cruz propose a new model that links the Canadian diamond with the USA diamond across a border that is argued to not be so relevant as thought. Figure 2.4 shows Rugman and D’Cruz’s double diamond model applied to the Canada/US case as described in their 1993 paper.<sup>93</sup>

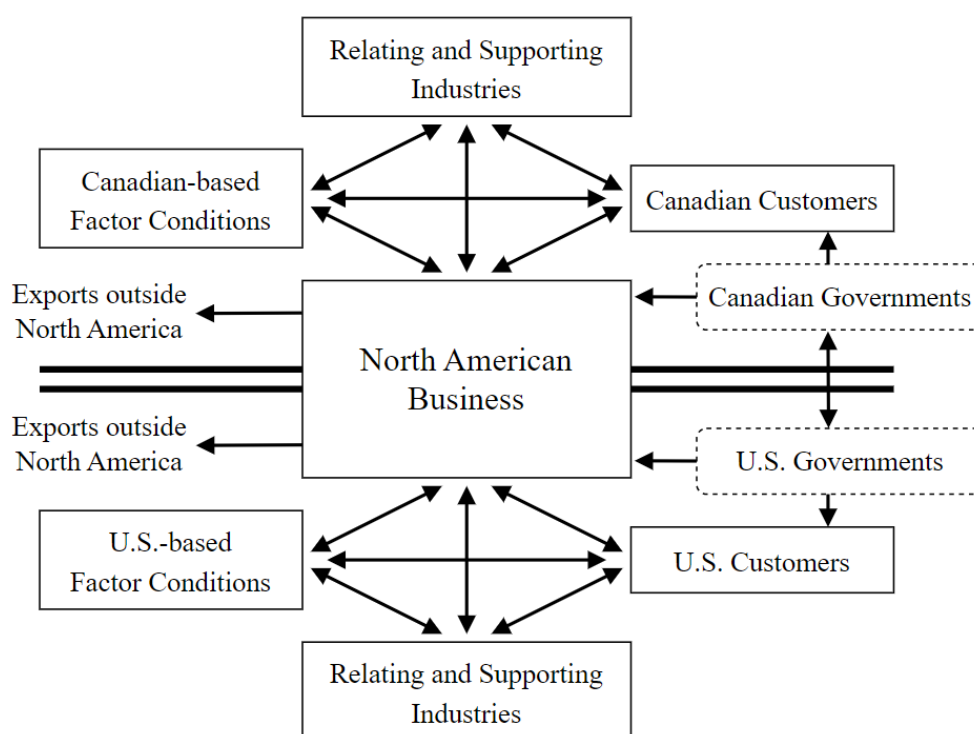


Figure 2.4: Double Diamond model of Canada and the US  
 Source: Rugman and D’Cruz, 1993, p. 34

The double diamond model consists of two loose diamond models of the four factors described by Porter: (1) Factor conditions, (2) demand conditions, (3) related and supporting industries and (4) firm strategy, structure and rivalry.<sup>94</sup> In an open-trade cross-border region, one nation’s factor ‘strategy, structure and rivalry’, which entails the business- and competition-related aspects, is linked strongly with another nation’s same factor. The reason for this is that a border that is open to trade leads to companies engaging in cross-border strategies; searching new markets and having to deal with new competitors and challenges. Therefore, the two diamonds seem to have more of a singular ‘strategy, structure and rivalry’ factor, depicted in figure 2.4 as the ‘North American Business’ region operating across the border.<sup>95</sup> Also, the

<sup>92</sup>See Rugman and D’cruz, 1993, p. 26.

<sup>93</sup>See the original model by Rugman and D’cruz, 1993, p. 34.

<sup>94</sup>Originally proposed in Porter, 1990, pp. 77–84.

<sup>95</sup>See the model elaborations by Rugman and D’cruz, 1993, pp. 31–35.

exports and sales happening outside the combined markets are depicted in figure 2.4.

What can also be seen in the double diamond model is the inclusion of the 'Governmental' external force, which strongly affects businesses and customers. Porter originally did not include the influence of the government as a factor in his diamond model but spent a number of pages addressing its crucial role as an enabler in his publication 'The Competitive Advantage of Nations'.<sup>96</sup> Governments of both nations in a cross-border scenario are responsible for creating a business environment and the policies necessary to allow nations to trade across the border freely. Therefore, Rugman and D'Cruz's double diamond model shows the power of the external governmental force and especially the important relations with customers and firms on either side of the border.<sup>97</sup>

In 1995, Moon, Rugman and Verbeke proposed a generalised double diamond model to suit the global competitiveness of other countries that were not in a typical open border trade environment.<sup>98</sup> This model more closely resembled Porter's original diamond than its 1993 predecessor.<sup>99</sup> However, in this case, a national diamond and an international diamond layered on top of each other show a nation's competitiveness score in a national context and an international context.<sup>100</sup> The distance between the inside diamond and the outside diamond thus shows how well a nation performs internationally: A small difference means does not perform well globally while a large difference points to international competitiveness. What sets this model apart from Porter's original model is that it can be applied to show global competitiveness in comparison with national competitiveness, which can be useful in some studies. However, Rugman and D'Cruz's original model proposed in 1993 (Figure 2.4) arguably better illustrates the ongoing interactions in the context of cross-border clusters.

### **2.1.2.3 The Double Triple Helix Model: Triple Helix in Cross-Border Regions**

The triple helix model shows the trilateral relation between government, industry, and academia, and highlights that innovation is created through interactions between these dynamic actors. In a recent paper by Inga Ivanova, Øivind Strand, and Loet Leydesdorff (2019) is mentioned that "the interactions are especially important for cross-border regions which wish to enhance their innovation performance."<sup>101</sup> In accordance with this, recent extensions of the triple helix model to cross-border environments have been made to model how innovation can be promoted across multiple nations.

One extension of the triple helix model is the double triple helix model, which shows interactions within two 'government, industry and academia' helices and the relations between them. This extended model was introduced by Andrey Mikhaylov in 2013, who argued that "the

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<sup>96</sup>See Porter, 1990, pp. 86–89.

<sup>97</sup>See Rugman and D'cruz, 1993, p. 21.

<sup>98</sup>See the original publication: Chang Moon et al., 1995, pp. 97–114.

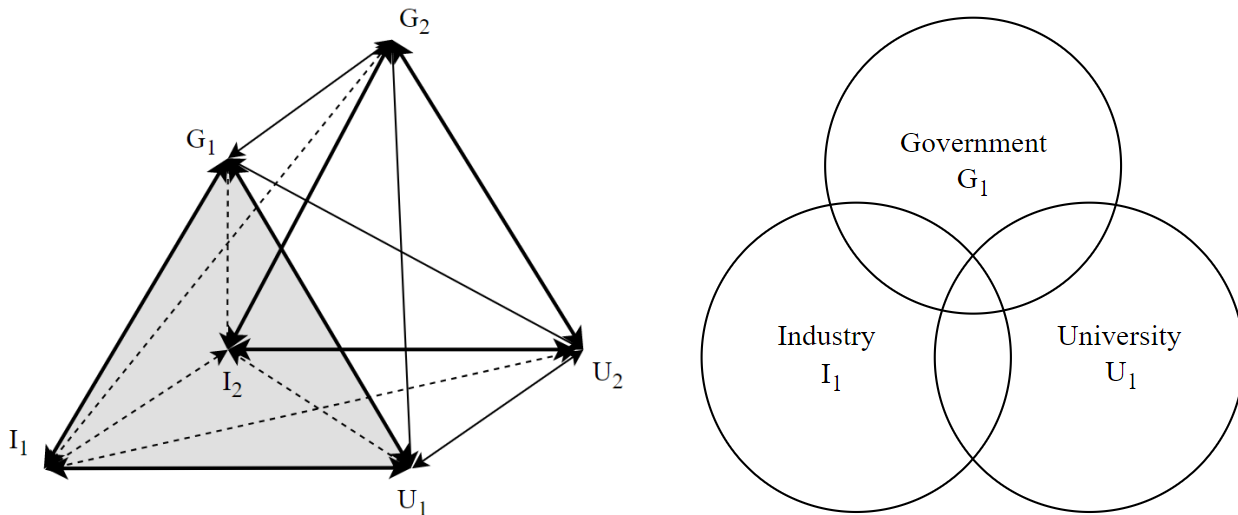
<sup>99</sup>See Porter, 1990.

<sup>100</sup>For elaboration and examples see Chang Moon et al., 1998, p. 138.

<sup>101</sup>Ivanova et al., 2019, p. 20; and also see Lundquist and Trippl, 2013.



triple helix model unveils its unique characteristics while applied to cross-border clusters”.<sup>102</sup> Mikhaylov found 20 cross-border clusters in the Baltic Sea region showing collaboration amongst actors. According to the author, the triple helix model’s inter-organisational structures were present on both sides of the borders investigated, and so the system could better be analysed through a ”double triple helix” model as depicted in figure 2.5.<sup>103</sup>



(a) The ”Double Triple Helix” model describing a cross-border cluster adapted from the original model by Andrey Mikhaylov in 2013 (b) A depiction of the triple helix model of one of the border regions

Figure 2.5: The ”Double Triple Helix” model  
Source: Mikhaylov, 2013, p. 1736

The double triple helix model shows that governments, industries and universities interact with each other even over borders. Figure 2.5a shows these double-sided interactions between each of the involved actors, as found by Mikhaylov in his multiple analysed case studies.<sup>104</sup> In line with the original triple helix model theoretical extensions by Etzkowitz, Mikhaylov explains that in this doubled model, the actors themselves, as well as the interactions between them (including cross-border actors), are dynamic.<sup>105</sup> Mikhaylov argues that besides some required ”stability” to fall back on, the cross-border network is characterised by ”uncertainty ... due to the cultural, legislative, infrastructural and other differences of the participating countries”.<sup>106</sup> The triple helix model’s fundamental aspect of constant transformation of roles and interactions therefore also seems to apply to cross-border situations, where the innovation system is even more complex. Mikhaylov summarises the drivers of these constant transformations as (1) the change in the number and structure of cluster participants, (2) the interchangeability of the

<sup>102</sup>Mikhaylov, 2013b, p. 1735.

<sup>103</sup>See Mikhaylov, 2013b, p. 1735.

<sup>104</sup>See the text and figures by Mikhaylov, 2013b, pp. 1735–1736.

<sup>105</sup>For elaboration on the dynamics of the triple helix model see Etzkowitz and Leydesdorff, 2000, p. 113; and Etzkowitz, 2003, p. 303; and the extension by Mikhaylov, 2013b, p. 1735.

<sup>106</sup>Mikhaylov, 2013b, p. 1735.

roles of actors and (3) the overall shift in strategic priorities of core actors.<sup>107</sup>

In 2014, Mikhaylov and Mikhaylova published an extension on Mikhaylov's research in identifying international clusters in the Baltic region. They used the doubled triple helix model to analyse a larger number of clusters and found that 28 of these qualified their two requirements for being an international cluster: (1) The cluster's structure should "correspond with the "Doubled triple helix" model and (2) the cluster should "be in line with the general definition of an international cluster".<sup>108</sup> 21 of these 28 international clusters could be reduced further to cross-border clusters (7 were transnational clusters). Even though they did not gather their own empirical data, the data used was gathered from reliable, official, and international institutions.<sup>109</sup>

In the same year, Sørensen and Hu published their exploratory take on the internationalisation of triple helix structures in the case of Danish organisations in China.<sup>110</sup> Although their case is not of two neighbouring countries interacting with each other, they agree with Mikhaylov, Mikhaylova and even Etzkowitz and Leydesdorff's early conceptualisations that the triple helix model can operate at international levels.<sup>111</sup> Sørensen and Hu conclude that their findings "suggest that it is possible for TH to go beyond national boundaries and interact with another TH in a foreign country to facilitate innovation activities".<sup>112</sup> Sørensen and Hu create a model that shows a triple helix structure in one country can set up a triple helix structure in a foreign country that in turn, once operational, can interact with the foreign country's regional triple helix system.<sup>113</sup> This in turn may lead to synergies and new innovative opportunities for both countries.<sup>114</sup>

The double triple helix model may prove useful in analysing international and cross-border clusters from a perspective that focuses on dynamic interactions and transforming roles of organisations; characteristics that suit most modern societies and businesses chasing innovation. However, one might argue that the double triple helix model is relatively vague and structures actors and relations between them in a less organised manner compared to for example the double diamond model. When looking at the double triple helix model (figure 2.5), it can be seen that everything interacts with everything. So it seems that the theory does not argue a specific structure of knowledge transfer or supply chain is central in the theory (Although this may sound contradictory as Etzkowitz and Leydesdorff argue that the university has a central role due to our knowledge society<sup>115</sup>). Despite and maybe even because of this, the double triple helix model's key takeaway is that a cross-border cluster is even more versatile and complex

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<sup>107</sup>See Mikhaylov, 2013b, pp. 1735–1736.

<sup>108</sup>For requirements (quoted from p. 128) and results see Mikhaylov and Mikhaylova, 2014, pp. 128–136.

<sup>109</sup>See the methodology section in Mikhaylov and Mikhaylova, 2014, pp. 126–128.

<sup>110</sup>See Sørensen and Hu, 2014.

<sup>111</sup>See Mikhaylov and Mikhaylova, 2014; and Etzkowitz and Leydesdorff, 2000, p. 118.

<sup>112</sup>Sørensen and Hu, 2014, p. 255.

<sup>113</sup>See the model elaboration by Sørensen and Hu, 2014, pp. 258–259.

<sup>114</sup>See the conclusions of Sørensen and Hu, 2014, p. 269.

<sup>115</sup>See Etzkowitz and Leydesdorff, 2000, p. 109.

than a single-nation cluster, which may lead to unique innovation opportunities and shared competitive advantages. Nevertheless, more research into the application of the double triple helix model is necessary to enhance the model as a theoretical framework.

#### **2.1.2.4 Cross-Border Regional Innovation Systems**

Besides Porter's diamond and the triple helix model, the regional innovation system's approach to cluster theory has recently also been extended to cross-border regions. Notable research into cross-border innovation spaces has been conducted by Lundquist and Tripl.<sup>116</sup> In 2010, Michaela Tripl's paper "Developing Cross-Border Regional Innovation Systems: Key Factors and Challenges" was published, which was one of the first explorations of how RIS could be applied to cross-border contexts.<sup>117</sup> The majority of the paper focuses on conceptualising which factors favour or prevent a cross-border regional innovation system (CBRIS) from developing, categorised in 5 dimensions: Knowledge infrastructure, business, relational, socio-institutional and governance dimensions.<sup>118</sup>

Central in RIS is a bilateral interaction between knowledge-generating organisations and knowledge-exploiting organisations. To enhance the development of a CBRIS, Tripl explains that knowledge-generating organisations should construct partnerships and knowledge transfer systems between research- and educational organisations on both sides of the region's border, and make sure they focus on the entire regional economy's needs (including the other nation's context). For the knowledge-exploiting/applying organisations holds that companies on both sides of a border region must maintain a "high road development path based on continuous innovation" according to Tripl.<sup>119</sup> Besides this, Tripl mentions that there must be plenty of complementary organisations surrounding the regional industry.<sup>120</sup>

Besides these two central dimensions, the relational, socio-institutional and governance dimensions are vital in CBRIS. Tripl underlines the importance of "symmetric transboundary relationships", meaning that bordering regions should put equal effort into connecting and cooperating with cross-border organisations in innovation and knowledge practices.<sup>120</sup> Furthermore, large differences in cultural and institutional characteristics, as well as significantly deviating NIS structures of bordering regions can obstruct a cross-border RIS from developing.<sup>120</sup> The last dimension calls for governments to actively enable involved organisations to interact with each other by means of a coherent innovation strategy.<sup>120</sup> In the end, even if all five dimensions are addressed adequately, policymakers will need to look beyond traditional methods to overcome potential barriers unique to a cross-border environment.<sup>121</sup>

In 2013, A paper by Karl-Johan Lundquist and Michaela Tripl was published which ex-

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<sup>116</sup>See Lundquist and Tripl, 2009; Tripl, 2010; and also Lundquist and Tripl, 2013.

<sup>117</sup>See Tripl, 2010, pp. 150–160.

<sup>118</sup>See the text and table in Tripl, 2010, pp. 152–156.

<sup>119</sup>Tripl, 2010, p. 152.

<sup>120</sup>See Tripl, 2010, pp. 152–156.

<sup>121</sup>See the five specific policy issues pointed out in Tripl, 2010, p. 157.

tended Trippl's 2010 paper on CBRIS. Lundquist and Trippl's core argument is that "cross-border RIS should be seen as the most advanced form of transnational integration, resting upon the success of previous incremental and less innovation-oriented modes of development".<sup>122</sup> To back up their argument, a conceptual model is proposed and developed by Lundquist and Trippl<sup>123</sup>). The model, first proposed in 2009, shows different stages of the development of a cross-border RIS and has been developed to include several dimensions.<sup>124</sup> The dimensions discussed by Lundquist and Trippl are based on four forms of proximity: Physical, cognitive, functional and institutional distance.<sup>125</sup> This model for the development stages of a CBRIS is depicted in figure 2.6 below.

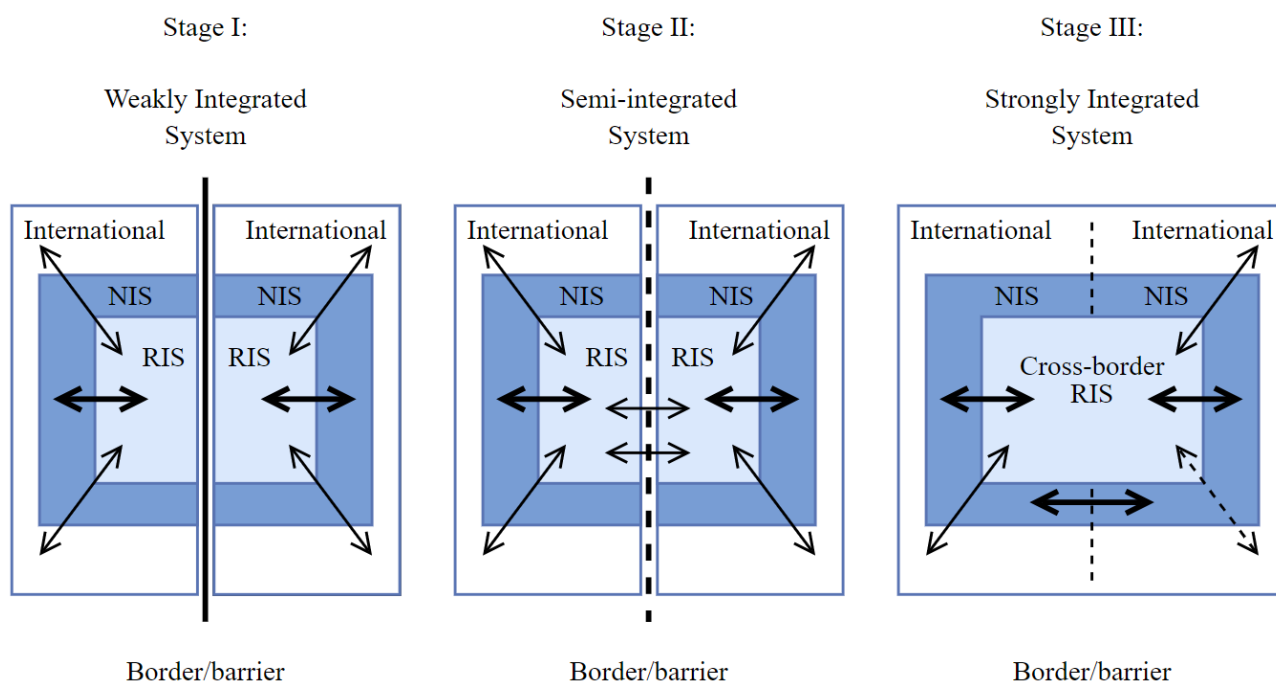


Figure 2.6: Three ideal types of different stages of cross-border integration  
Source: Lundquist and Trippl, 2013, p. 455

The three stages shown in figure 2.6 are of a weakly integrated system, a semi-integrated system, and a strongly integrated cross-border regional innovation system.<sup>126</sup> The first stage is a weakly integrated system with a low amount of cross-border interactions and relations, as well as an ineffective cross-border knowledge-transfer and innovation system.<sup>127</sup> Relations that do exist in these 'stage I' systems are often asymmetric, lack potential for synergies, and are limited by the multiple forms of proximity.<sup>127</sup> As can also be seen in figure 2.6, a 'stage I' system

In a 'stage II' system, Lundquist and Trippl explain an "emerging knowledge-driven system"

<sup>122</sup>Lundquist and Trippl, 2013, p. 452.

<sup>123</sup>See Lundquist and Trippl, 2009, p. 6.

<sup>124</sup>See Lundquist and Trippl, 2009, pp. 6–10; and also Trippl, 2010, pp. 150–160.

<sup>125</sup>See Lundquist and Trippl, 2013, p. 452.

<sup>126</sup>See Lundquist and Trippl, 2013, p. 455.

<sup>127</sup>See Lundquist and Trippl, 2013, p. 456.

can be identified, containing loose strands of knowledge and innovation relations.<sup>128</sup> Physical accessibility is improved in this stage, leading to more flows and relations between actors.<sup>129</sup> Besides this, in areas where functional and cognitive proximity are improved, a number of "bridging organisations" are present that promote other companies and organisations to engage in cross-border activities.<sup>128</sup>

In a 'stage III' system, all types of proximity have been improved to a point where substantial interaction between regions exists, acting as a single cross-border RIS. There is a "considerable flow of knowledge, expertise and skills across the border", through interactions and relations between both knowledge-generating and exploiting institutions.<sup>130</sup> As Tripl and Lundquist emphasise, a more developed cross-border innovation system such as a 'stage II' or 'stage III' system will lead to long-term competitive advantage in a globalising knowledge economy.<sup>131</sup>

Research on CBRIS remains very limited to this day. Authors such as Teemu Makkonen and Stephan Rohde (2016) addressed this issue and the problematic mismatch between the available conceptual literature and empirical studies regarding CBRIS.<sup>132</sup> They argue that the reason for this mismatch is that the "concepts of proximity, integration and CBRIS dimensions" are too "fuzzy and intangible" to measure empirically.<sup>133</sup> Therefore, these concepts should be defined in a way that is more easily measurable, and subsequently, be analysed in empirical studies.<sup>134</sup>

One recent study that attempts this was conducted in 2021 by Jue Wang, Kevin Chandra, Coco Du, Weizhen Ding and Xun Wu, in the Hong Kong - Shenzhen region: Two states with an "autonomous status".<sup>135</sup> They use a simplified framework consisting of the factors of proximity, collaboration, and connectivity, which they connect with empirical data. They were able to connect their data and framework and conclude that the Hong Kong - Shenzhen region performs above average in scientific research cooperation, but below average in technological linkages when compared to other European and North American CBRISs.<sup>136</sup>

#### **2.1.2.5 Best Case: The Øresund Region and the Medicon Valley Cluster**

The region that is studied most frequently regarding its cross-border innovation system and clustering activity is the Øresund region, consisting of Copenhagen, Malmø and their surrounding regions.<sup>137</sup> The Øresund bridge opened in 2000 to the public<sup>138</sup>, leading to a notable amount of studies that wished to capture the effects of the considerably increased accessibility between

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<sup>128</sup>Lundquist and Tripl, 2013, p. 457.

<sup>129</sup>See Lundquist and Tripl, 2013, p. 457.

<sup>130</sup>Quoted and referenced from Lundquist and Tripl, 2013, p. 457.

<sup>131</sup>See the conclusion of Lundquist and Tripl, 2013, p. 458.

<sup>132</sup>See Makkonen and Rohde, 2016, p. 1635.

<sup>133</sup>Makkonen and Rohde, 2016, p. 1636.

<sup>134</sup>See Makkonen and Rohde, 2016, p. 1636.

<sup>135</sup>Wang et al., 2021, p. 8.

<sup>136</sup>See the conclusion of Wang et al., 2021, p. 9.

<sup>137</sup>See Rohde, 2016, p. 347.

<sup>138</sup>See the Øresund bridge's website: <https://www.oresundsbron.com/en/node/6738>

the two Scandinavian cities.<sup>139</sup> Around two decades ago, researchers could only publish predictions about the effects that the bridge and the dramatically increased accessibility between the countries, were going to have on the two, now physically connected, countries.<sup>140</sup> Soon after, the first effects on economic integration and regional innovation systems were analysed, as well as publications discussing specific clusters such as the Medicon Valley cluster.<sup>141</sup>

The Øresund region is a vital cross-border region within the EU and is one of the most developed cross-border regions.<sup>142</sup> The largest advantage of this is "that they share cultural, historical, and linguistic heritages so that the physical barriers between the regions are very low compared to other cross-border regions."<sup>142</sup> Other reasons given are "the very strong motivation to create an innovative cluster", and a "clear division of work" between multiple forms of management.<sup>142</sup> Recent research points out that indeed there are significant innovation effects in the region. In 2022, researchers Ejermo, Hussinger, Kalash, and Schubert concluded that the Øresund bridge led an increase of 30%-35% in the Malmö region's patent filings, of which 78% could be explained by an inflow of highly skilled individuals into the Malmö region.<sup>143</sup> It must be stated that the results do not necessarily result from pure cross-border activity, as a flow from Gothenburg and Stockholm into Malmö caused the change according to Ejermo et al.<sup>144</sup> However, the increase in patent filings after the Øresund bridge's construction still stands. Ejermo et al. explain that perhaps by offering better job matches on either side of the bridge, the outflow from Stockholm and Gothenburg can be explained as a shift in human capital. Nevertheless, this research points out the impact that reduced functional proximity can have on a region.<sup>144</sup>

According to Hansen, the Øresund region can be regarded as a 'semi-integrated CBRIS' (see figure 2.6 and the accompanying text) because of the bridge's increased accessibility between the regions.<sup>145</sup> Hansen explains the "continuing presence of administrative and cultural barriers" as well as (also explained by Lundquist and Winther) the "considerable differences between the Danish and Swedish national Innovation systems" are preventing the CBRIS from attaining a 'strongly integrated system' status.<sup>146</sup> However, Hansen does point out that the CBRIS is likely still more advanced than bordering regions in many other contexts.<sup>147</sup>

The Medicon Valley cluster is specialised in life sciences such as biotechnology and pharmacy, and today consists of more than 350 companies with local research and development, as well as 4 large, global pharmaceutical companies.<sup>148</sup> Besides this, the non-profit Medicon Valley Alliance

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<sup>139</sup>For example Hansen, 2013.

<sup>140</sup>See as an example Matthiessen, 2000, pp. 171–180.

<sup>141</sup>See Coenen et al., 2004, pp. 1003–1018; and a RIS example is Lundquist and Winther, 2006, pp. 116–117; for a cross-border cluster analysis see Park, 2014, pp. 373–374.

<sup>142</sup>See Park, 2014, p. 373.

<sup>143</sup>See the conclusions by Ejermo et al., 2022, p. 18.

<sup>144</sup>See Ejermo et al., 2022, pp. 17–18.

<sup>145</sup>For CBRIS stages see Lundquist and Trippel, 2013, p. 455; And see Hansen, 2013, p. 28.

<sup>146</sup>See Lundquist and Winther, 2006, p. 126; Quote from Hansen, 2013, p. 28.

<sup>147</sup>See Hansen, 2013, p. 28.

<sup>148</sup>See the Medicon Valley website, URL: <https://mediconvalley.greatercphregion.com/about-medicon-valley>

cluster organisation has over 250 members that "represent the region's triple helix", including regional companies, universities and research facilities, and even regional governments.<sup>148</sup> Data on the Medicon Valley website shows that besides specialised companies, the region involves 9 life science universities, 7 science parks focused on life sciences, 10 incubators, 28 hospitals of which 9 are related to universities in the region, and other research facilities.<sup>148</sup> According to Porterian cluster theory, triple helix theory and RIS this data indeed explains the international competitive advantage of Medicon Valley. In a nutshell: Medicon Valley consists of an industry of many specialised companies and a large number of knowledge-generating organisations such as universities and research institutes, connected by an overarching network even involving regional governments, all geographically collocated in the cross-border Øresund region.

The cluster organisation Medicon Valley Alliance is, according to Hansen, a "broadly recognised and very successful example of policy intervention stimulating cross-border collaboration".<sup>149</sup> Hansen concludes that only increased accessibility in a cross-border region is not enough to improve knowledge flow, but requires a targeted policy effort as was the case in Medicon Valley.<sup>150</sup> Double diamond, double triple helix and CBRIS theory all agree that stimulating roles of governments and policies are crucial to the success of a cross-border cluster.<sup>151</sup> As Hansen goes on to explain, the cluster organisation focuses on building social relations within the industry.<sup>152</sup> This focus on promoting interactions and collaboration stimulates innovation, as the sections above explain.

Therefore, at least in theoretical terms, companies in the Medicon Valley cluster should perform well compared to their international, isolated rivals. The 2021 annual report of the Medicon Valley Alliance presents data that confirms that also in practice, the Medicon Valley cluster performs well.<sup>153</sup> Studies show that the Medicon Valley cluster operates well as a cross-border cluster, compared to other cases, and is indeed still a prominent example of a successful cross-border cluster.<sup>154</sup>

#### **2.1.2.6 Local Case: The Dutch-German EUREGIO**

One of the oldest - if not the oldest - European cross-border regions is the Dutch-German bordering region commonly referred to as the EUREGIO, founded in 1958. This cross-border region includes Dutch regions Twente and Achterhoek and German regions Münsterland and Osnabrücker Land, consisting of a cross-border network of 128 Dutch and German municipalities, water boards, and other types of regional governments.<sup>155</sup> Even though this cross-border

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<sup>149</sup>See Hansen, 2013, p. 28.

<sup>150</sup>See Hansen, 2013, p. 35.

<sup>151</sup>See Rugman and D'cruz, 1993, p. 35; and also Mikhaylov, 2013b, p. 1736; and see dimension 'Policy structures' in Table 1 of Lundquist and Tripl, 2013, p. 455.

<sup>152</sup>See Hansen, 2013, p. 29.

<sup>153</sup>URL: <https://mediconvalley.greatercphregion.com/about-medicon-valley>

<sup>154</sup>See Park, 2014, p. 373; See Table 2 in Wang et al., 2021, p. 6.

<sup>155</sup>URL: <https://www.euregio.eu/>

region is one of the oldest in Europe, it is relatively understudied, especially when compared to the Øresund region.

Although the area consists of two arguably rural corners of the bordering nations, a total of around 3.4 million people live in the EUREGIO, of which two-thirds of these people reside in Germany.<sup>155</sup> Much like the Øresund region, the EUREGIO contains numerous research universities such as the University of Twente, the University of Münster, and Osnabrück University, with their combined student number of around 70.000.<sup>156</sup> Naturally, the region also contains many companies, industries and governmental authorities.

These institutes are all connected by an overarching organisation identically named EUREGIO, which has an office in the border city of Gronau. The organisation focuses on providing residents and companies of the cross-border region with services that stimulate cross-border activity and handles spatial planning, economic policy, and even social and cultural matters.<sup>157</sup> Besides this, EUREGIO allocates the Interreg funds provided by the EU to stimulate cross-border collaboration as well as membership fees to projects they deem necessary. All in all, as summarised by Perkmann, "the EUREGIO organisation has established itself as a highly regarded regional development agency" that has developed the cross-border region into a "central location in North-western Europe".<sup>158</sup>

Recently, Makkonen, Williams, Mitze and Weidenfeld published an empirical study based on national and international statistics comparing 28 cross-border regions to each other.<sup>159</sup> In this study, the EUREGIO indeed scores well compared to most other cross-border regions. The EUREGIO has almost the highest score in the economic structures category and performs better than the majority of other cross-border regions in the other categories of science bases, technological linkages, co-publications- and co-patents per 1 million inhabitants.<sup>159</sup>

In a case study by Klatt and Herrmann (2011), cross-border cooperation was assessed in four German-European cross-border regions. What makes the EUREGIO so functional as a cross-border region, is the low physical distance between the bordering regions, and the overall openness of the border. Klatt and Herrmann's studies show that the EUREGIO's 'land border' and the low distance between the main economic centres in the region (the Enschede-Hengelo-Gronau "agglomeration" and the cities Rheine and Münster), lead to a high potential interpenetration of the border and promote cross-border integration of economic models as if it were a single nation.<sup>160</sup> The absence of any costs or complexities of crossing the border adds to this. However, a counteracting mechanism is what Klatt and Herrmann describe as a medium difference in language, culture and socio-economic factors.<sup>160</sup>

Traditionally, the EUREGIO is well-known for its textile industry. In cities such as Enschede

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<sup>156</sup>See the websites of the universities, Twente: <https://www.utwente.nl/en/>, Münster: <https://www.uni-muenster.de/en/> and Osnabrück: <https://www.uni-osnabrueck.de/en/home/>

<sup>157</sup>See Perkmann, 2007, p. 258.

<sup>158</sup>Perkmann, 2007, p. 260.

<sup>159</sup>See the research and especially Table 1 of Makkonen et al., 2018, p. 1970.

<sup>160</sup>See Klatt and Herrmann, 2011, pp. 75–77.



and Hengelo, as well as cities on the German side, the textile industry was a cluster that provided many jobs in the region.<sup>161</sup> Although this cluster is still well-known in the collective memory of the EUREGIO, there are no evident, still-operating remains of this industry. It can be argued that an apparently well-performing cross-border region must have some industries or clusters that stretch over the border. However, studies that point out the presence of modern industrial clusters in the EUREGIO are very limited. Later sections of this thesis, based on empirical data, touch upon the topic of clusters within the EUREGIO in more detail.

## 2.2 International Firms

### 2.2.1 Company Internationalisation: Transnational or Multinational

Porter's diamond of competitive advantage focuses on relations between multiple organisations and external factors, that together contribute to (inter-)national competitive advantage. This industrial perspective gives the industry (or cluster) the central role. However, for a company to become successful, it should not have to rely solely on its environment, especially in an international economy characterised by globalisation.<sup>162</sup> In the end, each company is responsible for adopting a suitable strategy to maximise its success in local as well as global markets.

Companies that engage in international business maintain different strategies. Researchers have tried to map the variety of organisational strategies in multiple ways, of which one of the most relevant, even to this day, is Bartlett and Ghoshal's typology of international strategies (Figure 2.7).<sup>163</sup> Bartlett and Ghoshal's model depicts a typology of organisational strategies based on their characteristics in the variables 'global integration' and 'local responsiveness'.<sup>164</sup> In the model, high global integration refers to companies with centralised and efficient operations, whereas low global integration would mean that companies operate more on a decentralised and local scale. The variable local responsiveness refers to the extent to which companies adapt to unique local demands or maintain an internationally standard approach.

Bartlett and Ghoshal argue that up until the late 1980s, most worldwide industries could be characterised by "relatively unidimensional strategic requirements".<sup>165</sup> The three types of international industries and companies operating in them could be characterised as either global, multinational or international, each with a distinct worldwide strategy.

The first of these international strategies is the *global strategy*. A global strategy fits large-scale industries by increasing efficiency by means of centralised manufacturing processes and

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<sup>161</sup>See Perkmann, 2007, p. 258.

<sup>162</sup>For globalisation features (covered in the next section) see Dunning, 1998, pp. 47–48.

<sup>163</sup>See the original work by C. Bartlett and Ghoshal, 1989; and recent evidence to support its relevance: Tallman et al., 2018, p. 530.

<sup>164</sup>See the original theory and model in the book by C. Bartlett and Ghoshal, 1989.

<sup>165</sup>See C. A. Bartlett and Ghoshal, 1987, p. 8.

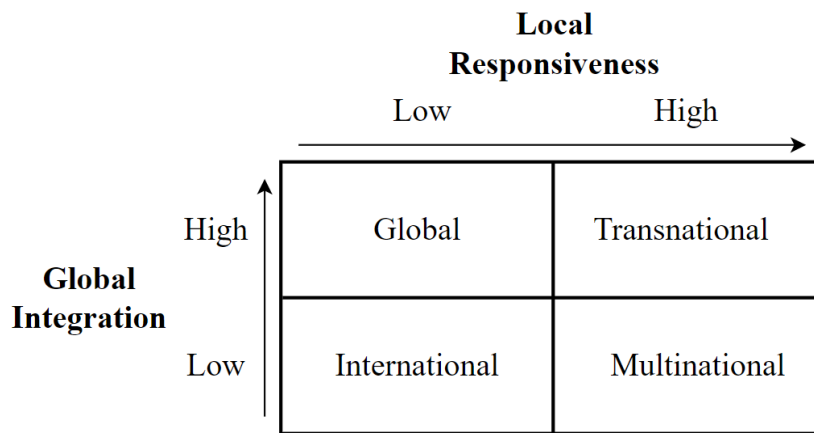


Figure 2.7: Bartlett and Ghoshal's model of international strategies  
 Source: Own illustration based on the original: Bartlett and Ghoshal, 1989

R&D.<sup>166</sup> These centrally-developed, low-production costs products are then shipped around the globe without any form of local responsiveness.

In the opposite corner of Bartlett and Ghoshal's typology stands the *multinational strategy*. With this type of strategy, organisations adapt to the different socio-economic or cultural contexts and demands that nations may bring.<sup>166</sup> In doing so, the overarching organisation gives its local businesses the freedom to manufacture and develop products autonomously. Low global integration and high local responsiveness characterise the multinational strategy.

The *international strategy* is characterised by low global integration and local responsiveness. This strategy instead focuses on learning from different worldwide industries and international knowledge transfer.<sup>167</sup> Innovative ideas are communicated to headquarters which in turn transfer the knowledge to subsidiaries around the globe. The innovative, globally applicable products are then produced locally according to the diffused knowledge and breakthroughs.

Bartlett and Ghoshal explain that in the 1980s, transitioning industries forced companies to respond to new challenges that required combining the three traditional strategies.<sup>167</sup> For a company to be competitive, it needed to be efficient, responsive, as well as able to learn.<sup>167</sup> Bartlett and Ghoshal called this newly emerged strategy the *transnational strategy*, which combines "global efficiency, national responsiveness, and worldwide learning" into a single package to take on modern industries.<sup>168</sup>

Drawing the attention back to cluster theory, research shows that international companies (especially multinational enterprises) promote international innovation and enhance the competitive advantage of a region.<sup>169</sup> Evidence that relates this to clusters is found in a recent paper in which researchers Ivanova, Strand and Leydesdorff investigate how to increase synergy in a region. They conclude that triple helix theory, cluster theory, and global value chain

<sup>166</sup>See C. A. Bartlett and Ghoshal, 1987, p. 9.

<sup>167</sup>See C. A. Bartlett and Ghoshal, 1987, p. 10.

<sup>168</sup>C. A. Bartlett and Ghoshal, 1987, p. 12.

<sup>169</sup>See Gerybadze and Reger, 1999, p. 251; And also Rugman and Verbeke, 2004, p. 3.

research (as well as their own calculations) ”all point to the central role of the internationally owned firms in the clusters. Internationally owned firms seem to be a key element for enhancing synergy in a region.”<sup>170</sup> The authors explain that this synergy is important for international turnover and leads to a more efficient regional innovation system.<sup>171</sup>

Therefore, naturally, multinational firms are expected to be found in any industry that is potentially a cluster. The reasoning for this is that their local responsiveness in the region should entail their interaction with other local firms and organisations; a fundamental mechanism in cluster theory. Besides, firms manufacturing products or conducting R&D operations within a cluster will benefit from localised and specialised suppliers and complementary organisations.

Due to our modern global economy, firms might find themselves having to balance out local responsiveness with efficient, centralised, outside-of-the-cluster production and development.<sup>172</sup> This does, however, not imply that transnational companies cannot be found in clusters at all, as subsidiaries could benefit and innovate from engaging in the competitive cluster. The high local responsiveness of multinational and transnational companies therefore also seems appropriate for engaging in cross-border clusters, which in essence, would require even more capability to adapt to the multiple unique environments to maximise clustering benefits. Companies with international or global strategies do not adapt to regional contexts the way transnational and multinational companies do. However, they might still see plenty of reason for settling (partially) in the efficient, innovation-driven clusters, learning from state-of-the-art knowledge or cutting-edge technological breakthroughs.

## 2.2.2 FDI in Clusters: Internationalisation or Regionalisation?

Globalisation has characterised international economies over the past decades, leading to companies arming themselves with a variety of international business strategies. The features of our current global economy are threefold according to Dunning (1998): (1) The emergence of the worldwide 'knowledge economy', (2) globalisation effects such as efficient transport and communication, and (3) the emergence of "alliance" capitalism.<sup>173</sup> While on the one hand globalisation poses a threat to firms neglecting its significance, it creates opportunities for firms not afraid of competing at a global scale. Large international firms and investors are actively investing in opportunities across the - now not so meaningful - borders.

One of the most common ways in which companies invest internationally is through the phenomenon called Foreign Direct Investment (FDI). In essence, FDI is when a company or other investor from one country (home country) invests in a different country (host country). This is done by acquiring an existing business or by investing in capital to form a new business entirely. FDI has several advantages for the investor itself, such as the common motive behind

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<sup>170</sup>Ivanova et al., 2019, pp. 31–32.

<sup>171</sup>See Ivanova et al., 2019, p. 18.

<sup>172</sup>See C. A. Bartlett and Ghoshal, 1987, p. 10.

<sup>173</sup>See Dunning, 1998, pp. 47–48.

FDI: Opening up new markets and potential in a foreign location, as well as the ability to learn from and innovate in a different environment. However, FDI also has advantages for host countries. Especially in developed host countries, where FDI has been shown to lead to enhanced local economic growth due to spill-over caused by the links between local and foreign companies.<sup>174</sup> As explained by Dunning: "Foreign direct investment speeds up the process of economic growth and restructuring. It does so both by providing technology, entrepreneurship and organizational skills at a lower cost than any alternative usage of resources, and by its competitive stimulus and spill-over affects the rest of the economy".<sup>175</sup> However, papers by Dunning and Alfaro et al. also agree that host countries have to be technologically developed enough and have sufficient "innovatory capacity" to interact properly with MNEs.<sup>176</sup>

FDI and cluster theory are related in the sense that FDI can be used as a tool by international competitors to embed themselves within clusters all around the world, granting them access to the benefits they offer. Dunning explains that even in the global economy, the international shift of companies and the transfer of assets across borders is countered by the emergence of "immobile clusters of complementary value-added activities".<sup>177</sup> Companies may find that to gain competitive advantage at a global scale, they need to cooperate at a regional level, as originally described by Porter's theories.<sup>178</sup> Firms and investors therefore strategically make use of FDI to embed themselves into clusters, to enjoy synergy and benefits. Porter (1998) elaborates: "As global competition nullifies traditional comparative advantages and exposes companies to the best rivals from around the world, a growing number of multinationals are shifting their home bases to more vibrant clusters - often using acquisitions as a means of establishing themselves as insiders in a new location."<sup>179</sup>

Due to our open global economy, firms have the luxury of being able to look for the best possible location to invest, even in international settings. According to Porter's cluster theory, investors should invest in businesses located within clusters, as they lead to enhanced international competitive advantage.<sup>180</sup> In a 2004 study, McCann and Mudambi argue that instead of blindly following Porter's theory and locating within an industrial cluster, MNEs should carefully analyse a trade-off scenario between the benefits that a cluster may potentially offer the company and the costs of locating within the cluster.<sup>181</sup> To elaborate, Porter's identified clustering benefits stand and offer companies enhanced competitive advantage.<sup>182</sup> Porter's work, therefore, suggests that FDI into clusters may seem the most strategic move, although investors should carefully analyse both the benefits and the costs of the investment.<sup>183</sup>

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<sup>174</sup>See Alfaro et al., 2010, p. 254.

<sup>175</sup>Dunning, 1994, p. 86.

<sup>176</sup>See Dunning, 1994, pp. 86-87; and Alfaro et al., 2010, p. 254.

<sup>177</sup>Cited from Dunning, 1998, p. 48.

<sup>178</sup>See Porter, 1990; and also Porter, 1998.

<sup>179</sup>Porter, 1998, p. 87.

<sup>180</sup>See Porter, 1990.

<sup>181</sup>See McCann and Mudambi, 2004, p. 505.

<sup>182</sup>For benefits see Porter, 1998, pp. 80-84; also see McCann and Mudambi, 2004, p. 503.

<sup>183</sup>See McCann and Mudambi, 2004, p. 505.

# 3 Theoretical Framework

## 3.1 Clusters and Innovation Systems

After having completed a broad literature study into subjects related to cross-border clusters and collaboration, regional innovation systems and international strategies, this information is condensed into a single theoretical framework. Based on this framework, a hypothesised model is constructed, aiming to visualise the findings from the case studies conducted in later sections. Furthermore, the theoretical framework sets out a number of categories that are used to construct interview questions based on these. This way, the interview questions asked during the case studies cover all theories that are to be tested.

The literature review of Chapter 2 above has addressed a variety of relevant theories regarding clusters and regional innovation systems, as well as their cross-border applications. Besides this, a more strategic view from a company perspective has been addressed. A comprehensive overview of all the discussed theories is given in Table 3.1 below. Also, the discussed theories and a number of important publications in each theory are listed. For more details regarding a specific theory, the sources or the corresponding sections of this thesis can be reviewed.

Research Fields	Theories	Fundamental Publications
Industries, Clusters and Innovation Systems	Porter’s Cluster Theory, Triple Helix Theory, Regional Innovation Systems Theory (RIS)	Porter (1990; 1998), Etzkowitz and Leydesdorff (1995; 2000), Autio (1998), Cooke (2002)
Cross-Border Clusters and Innovation Systems	’Double Diamond’ Model, ’Double Triple Helix’ Model, Cross-Border Regional Innovation Systems Theory (CBRIS)	Rugman and D’cruz (1993), Mikhaylov (2013), Tripl (2010), Lundquist and Tripl (2013)
Cross-Border Strategies and Collaboration	Model of International Strategies, Foreign Direct Investment	Bartlett and Ghoshal (1987; 1989), and FDI studies such as Dunning (1998)

Table 3.1: Overview of theories and fundamental publications discussed in the literature review, listed per research field

The cross-border extensions of cluster, TH and RIS theory all point out that relations between multiple actors and especially the interactions between them are essential for stimulating innovation and other synergistic benefits. Therefore, engaging in cross-border activities is a unique opportunity for firms and institutions located in such regions. Especially when combined with the correct international strategy, as elaborated in sections 2.2.1 and 2.2.2.

The models in figure 3.1 depict how cluster, triple helix and regional innovation systems

theory relate in a traditional (left) as well as a cross-border case (right). In both cases, a border can be identified and two separate national innovation systems (NIS), where the cross-border case shows a dashed line indicating an open border (or at least a more open border than in the traditional case, also see figure 2.6).<sup>184</sup> The traditional case shows two blue circles, indicating a multi-industry network of companies, academic institutions, research facilities, governments and other involved organisations in line with triple helix and RIS studies. The cross-border case shows only a single cross-border regional innovation system.

Back in section 2.1.1.2 was explained that one of the main differences between regional innovation systems and clusters is that a cluster refers to a single industry, which in turn can be part of a broader RIS stretching multiple sectors.<sup>185</sup> This difference is visualised in both models by the smaller white circles depicting clusters and cross-border clusters. Moreover, the clusters as well as the cross-border clusters are overlapping, as in most cases it is expected that involved actors such as universities or local governments interact with multiple clusters and not just one. Besides these, clusters might have other organisations or at least a geographical location in common.

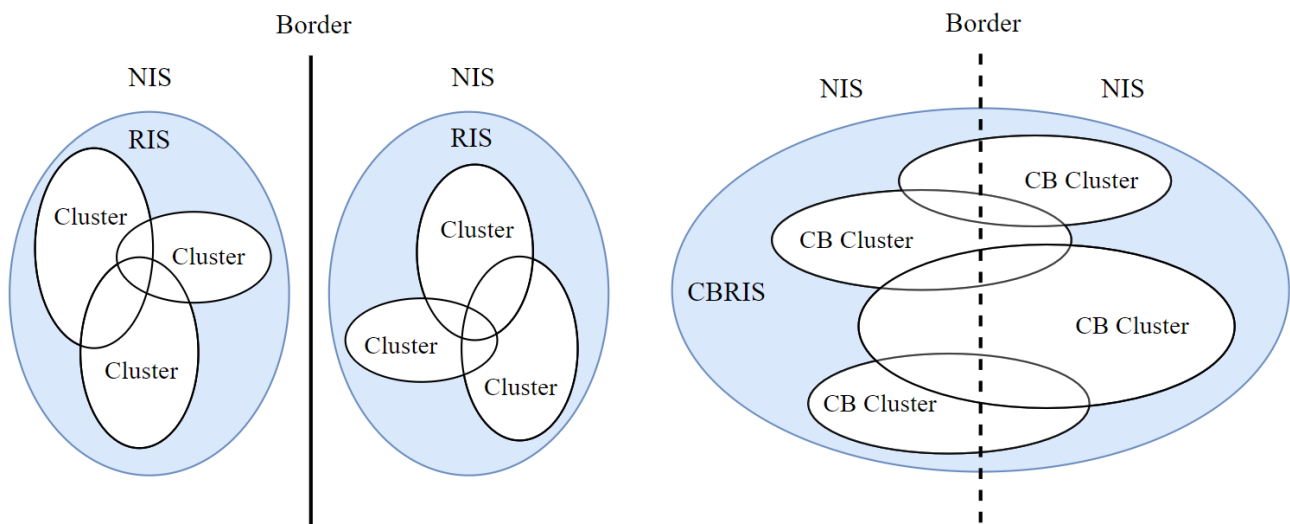


Figure 3.1: Model depicting two non-integrated regional innovation systems and clusters (left) and a model of a cross-border regional innovation system and cross-border clusters (right)

Source: Own illustration

## 3.2 Cross-Border Activity

To further investigate companies' cross-border (CB) activities and especially motives for doing so, the range of expected cross-border activities must be classified in advance. As a starting point we can adopt a number of categories from Porter's cluster theory, and keep into account the importance of interactions between organisations as explained by all theories. Since

<sup>184</sup>In line with Lundquist and Tripl, 2013, p. 455.

<sup>185</sup>See Coenen et al., 2004, pp. 1004–1005.

the units of observation of this thesis are companies, some factors of cluster theory are more applicable than others.

Firm strategy, structure and rivalry are arguably the most important in this regard. A solid cross-border strategy and an organisational structure to support it are vital for any company aiming to maintain long-term competitive advantage in a cross-border region. Moreover, in deciding on a firm structure and strategy, competition must be taken into consideration. The first categories of cross-border activity are therefore: *Operations, Strategy and Competition*. The term *Operations* is a very broad term, and although it is closely related to structure, *operations* seems a more fitting category name as it seems more dynamic. Operations tend to be focused on activities conducted by the company, whereas a structure imposes a fixed system describing the relation between actors.

Another category of cross-border activity is *Employees*, which refers to the attraction of employees from across the border. In Porter's diamond, 'factor conditions' refers to amongst others an educated workforce, which in the case of cross-border regions can come from the neighbouring nation. Motives for companies attracting cross-border employees are expected to be their knowledge of the international context, ability to speak the language and possibly more.

When taking the perspective of a certain company, some companies in the region can be referred to as competitors, whereas others can be seen as suppliers. Although suppliers are also companies aiming to generate profit, their goods do not substitute those of the companies buying from the suppliers and are therefore not competitors, but a vital part of any supply chain: *Suppliers*. When studying cross-border activity, cross-border relations with *Suppliers* could be interesting as a number of benefits can be predicted. One of these could simply be lower purchasing costs across the border, whereas another could be a higher quality of goods.

A cluster or even an innovation system would not be complete without the integration of multiple supporting institutions. Whether referred to as 'Related and Supporting Industries' as one of Porter's factors or addressed as influences of governments and academic institutions in triple helix and RIS theory, the interactions of companies within a cross-border region with these organisations are essential to maximise the potential of their region. The category of cross-border activity that investigates companies' relations with these organisations is simply called *Institutions*.

A key takeaway from cluster theory, triple helix theory, as well as RIS theory, is that simultaneous cooperation and competition between firms leads to innovation. The term for this - 'coopetition' - has been described as a "risky but potentially rewarding relationship".<sup>186</sup> Coopetition relies on companies sharing information or other resources with each other, establishing a high-value shared knowledge foundation which in turn is used separately by the firms to create enhance their own products or services. Because there are also some risks involved, such as for example free-riding, *Cross-Border Collaboration* could prove an interesting branch

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<sup>186</sup>Ritala and Hurmelinna-Laukkanen, 2013, p. 154.

of cross-border activity. Nevertheless, research from the 'best-case' Øresund region has shown that regional cross-border cooperation has helped overcome some of the barriers involved in being a cross-border cluster.<sup>187</sup> Therefore, cross-border collaboration is studied as a key form of cross-border activity.

Companies engaging in one or more of these categories are expected to benefit from these cross-border activities. Figure 3.2 shows a hypothesised model of how a company benefits from a variety of cross-border activities, while still experiencing the ordinary, non-cross-border clustering benefits. The categories described above and shown in figure 3.2 are used to construct interview questions. The answers to these questions from the multiple case studies are in turn used to prove the hypothesised model correct, or to provide insights on how to modify it for future research purposes.

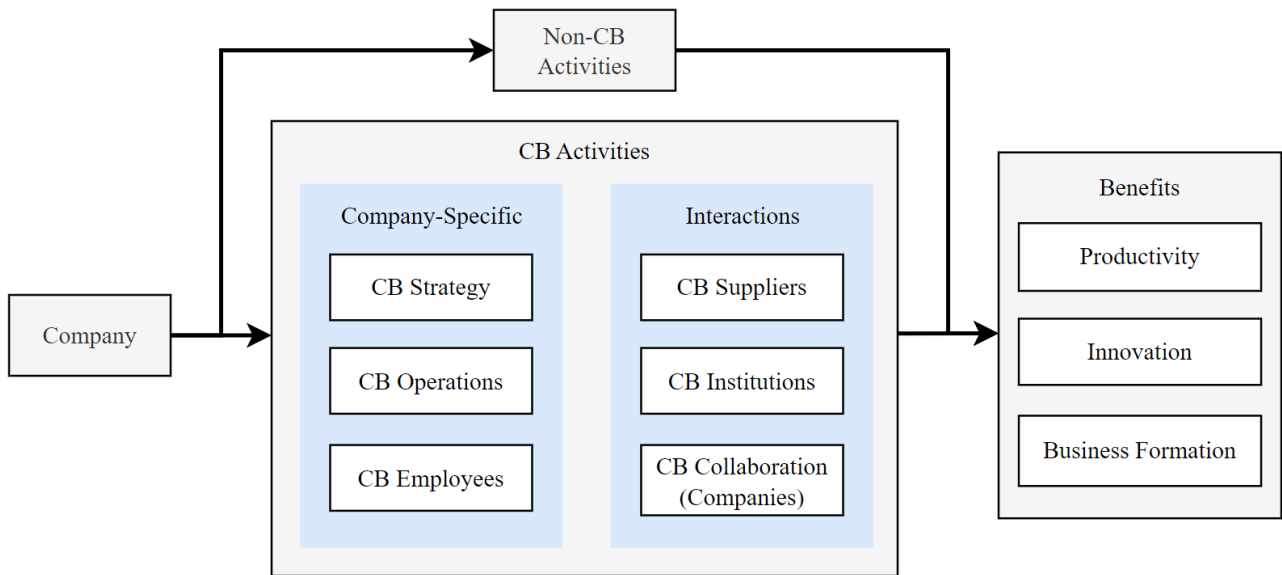


Figure 3.2: Model showing a variety of cross-border activities that hypothetically lead to cross-border clustering benefits

Source: Own illustration

<sup>187</sup>See Yndigegn, 2011, p. 57.



# 4 Methodology

## 4.1 Research Purpose: Exploratory vs. Confirmatory

Cluster theory and regional innovation systems theories have been studied theoretically for a number of decades. However, their cross-border applications are still poorly researched, especially empirically. This thesis aims to provide more empirical insights from organisations active in cross-border activities. This thesis focuses on the EUREGIO, so all case studies and interviews conducted are within the context of the EUREGIO.

In the first sections of this thesis, multiple theories on the topic at hand were researched and discussed to get a better understanding of the research field, resulting in a model for analysis (figure 3.2). This model shows a range of cross-border activities that companies in a cross-border region are hypothesised to be engaged in. The model and the categories within it are based on the literature review conducted beforehand and based on Porter's theories, triple helix and RIS studies. The methodology and empirical procedure of sections 4 and 5 aim to test this conceptual model.

The research to be conducted is of a combination of confirmatory and exploratory nature. The predicted cross-border activities in figure 3.2 are based on existing and tested theories such as Porter's cluster theory or even more specifically, CBRIS studies such as Tripl's work.<sup>188</sup> Therefore it can be argued that this research aims to confirm whether companies operating in cross-border regions are actively enjoying the benefits described in existing theories. In that sense, the research would appear to have a confirmatory nature: The existing theories and hypothesised benefits would be tested by investigating whether they still hold when researched from a fresh company/organisational perspective.

On the contrary, it can also be argued that the research, although seemingly confirmatory, is in fact exploratory. Although the hypothesised motives (benefits) and cross-border activities are not necessarily new, the proposed model (figure 3.2), the elements within it, and the relations between the elements is a new unique theory. The method consists of a number of semi-structured interviews that allow for the exploration of cases, rather than sticking to a fully defined structure. The reason for this is that it is unknown how companies and organisations view the prescribed theories on cross-border cluster and regional innovation systems theories. Hence, the research explores a new perspective on cross-border cluster theory. In addition, cross-border applications of cluster and RIS theories are still heavily understudied, especially empirically, which adds to the argument that the research can be seen as exploratory.

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<sup>188</sup>See Porter, 1990; and CBRIS studies such as Tripl, 2010, pp. 150–160.

## 4.2 Choosing the Method: Research and Interviews

As mentioned in the introduction, this research aims to discover in which types of cross-border activities companies in the EUREGIO are engaged, and in particular their motives for doing so. Section 3.1 condensed the literature reviewed in the first sections of this thesis into a single theoretical framework. The method to test this theoretical framework consists primarily of investigating the EUREGIO in more detail, followed by interviewing experts within companies and institutions about their cross-border activities and views on the topic.

Cross-border regions and clusters are very widely applicable since we live in a world that is characterised by globalisation and open markets. For example within the European Union, the free trade agreement allows many bordering countries (and even non-bordering countries) to trade seamlessly. This means that there are many locations where regional innovation systems exist and even cross-border clusters could form, as Makkonen et al. have shown in their 2018 paper.<sup>189</sup> Because of the vast number of cross-border regions, and the different cultural, social and economic contexts surrounding each of them, this study focuses on the EUREGIO. This ensures the scope of the research is not too broad and eliminates possible interfering variables caused by different circumstances and external factors.

The reasons why the EUREGIO is chosen are because it is (1) in need of more detailed - especially empirical - research, and (2) it is the region in which the author is situated, making identifying, contacting and researching companies easier, adding to the overall value of the thesis. Moreover, understanding the regional context in depth, and the ability to understand local sources (in Dutch and German languages) add to a more effective methodology. Nevertheless, more detailed information about the EUREGIO is gathered on top of the research of section 2.1.2.6. This is done by theoretically analysing the EUREGIO as a CBRIS, as well as through an expert interview with a representative of the overarching organisation EUREGIO. Besides this, discussions and presentations at the Digital Summit EUREGIO conference are analysed, to get an even better understanding of cross-border cooperation and activities within the border region. Section 5.1 discusses this topic in more detail.

To study cross-border and possibly clustering activity within the region, information from companies is gathered by interviewing experts within them. While selecting companies that should be interviewed, two main criteria should be considered. The first is that companies should be selected based on promising prior information and knowledge about their cross-border activity. To keep the scope of this research focused and to keep the research feasible within the given time constraints, only companies that are known to engage in cross-border activities are studied (while the activities can range from for example cross-border employees to an international supplier network). This maximises the usefulness of the results gathered from a manageable set of interviews.

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<sup>189</sup>For an illustration and empirical study of a number of European cross-border regions see Makkonen et al., 2018, pp. 1967–1970.

The second criterion is that the companies are engaged in similar industries. If companies engaged within a certain industry are analysed, this limits the effects of industry-specific conditions and leads to an overall increase in comparability. Therefore, the set of analysed companies consists of several companies from a mutual regional cross-border industry.

One bottleneck in this approach is that it is difficult to identify companies that satisfy both of the requirements. Finding companies that are engaged in a certain industry is not difficult, as the EUREGIO itself is one of the most prominent cross-border regions according to population and especially economic structures.<sup>190</sup> Moreover, cross-border industries and platforms connecting companies from both sides of the border exist, which can be used as sources.<sup>191</sup> The issue is that, even for companies in a cross-border industry, it is difficult to identify beforehand these companies are engaged in actual cross-border activities, or are merely part of an industry that also exists in the neighbouring region.

The interviews cover questions relating to cross-border cluster theory and multiple forms of cross-border activities as shown in figure 3.2. The interviews are semi-structured, meaning they maintain a fixed and ordered frame of questions, while still allowing follow-up questions to be asked. On the one hand, the overall fixed structure allows the interviews to be compared more easily in a cross-case analysis (section 5.3), aiming to generalise some of the findings. On the other hand, allowing for follow-up questions could also prove beneficial. It is predicted that some companies may be invested in particular cross-border activities more than others, so in-depth questions could uncover more valuable information. The full list of interview questions, as well as a table with the conducted interviews and lengths, can be found in the appendix (See Appendix A).

Semi-structured interviews are chosen as the method of investigation, as the companies that can be identified are predicted to be engaged in diverse and very unique cross-border activities. Researcher Thomas Diefenbach explains that Semi-structured interviews as a qualitative research method allow for "freedom and room for creativity", and allow the researcher to select and group data as freely as they think is reasonable and as creatively as they are able to."<sup>192</sup>

On the other hand, Diefenbach explains that qualitative research by means of semi-structured interviews also has many drawbacks such as subjectivity based on interviewees' bias, assumptions, the researcher's interpretation and overall validity of the data.<sup>193</sup> Therefore, a weigh-off between the benefits and drawbacks must be made. As mentioned, the predicted diversity of the case studies, and given that cross-border collaboration and CBRISs are in general difficult to quantify, qualitative research by means of semi-structured interviews is still the preferred method.

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<sup>190</sup>See Makkonen et al., 2018, p. 1970.

<sup>191</sup>See for example the website of EUREGIO, URL: <https://www.euregio.eu/>, or more specifically the Hydrogen [X] platform, URL: <https://www.hydrogenx.online/nl/home#>

<sup>192</sup>Diefenbach, 2009, p. 890.

<sup>193</sup>See conclusions and Table 1 in Diefenbach, 2009, pp. 891–893.

## 4.3 Explaining the Method

### EUREGIO analysis

The first part of the empirical research aims to better understand the CBRIS and its leading cross-border organisation EUREGIO. Firstly the website of the EUREGIO is studied to understand the goals, operations and structure of the organisation.<sup>194</sup> Using this information and the knowledge derived from the literature review in the earlier sections of this thesis, a semi-structured interview is set up. The questions of the interview are divided into the categories: General, regional innovation system, clusters and cross-border companies. The entire list of interview questions is attached in Appendix A.

Before the first question is asked, an introduction to the topic is given, which explains the topic and aim of the thesis. Some definitions and explanations of some of the terms and concepts are given so a mutual understanding is created. Furthermore, it is asked beforehand whether the interviewed employee agrees to the interview being anonymously transcribed to be used for research purposes.

The first category contains general questions that ask about the organisation EUREGIO and how it operates. The second category continues from this by asking how EUREGIO governs the RIS of the region. The third section narrows the topic down from RIS to clusters, by asking questions aiming to uncover some industries that could possibly be clusters. The final category dives even deeper and focuses on finding leads to companies engaged in cross-border activities, which is then studied in a later stage of the thesis.

Besides an interview and self-study into the organisation EUREGIO, a substantial amount of information about the regional innovation system is gathered by attending the Digital Summit Euregio conference in Münster.<sup>195</sup> At this conference, panel discussions, keynotes and other presentations are held about the collaboration between the Netherlands and Germany within the EUREGIO cross-border region. The speakers and representatives present can be regarded as experts on the subject of study, due to their experience in companies active across the border. Therefore, the input from the individual presentations, and especially a panel discussion held by a number of notable speakers, in combination with the results of the EUREGIO interview should provide valuable and detailed results. Section 5.1 covers the interview's results and the insights obtained at the Digital Summit Euregio conference.

An important point that should be noted, is that even though this part of the empirical research does not yet entail investigating specific companies, it is predicted that it does already provide valuable insights regarding motives for cross-border activity. The results are provided by representatives from the overarching cross-border organisation or otherwise engaged in cross-border collaboration. As these experts deal with companies active across the border on a

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<sup>194</sup>See the website of EUREGIO, URL: <https://www.euregio.eu/>

<sup>195</sup>Digital Summit Euregio, Münster, 24 May 2023, URL: <https://digital-summit.eu/en/>

daily base, they are bound to understand adequately what the benefits and motives for these companies might be. Later on during the empirical study, actual companies are investigated to further investigate these motives and test the hypotheses.

## **Company analysis**

After having researched the EUREGIO CBRIS as a whole, some specific companies are interviewed for more detailed empirical data. This data is used to uncover a diverse range of cross-border activities and in particular the companies' motives for engaging in these. Section 3.2 shows a hypothesised model with six categories of cross-border activity. To test the model, these categories are to be studied in this thesis through in-depth company case studies.

The complete list of interview questions can be found in Appendix A.2. Similar to the EUREGIO interview, the semi-structured interview starts with a general introduction to the topic and goal of the thesis, as well as a statement of several definitions. Once again, consent to transcribe the interviews anonymously for research purposes is asked. Afterwards, the interview commences by asking about the company and the function of the interviewed employee.

After a short introduction to cross-border activities within our region, the first category of cross-border activity to be investigated is 'CB strategy', which relates to the market, target group and competitors. Afterwards, the categories CB Operations, CB Employees, CB Suppliers, CB Institutes and CB Collaboration are covered. The latter investigates the relations to and involvement with other companies from across the border for mutual benefit. The interviews are concluded by asking two general questions about cross-border activities, that are predicted to provide valuable answers.

## **Effectiveness and Efficiency**

The companies that are to be interviewed are all companies that are known to conduct cross-border activities of some sort. Therefore, the effectiveness of the interviews is predicted to be higher than if a large number of random companies were interviewed. Furthermore, since the interviews are very detailed and cover a lot of different cross-border activities, the efficiency of the data collection is also high: A lot of data can be obtained from a single interview. Despite this, multiple companies should still be interviewed to be able to compare the cases, and remove possible company-specific biases.

Since the interviews and discussions are transcribed, all spoken words of the interviews are stored for analysis afterwards. As opposed to taking notes of important answers and remarks, transcriptions make sure all data is collected. Software is used to transcribe the interviews automatically. Subsequently, the software-generated transcriptions are revised using the recordings to remove errors and highlight the cores of the answers given. Although the transcriptions are not attached in this thesis, the author possesses these in case they are required or requested at a later stage. Because the interviews are transcribed, they can be analysed

thoroughly after the interviews, by coding keywords and comparing the answers to the base interview questions (Appendix A).

This thesis focuses on the EUREGIO as a CBRIS but also aims to analyse companies' perspectives on this. The method of the empirical analysis first focuses on the entire CBRIS and experts engaged in its development, followed by a narrowed-down analysis of specific company cases. This method is appropriate for this thesis as contextual results from the early stages can be useful in understanding the specific companies' cases better, and asking more effective, knowledge-backed questions.

Although a study of a much larger number of companies would also be very insightful, this is out of the scope of this research. The interviews with experts in this thesis are detailed enough to provide useful conclusions and test the theoretical framework proposed in section 3.1. After all, this thesis eventually aims to detect some predicted motives for engaging in cross-border activity and explore what benefits and drawbacks they experience from these activities.

## **Implications**

Some implications of the method described above may be that the interviewed companies may only be engaged in a single category of cross-border activity. If that is the case, then there are two possible undesirable scenarios. The first is where all the interviewed companies are engaged in the same category of cross-border activity. Although on the one side this is positive, since it would show a pattern that could lead to a generalisation of the findings, on the other hand, it is a shame that there is no empirical data for the other categories of cross-border activity.

The other undesirable scenario is where multiple different cross-border activities are discovered in the companies, but each is only mentioned in one case. In this scenario, it would not be possible to generalise any conclusions regarding individual cross-border activities. However, it would be interesting to gather information regarding a range of different cross-border activities. Therefore, to avoid both of these undesirable scenarios, enough interviews with companies appearing to engage in multiple categories of cross-border activities should be conducted.

Another implication of a method focused on interviews is that the qualitative results are determined by the interpretation of the analyser. In this study especially, interpretation is something to be aware of, as some of the interviews are conducted in Dutch, and translated to English. Information from German sources is also accessed, which must be translated into English to be able to compare the results. Fortunately, fundamental terms such as 'cross-border' and 'innovation' are distinguishable in each of the languages. Besides this, in many languages, English terms (such as 'cluster') are used. Finally, the author of this thesis lives inside of the Euregio and speaks all three languages to an adequate degree.

# 5 Empirics

## 5.1 Empirical Study of the EUREGIO

### 5.1.1 EUREGIO: Cross-Border Collaboration and Clusters

Section 2.1.2.6 describes the EUREGIO as the oldest and one of the most developed cross-border regions in the world.<sup>196</sup> Whereas section 2.1.2.6 briefly covers how the region performs as a CBRIS, this thesis aims to further investigate this cross-border region from a cluster and company perspective. Therefore, an in-depth expert interview at the EUREGIO organisation, as well as information gathered from the EUREGIO website is used to provide more qualitative data.<sup>197</sup> This section and the following cover the findings in detail.

A semi-structured interview with a spokesperson of EUREGIO was set up that aimed to understand the operations of the organisation itself, as well as get more insight into the cross-border region to be studied. The interview questions have been added in appendix A.1 at the end of this thesis. The interview questions started at a general level, followed by questions regarding the regional innovation system, clusters within the cross-border region, and finally cross-border companies within the region.

#### General: EUREGIO in a Nutshell

Formally, EUREGIO is an "inter-municipal partnership" in which EUREGIO itself functions as the overarching organisation.<sup>198</sup> The organisation has a "binational structure", also reflected in its 128 associated German and Dutch municipalities, and is also "bilingual".<sup>199</sup> When asked whether any companies were affiliated with EUREGIO directly (which could possibly have been an interesting pool for further analysis), the spokesperson mentioned that "companies are not affiliated in that sense". Instead "what EUREGIO does for the economy or for businesses, is especially stimulating network formation between the development-organisations of both sides of the border and therefore also for companies."

In the Dutch-German cross-border region, EUREGIO aims to "integrate both regions ... all with the goal of improving the quality of life for people in the region, and of course also improving the business climate for the economy." Furthermore, EUREGIO wants to form one common city-country-region ("één gemeenschappelijke stad-land-regio" or "einem gemeinsamen

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<sup>196</sup>See Perkmann, 2007, p. 258; And also Makkonen et al., 2018, p. 1970.

<sup>197</sup>Website of EUREGIO, URL: <https://www.euregio.eu/>

<sup>198</sup>Quotes in section 5.1.1 are from the transcribed EUREGIO interview unless stated otherwise. The quotes have been carefully translated from Dutch.

<sup>199</sup>Map and list of associated municipalities can be found on the EUREGIO website (in Dutch or German), URL: <https://www.euregio.eu/wie-we-zijn/regio-en-leden/>

Gebiet”<sup>200</sup>), in which the border does not form an obstacle that impedes living, working, business, and studying across the border. In their strategy EUREGIO 2030, the organisation has established how they will reach their set goals by 2030.<sup>201</sup>

## **Regional Innovation System of the EUREGIO: Dutch-German Synergy**

In response to the question of how EUREGIO tries to promote innovation in certain industries, the spokesperson mentioned that ”The EUREGIO is a neutral platform and mainly stimulates network forming.”<sup>202</sup> EUREGIO tries to help companies that want to cross the border by ”establishing contacts” (which was explained to be more difficult for companies than it would seem), as well as ”taking away the fear of crossing the border” due to both cultural differences and a language barrier. The spokesperson went on to explain that EUREGIO prepares and helps companies with this. Furthermore, the advice of diving into the cultural differences before operating on the other side of the border was given, and to properly understand each other’s forms of business etiquette.

When discussing the language barrier: ”Germans are perfectionists, and only want to speak Dutch when they can speak it perfectly”. ”Dutch people think they can speak German, which they can. It is not perfect, but they just do it. And that is actually the correct approach. That is where we can learn from each other ... The Germans can take an example from the guts shown by the Dutch, and the Dutch entrepreneurs can also learn from the German ’pünktlichkeit’: The German punctuality.” Continuing from this, and as is also stated in the EUREGIO’s website, the interviewee explains that ”if you throw everything together, you get what we call  $1 + 1 = 3$ . Then you really get an added value.”<sup>203</sup> In conclusion, the interviewee mentioned that ”the border is more strongly present in the minds than it is actually felt ... You just have to dare, don’t you? And you need to be properly informed.”

In general, and as explained above, EUREGIO has the function of facilitating networking in the cross-border regional innovation system. This holds for companies that reach out to EUREGIO and associated cross-regional development organisations such as Oost NL.<sup>204</sup> Moreover, EUREGIO also collaborates with universities, both applied sciences and academic institutes. Furthermore, ”we are also asked frequently to give presentations or guest lectures at schools, especially for opening people’s eyes to also take a look over the border in their profession, career, but also in case they will become entrepreneurs later on... It does not stop at the border, grab those opportunities.”

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<sup>200</sup>Cited in Dutch and German from the website of EUREGIO as well as the interview, URL: <https://www.euregio.eu/wie-we-zijn/missie-en-visie/>

<sup>201</sup>See: <https://www.euregio.eu/wie-we-zijn/missie-en-visie/>

<sup>202</sup>Quotes in section 5.1.1 are from the transcribed EUREGIO interview unless stated otherwise.

<sup>203</sup>See: <https://www.euregio.eu/wie-we-zijn/missie-en-visie/>

<sup>204</sup>See the website of Oost NL, URL: <https://oostnl.com/en>



## Clusters in the EUREGIO

When asked if any particular industries or sectors characterise the cross-border region, the interviewee responded that the region is "quite diverse".<sup>205</sup> Potentially only a trend could be seen in the MedTech industry when taking a look at the previous Interreg funding period. However, as translated by the interviewee: "Whether that is necessarily the cluster or the industry, I do not know, but in Interreg 5 we did have medical innovations that were subsidised." The spokesperson added that EU money enters the region through Interreg projects, which the organisation EUREGIO co-manages. These Interreg fundings are meant to promote cross-border collaboration and stimulate cross-border innovation.<sup>206</sup> Furthermore, a question regarding the platform Hydrogen [X] was asked, which was an EUREGIO initiative to bring together innovative hydrogen-related companies and institutions. Although "a neat platform", the response could be summarised by the statement that "it is at this moment not really more than a website" that could pose as a network for involved parties.

## Cross-Border Companies in the EUREGIO

The last category of questions aimed to uncover some specific companies in the EUREGIO that are active across the border. The interviewee mentioned that there surely are companies that make use of our cross-border region. The first example is Emsflower, a large garden company, which is a Dutch-owned company in Germany. The company is said to have employees from both sides of the border, "a beautiful example of Dutch people grasping the advantages of the German part of the region."

Another example mentioned was Easy Sanitary Solutions, which is a company that has its production situated on the other side of the border, and so is located on both sides of the border. Besides that, a more local example is Auto Vortkamp, which is a car dealer that was first situated in Gronau but has recently also started in Enschede to sell German-imported cars to the Dutch market. Since they already had a large customer base on the Dutch side of the border, their location in Enschede makes sense. The interviewee mentioned that surely other companies in the cross-border region have employees from the other side of the border, but did not specify any further.

As a final remark to conclude the interview, the interviewee mentioned that "to stimulate the economical collaboration across the border even more ... it is important that the future generations of young entrepreneurs, that are now still school children or students, are aware of the opportunities" (of cross-border collaboration). Multiple Interreg projects are active to stimulate children to look over the border starting from a young age: "If you are open to the neighbouring country, you are also more open economically."

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<sup>205</sup>Quotes in section 5.1.1 are from the transcribed EUREGIO interview unless stated otherwise.

<sup>206</sup>For more information on EUREGIO Interreg projects see: <https://www.euregio.eu/subsidie/>

## 5.1.2 Digital Summit Euregio: Company Perspectives on Cross-Border Collaboration

On the 24th of May 2023, the Digital Summit Conference was held in Münster. The yearly event aims to promote Dutch-German innovation through collaboration by providing the perfect networking opportunity, combined with inspirational talks from leading cross-border organisations and companies. During the 2023 edition, the focus was on digitalisation, but the underlying topic of cross-border collaboration was also present in every event. Especially one discussion is significant for this thesis.

This event was a panel discussion about German-Dutch cooperation. The participants were from five organisations heavily engaged in cross-border activity within the border region: Tembo group, FME, Demcon, IHK Nord Westfalen and EUREGIO itself. The discussion was moderated by a representative of Oost NL. The participants as well as the moderator of the session are undoubtedly experts on cross-border activity and cooperation within our region, and so their views can be regarded as valuable data for this thesis. All in all, the discussion was positive and inspirational, and the speakers complemented each other's visions and answers to the questions asked.

### 5.1.2.1 The Potential of Dutch-German Collaboration in the EUREGIO

In general, the speakers of the panel discussion all agreed that the Netherlands and Germany are a good combination, and all strongly support cross-border collaboration between the two nations, especially at a regional level. The Dutch industry was stated to be "very well lined up" with Germany, with the rest of Europe, and even the world. But there is still so much potential in the collaboration and innovation in trade across the border", according to a speaker from the Dutch company FME.<sup>207</sup> This was agreed upon by the German participants, as the IHK Nord Westfalen representative added that the countries must profit from the potential of the "connection to the Netherlands, so close to us."

In 2021, the Dutch-German Innovation and Technology pact was signed with the intent of promoting cross-border collaboration, leading to mutual benefit. The FME speaker described the agreement as being: "A pact of which we are very proud, because now we have, on various levels, the opportunity to bring forward the collaboration that we have between the Netherlands and Germany: Business to business, government to government and also on a platform level like smart industry in industry 4.0." It was mentioned that recently, intentions to promote cross-regional innovation and collaboration have increased even more, especially during the past three or four years. Participants Oost NL, IHK Nord Westfalen and other involved parties were proud to present they had signed a memorandum of understanding (MOU) describing the

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<sup>207</sup>Quotes in section 5.1.2 are from the panel discussion at the Digital Summit Euregio. Some parts that were in German have been carefully translated.

goals and a roadmap for cross-border collaboration and innovation for the coming years. As is also established in a recent press article by Oost NL, the focus lies on the four cross-border clusters (to which substantial European funds have been allocated): Advanced Manufacturing & Robotics, Energy, Med-Tech and Circular Economy.<sup>208</sup> The reason for this is that these four cross-border clusters are stated to be mutual successful industries, that align with both countries' national agendas, as well as relevant European programmes.<sup>209</sup> According to Wendy de Jong, director of Oost NL, an important focus of cross-border collaboration between East-Netherlands and Nord-Westfalen lies on the mutual areas of success: Battery-technology, digital industry, and medical healthcare.<sup>210</sup>

### 5.1.2.2 Dutch-German Collaboration: Combining Flexibility and Quality

Through personal experience in the cross-border region, the moderator argued that "German-Dutch cross-border cooperation is a difficult job, but a worthwhile job", as there is "much potential" to be explored. Elaborating on this, the moderator stated that in their personal conviction, "the Netherlands and Germany tandem ... is the best tandem there is". Which was agreed upon by the other participants later on in the discussion, as is elaborated below. In other keynotes of the summit, the same vision was shared, such as by a representative from ASML, who mentioned that the two nations are a good combination. A discussion participant representing Demcon agreed with this, arguing the Dutch and Germans are almost the same, but there are some differences, also within the large Germany. As Dutch people doing business in Germany, the speaker elaborated that there are bound to be difficulties. However, on the positive side of this stood that "when you can overcome these difficulties, you can get a very good relationship". The speaker representing Demcon further underlined that what the Dutch and Germans have in common is that they build up on trust. Once trust has been established, "that is the beginning of a good relationship."

Further discussion on the differences in mentality and culture between the Netherlands and Germany pointed out some further, more detailed differences. In general, the participants agreed that the differences are not necessarily bad and that they even complement each other. As an IHK participant elaborated, "Germans always need a plan, ... a very clear plan, and every contract and everything else will be very formal. The Dutch way is different. It's the other way around, let's do something, let's start and see what comes out of it". Although these are some clear differences, the speaker added that "if the planning of the Germans is combined with the flexibility and innovation of the Dutch ... this will be a great team". Another speaker mentioned "the Netherlands is open for relations in general. We are creative, always in for a concept, trying to make it work. We're flexible, agile, those kinds of terms. I think there's a lot of benefit in that. Easygoing, and let's give it a try: The bottom-up approach". Another

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<sup>208</sup>See the recent article by OostNL, 2023.

<sup>209</sup>See the recent article by OostNL, 2023.

<sup>210</sup>Translated quote by Wendy de Jong in the article by OostNL, 2023.

speaker mentioned that on the one hand, the Dutch mentality is to be "risk-takers" and be "flexible", while the German mentality on the other hand, was described as more "thorough", and although sometimes slow, this leads to the quality that Germany is known for (e.g. the well-known "Made in Germany" quality). The differences were illustrated by labelling the Dutch as having a "trade DNA", whereas the Germans have "industry DNA", according to the speakers multiple decades of experience in cross-border business.

The discussion participants agreed that these differences between the two sides of the border together formed an effective combination. For example, a speaker representing Tembo group summarised the discussion on differences in culture and ways of doing business by highlighting the importance of the combination of the different qualities: "Times that are coming are not any more to look, what are the Germans or what are the Dutch? left or right? It is really about looking at how we can combine what we have because we have the Dutch speed, creativity and beautiful guts to step into the unknown, and really German thorough planning, and especially risk management, then we can be the winners, and the winners on the global scale". Moreover, the speaker added, that this 'combination' step "should be the focus in the coming years". A representative of the EUREGIO cross-border organisation referred to this as a "1+1=3" synergy effect, that arose from the "Dutch flexibility and creativity, and the planning and understanding of how to engage something on the German side".

However, on the other hand, the EUREGIO representative highlighted that there is also strength in each nation having its own qualities and protecting these, instead of trying to become more similar to the other nation. The speaker also mentioned the EUREGIO's rule "Jeder seine Muttersprache", literally translating to "each their mother tongue". This relates to the speaker's/EUREGIO's belief that in a cross-border situation between the Netherlands and Germany, only Dutch or German should be spoken, and not an intermediate language such as English. A quote translated from German summarises the strength of combining strengths, while not forgetting the power of individual qualities: "Certain qualities are worth protecting, and if we then bring them together in joint projects, then we benefit from them and have incredible potential in this border region".<sup>211</sup>

### 5.1.2.3 The Positive Future of the Cross-Border Region

The signing of the Dutch-German Innovation and Technology pact, as well as the recent MOU, mentioned above, and the happening of the Digital Summit EUREGIO itself, already show quite some progress in promoting cross-border collaboration and creating a strong cross-border region. Relating to this, the speaker from Tembo group mentioned that the "industry is now making a move to promote cross-border networking, instead of a simple government initiative". However, in business-to-business cross-border collaboration, the Demcon representative mentioned "the

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<sup>211</sup>Original German quote: "Bestimmten Qualitäten sind schützenswert, und wenn wir die dann zusammenbringen, in Gemeinschaftsprojekten, dann profitieren wir davon und haben wir unglaubliches Potenzial in dieser Grenzregion" (Speaker on behalf of EUREGIO, 2023)

network is not strong enough, the challenge is to get to know each other better. We simply don't know all the players yet. This Summit is a good way to network".

In the near future, parties such as Oost NL, IHK Nord-Westfalen and EUREGIO aim to continue the development of the EUREGIO, proven by for example the MOU, providing a roadmap for the coming years. Besides the focus on the specific cross-border industries/clusters Advanced Manufacturing & Robotics, Energy, Med-Tech and Circular Economy, there is a focus on development itself. As explained by the EUREGIO speaker: "We have to attract people to our region, and that also means other things like: Education, culture, sport, entertainment, gastronomy, tourism, we really have to push everything much harder and that's always our task".<sup>212</sup> The speaker continued from this, stating the importance of all these factors in the development of the economies on both sides of the border region: "We need to become a region that is attractive to live and work in", also for people from outside of the region.

The participants of the discussion recognised that in promoting innovation, the attraction of young talent is of high importance. The speaker from IHK touched upon this subject by mentioning the region needs to keep students in the region. However, when companies make an active approach to open up to students (regarding cross-border collaboration or general topics), they often find that there is not enough will yet, they must be open to it. Another speaker mentioned that they had spoken to a number of academic partners the day before the summit, who "said they actually want to expand their cooperation even further, but that it is not so easy. We have the EUREGIO organisation but that is not sufficient for academic partners". Furthermore, it was explained that in order to enhance the EUREGIO cross-border region, a Dutch-German collaboration is more effective than a very general and complex Europe-wide collaboration: A regional approach was found to be more effective than a slow, high-level approach. A quote from a later conversation with an experienced representative of Oost NL summarises the state of the cross-border collaboration within the EUREGIO: "Right now we are in the second or third gear in most of these fields, but we are aiming for the turbo."

## 5.2 Cross-Border Activity Engaged Companies

This section provides the results of the interviews conducted at the companies that show the potential for cross-border activity. Firstly, in-case analyses of the individual interviews are conducted in sections 5.2.1 until 5.2.4, covering the responses given by the interviewees. In doing so, quotes translated from the interview transcripts are used as evidence of their activities. The transcripts themselves, as well as personal information and other sensitive data, has been left out of this thesis for privacy reasons. Section 5.3 covers the cross-case analysis between the multiple interviews, aiming to find similarities and differences.

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<sup>212</sup>Original German quote: "Wir müssen Leute in unsere Region ziehen, und das heißt auch weitere Sachen wie: Bildung, Kultur, Sport, Unterhaltung, Gastronomie, Tourismus, das müssen wir alles wirklich deutlich stärker forcieren und das ist immer unsere Aufgabe." (Speaker on behalf of EUREGIO, 2023)

### 5.2.1 5ahead: International Innovation through Cross-Border Collaboration

5ahead is an innovation-oriented startup of the German company ELA Container GmbH, located on the University of Twente's campus together with other innovative startups.<sup>213</sup> 5ahead is a subsidiary of the German company ELA Container, who are located just over the border with the Netherlands, in Haren. While ELA Container focuses on the production and renting-out of container units fitted for a variety of purposes (such as sanitary or first-aid purposes etc.)<sup>214</sup>, 5ahead is their fully innovation-oriented subsidiary, according to the interviewee: "Because we really wanted to be more innovative, we needed to start a separate company, and not a single department within a large family-owned company." The name 5ahead suits the innovation purpose of the company to think "5 steps ahead", to find new opportunities for engaging (future) customers.<sup>215</sup> This relates to their reason for locating on the University of Twente's campus, as 5ahead "needs to have people that view or engage things differently ... I need people that think: We should try that differently".

The interviewee explained 5ahead's target group to be very broad, stretching throughout Europe and "if possible the entire world". As the company is innovation-oriented, 5ahead focuses on any sector that could potentially create opportunities, very internationally: "I don't think in Germany, I don't think in the Netherlands, I think in ELA. Could be logistics, could be production, construction, whatever." Furthermore, the interviewee mentioned the absence of any real competitors due to their "unfair advantage" of receiving all the inside-information of the mother company ELA-Container, all the data and information, that other container companies do not receive.

5ahead is an independent subsidiary of the company ELA-Container, located mostly in Germany, with most of its German locations being in Haren. Besides that, ELA-Container has subsidiaries in 10 other European countries, of which the Netherlands is one (Groningen). The reason for this is that ELA-Container is very international, matching the goals and ambitions of a worldwide target group. Since 5ahead is a slightly different company focused on innovation, the choice to locate in the innovative environment of the nearby University of Twente was leading. Therefore 5ahead also "does not really have any suppliers", as in most cases when building a prototype "it is about being able to order parts quickly. It is not about finding the best or cheapest, or the supplier with the best conditions."

5ahead consists of a small team of four employees, each with their own nationality and background. The nationalities are Dutch, German, Austrian and South African. When asked if these diverse nationalities are effectively stimulating innovation, the interviewee responded that that was definitely the case. Furthermore, their diverse backgrounds in, among others,

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<sup>213</sup>See 5ahead's website: URL: <https://www.5ahead.com/en/>

<sup>214</sup>See ELA Container's website: URL: <https://www.ela-container.nl/>

<sup>215</sup>Quotes in section 5.2.1 are from the interview conducted at 5ahead.

health science, energy and software engineering enhanced this.

5ahead is located on the University of Twente's campus to profit from the network of firms; "it is a good location. You do need to have people that speak Dutch, otherwise it will be difficult." Besides that, they are planning to set up an innovation lab together with the university, allowing students to work on innovative projects, facilitated by 5ahead and ELA-Container. 5ahead also has "on average two or three" student projects with the University of Twente. They do not yet supervise theses, although the interviewee expressed they were very eager to start doing so.

As a German company in the Netherlands, 5ahead is actively in contact with companies to create new products or come up with new ideas, "that is important, when you are in a new country you are a guest. You need to be open to building up a network." Generally, these contacts are "mostly partnerships, such as between an IT provider", examples given were "sim-card providers", "front-end developers", "AX and UX designers" (Attentional-Experience and User-Experience) and other freelancers. 5ahead is open to new partnerships and collaboration opportunities. The interviewee also knew of the organisation EUREGIO, however, referred to a closer contact with Oost NL, who had contacted them before relating to cross-border projects. 5ahead has for example given a presentation and taken part in a start-up competition with companies in Münster.

When asked if cross-border activity can lead to competitive advantage, the response was "not very applicable in our case. But in general, I think so." Furthermore, referring to the cross-border region: "For me, there is no border. Unfortunately, there is a language border, although not for me as I can speak both languages. But for other people, it will be an obstacle." Lastly, the interviewee mentioned the difference in mentality between the Dutch and the Germans, where Germans expect the Dutch to speak German, while the Dutch simply try to speak German, which was stated to be the best approach.

### 5.2.2 Demcon: Technology Development Across Borders

"Demcon is a technology development company. We develop technologies for third parties", according to the interviewee at the new Demcon headquarters in Enschede. Furthermore, Demcon focuses on the "development and also some production", although they also have their own products that they sell worldwide, but their "main activity is development."<sup>216</sup> Demcon's target group is described to be "companies that want to have certain technologies developed, who cannot do that on their own, or not quickly enough. That is our target group." These companies are in a very diverse range of sectors, from medical devices to energy, or semiconductor devices.

The interviewee explained that an important aspect in their business was that their customers need to be "willing to work together on developing something", which is a difficulty

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<sup>216</sup>Quotes in section 5.2.2 are from the transcribed and translated interview conducted at Demcon Enschede

especially when engaging the more traditional family-owned German firms: "Companies in the Netherlands find it usual that we develop innovations for them", while in Germany generally "getting innovation from outside the company is often still quite scary." When asked how Demcon ensures they can effectively engage the German customers, the interviewee explained: "Germans typically want to see a track record within the sector they are active, that you have done something distinctive in that sector." Whereas in the Netherlands, Demcon's wide knowledge and capabilities in all sectors is generally accepted. This is the difficulty in attracting German customers. As far as competitors go, "there are of course enough companies that successfully sell products in Germany, and that goes both ways, also German companies that sell things here. But many Dutch companies find this type of technological development that we do very difficult."

Demcon is located primarily located in the large technical university cities of the Netherlands: Enschede, Eindhoven, Delft, Groningen, Leiden and Maastricht. In Enschede, many different branches, and their headquarters are located. Whereas in Germany, Demcon is only located in Münster, "but we are thinking of a next step", as Münster is not a technical university city. However, the interviewee mentioned the benefit of their location in Münster is that it is close to Enschede, "so we can cooperate well." Besides that, the interviewee mentioned their reason for also locating in Germany is "mainly to attract work from Germany", and besides this "we often have customers that appreciate a German subsidiary, then they can do business with a German GmbH."

The interviewee explained that many German employees work at Demcon Enschede, and that also quite a number of these German employees end up never going back to Germany. Furthermore, a number of employees commute from Münster to Enschede and the other way around, as the locations are reasonably close, so there are "interactions and cooperation." Demcon has a large network of suppliers, mostly in the Netherlands and Germany, that they use for the production of their developed parts. "The Dutch locations generally have a slightly more Dutch supply chain, whereas the German office is surrounded by a more German supply chain. But they also go together, we also have German suppliers here", and the other way around. Moreover, the interviewee mentioned the difference between these Dutch and German suppliers is that "the Dutch are very good at developing and the Germans are very good at producing."

As mentioned above, Demcon is located in cities with technical universities. The interviewee mentioned that these universities are often engaged in projects with customers who want to have something developed at a more fundamental, theoretical level. Demcon then takes this knowledge and makes a fully functional product with this theoretical background. Furthermore, the cooperation was mentioned to be "quite intensive" and generally research-related. Besides that Demcon has around 50 students writing their theses at Demcon, a good way to "get to know each other."

Demcon collaborates with companies from across the border in mutually beneficial projects



frequently, and the interviewee mentioned a recent example of a collaboration with a cross-border company related to the integration of new technology. Furthermore, the interviewee also mentioned there are numerous "opportunities for Dutch companies in Germany", regarding this. These collaborations arise from the existing network. However, the interviewee mentioned always trying to extend the network whenever this is possible, by means of for example conferences. Along with this mentality, the interviewee explained that Demcon is "open for new projects, a new collaboration, and flexible in potential ways of collaboration." The interviewee mentioned contact with the organisation EUREGIO, however, explained that they were more involved in subsidy-related projects and so not very applicable in Demcon's case.

When asked if cross-border activity could lead to competitive advantage, the interviewee confidently responded: "Definitely, I am convinced of that." They continued by explaining that companies should put themselves out there and should speak to people and other companies: "You need to actively put time, effort and money into that." The interviewee also mentioned the existence of a language barrier, one that especially the younger generation struggles with. The interviewee went on to explain that speaking German is more effective than only being able to speak English in business environments. "I do see the border as a border that you need to cross, but because it is a border, it remains a border for many companies. So there is a chance for us to profit from that." Therefore, the interviewee explained the border can lead to a competitive advantage for companies that dare to cross it.

### **5.2.3 KTR Benelux: Sales through Cross-Border Engagement**

The company KTR designs mechanical systems such as couplings and other drive technologies, brake systems and hydraulics. The company originates from the German city Rheine, close to the Dutch-German border, where its headquarters is located. Besides that, the company has 24 subsidiaries and 90 sales partners throughout the entire world.<sup>217</sup> What their subsidiary KTR Benelux b.v., located in Hengelo, focuses on is "purely the project engineering and sales here in the Benelux", according to the interviewee.<sup>218</sup> By project engineering is meant the development and production of a specific technology (such as a coupling system) for a customer, according to their needs and specifications. The subsidiary handles projects almost entirely on its own, and only sometimes an employee from Rheine joins in.

KTR's target group consists of a wide range of drive system applications. The interviewee mentioned their projects range from transmission systems in trains to the couplings within wind turbines, the shipping industry, or in smaller equipment such as packaging machines. The interviewee explained their focus was on the Benelux: "all subsidiaries are focused on their own country." Nevertheless, the interviewee mentioned they utilise a portal, "where we collaborate very closely together with all the subsidiaries. We see each other twice a year, the managers,

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<sup>217</sup>See KTR's website, URL: <https://www.ktr.com/nl/>

<sup>218</sup>The quotes in section 5.2.3 are translated from the transcribed interview conducted at KTR Benelux b.v.

but also with all the sales engineers we see each other often.” Therefore, although KTR consists of many different subsidiaries, they still work together closely.

The interviewee explained that ”of course we have competitors”, however, mentioned they had two major advantages over their competitors. The first is their large portfolio of components: ”There is not one company in the market that has the same portfolio as us.” Therefore their many application possibilities give them an edge over competitors. ”But we distinguish ourselves mainly because of our structure as we have it”, referring to entire dedicated subsidiaries to specific markets. There are some other competitors from Germany ”of a comparable scale”, although these companies ”operate in a different way, they do not have the same subsidiary network as us.” However, the interviewee did underline the importance of the existing competitors, as they keep the company on edge.

The operations of KTR are spread out throughout the world, ”product development is in Rheine, so the base is always in Rheine ... However, sometimes we even think of something that Rheine does not know yet, and that is always quite fun.” Besides that, the project engineering departments in other countries focus on their regional markets and manage projects within their proximity, based on the technologies developed in Rheine. KTR Benelux is a sales department, and so the interviewee explained they did not deal with a network of suppliers: ”Production takes place there (in Rheine), storage is there, so in that sense, we have a very limited function in the supply chain.”

KTR Benelux consists primarily of a Dutch team of employees and one Belgian colleague. The interviewee did mention the importance of this Belgian employee, as having this Belgian employee for doing business in Belgium, has had a major positive influence in conducting business with these customers: ”As soon as we hired a Belgian employee, we were immediately successful” (referring to business in Belgium). ”Furthermore, we do not have any international employees. But that is also not really necessary because eventually we are focused on the Netherlands and Belgium.” The interviewee explained that the same held for their other sales departments throughout the world, which primarily consist of employees from the same regions they operate in: ”That has been effective since the very first moment.”

It was mentioned that when doing business in Germany ”you need to take into account a different way of thinking”. An example of a noticeable difference when dealing with German companies that were given is the more hierarchical structure. Whereas ”as a German doing business in the Netherlands, that will likely not be easy either.” Some other mentioned differences are that Dutch people are generally ”more innovative”, while Germans are ”perfect performers”.

The interviewee mentioned that in some cases, the company collaborates with partners or the customer in developing a product, but that it is not very common. The company had not collaborated with any cross-border companies in collaboration projects. However, regarding cross-border collaboration, the interviewee stated: ”We are a perfect example of how it is possible.” Despite this, KTR Benelux had not been engaged with organisations such as

EUREGIO regarding the topic, although "the German side of the company might be." One reason for this is that KTR Benelux is only focused on sales, and not on production. In response to cross-border collaboration, the interviewee argued: "I think you always need to be active together" and "I think that if you have a unique product, you produce it in Germany and you do not go to the Netherlands, that is not smart." Leading into the last question of the interview, the interviewee mentioned the border is nothing but a language barrier that is fading because of the increase in knowledge of the English language, while the physical border does not exist at all anymore. However, a small cultural barrier does exist between the Netherlands and Germany, according to the interviewee. In addition, they added that "it is only good that you are active" across the border, and that if you are not, "you will be thrown back."

#### **5.2.4 3T: Technology Co-development in the EUREGIO**

3T is a company specialising in the development of embedded systems and electronics and develops these products in collaboration with its customers. Customers can also choose to have the developed products supplied by 3T. The interviewee explained that 3T "mainly operates in markets that are of high quality, so really high-tech industry such as for ASML."<sup>219</sup> The main focus of 3T is developing electronics and embedded systems but they are also active in the medical devices industry. This target group also sometimes stretches over the border, especially since 3T's recent acquisition by Kendrion, who already have an active customer base in Germany. Although the interviewee mentioned they "have quite some projects in Germany, usually just over the border", this is not necessarily their focus as "it is actually busy enough in the Netherlands, if you see how much work we can pick up. Yes, that is really already more than sufficient."

Another point that was made is that 3T is a co-developer and wants to be in close proximity in order to work together effectively with the client: "We call ourselves a co-developer, so we develop electronics together with our customer according to their wishes. And yes, we find it necessary to be nearby for that so that we can just drive two or three hours to be there and meet the people there: Personal contact."

3T has a number of large Dutch competitors, such as Benchmark, Prodrive, Neways and also the nearby Demcon. Although the interviewee did know some competitors in Germany, it was mentioned that "it is not that we look at that very much", as they have not really focused on the other side of the border up until now. One reason for this is that the interviewee mentioned that "Germans still do a lot themselves, they develop things themselves, and yes, are reasonably hesitant to outsource these sorts of activities." German firms are "less familiar" with these 'development services'.

Besides their location in Enschede, the company has a slightly smaller department in Eindhoven. Their owner Kendrion is also located in the Netherlands, but also in Germany. Their

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<sup>219</sup>Quotes in section 5.2.4 are from the transcribed and translated interview conducted at 3T

location in Enschede arose from the nearby University of Twente as the Centre for Micro-Electronics Twente (CME Twente), and grew into what is now 3T, explaining the reason for their location in Enschede. The company has a large and growing number of international employees from around the globe. The interviewee went on to explain "you can hardly find engineers in the Netherlands", so companies need to attract international employees.

Regarding suppliers, the company does not always refer to a fixed network of suppliers (although the interviewee did mention two companies in the region). This is because the development of the product takes place at 3T, while the production and the location of the production are sometimes determined by the customer's wishes, whether that is in the region, or all the way in China. The company does, however, have close contacts with the University of Twente, through its partnerships with the popular student teams Solar Team Twente<sup>220</sup> and Solar Boat Twente.<sup>221</sup> Further interaction with the University of Twente is maintained through activities organised by study-associations, as well as the supervision of, and the participation in numerous theses.

The company had not engaged in cross-border collaboration projects with other companies recently. A reason that was given is: "My general perception is that it takes longer to get a buy-in at a German company. You will need to get past more managers to get a better buy-in before they want to do something together at all ... In the Netherlands, it is more accessible." The interviewee added that "it needs to make sense to collaborate. For me, it is not the goal to form a collaboration with other companies. If it makes sense to collaborate, then we usually find each other." The interviewee mentioned "it could well be good to do that" (engaging in cross-border collaboration), however, referred back to the fact that the company had enough opportunities within the Netherlands already. Therefore, it is not critical to actively look at cross-border collaboration. In cases where German clients did take part in a co-development project, the interviewee explained this was often a result of the existing German network of their owner company Kendrion. This network provides them with these opportunities from across the border. Nevertheless, "the potential in the Netherlands is so large that you could say, actually, there is sufficient work available here." Besides this, it was mentioned that many of Germany's largest industries, such as the automotive industry, are not really sectors that 3T operates in.

In response to the general question if cross-border activity could lead to competitive advantage, the interviewee responded: "I think that depends on the set goals of your company. As a development-service company that cannot really look further than a travel distance of 3 hours, that determines our region, and also a part of Germany belongs to that." The interviewee continued to explain that as a company you cannot neglect this part of your proximity, as it remains a region with potentially interesting customers. The interviewee also mentioned the ease of communication, through the English language, was increasing because of interna-

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<sup>220</sup>See the website of Solar Team Twente, URL: <https://www.solarteam.nl/>

<sup>221</sup>See the website of Solar Boat Twente, URL: <https://www.solarboattwente.nl/>

tionalisation. In a final response was mentioned that the border is seen as an opportunity, and not as an obstacle. The interviewee explained that the (decreasing) language barrier is not everything in business, as company culture is not only defined by language: "If you have the same expectations, such as for the quality, as we have too, and they are willing to pay for that, then it is less problematic."

## 5.3 Cross-Case Analysis

The in-case analyses of the four companies show that there are a number of similarities and differences between the companies. However, to make way for a more effective comparison, a table is created, depicting the responses of the interviewees side-by-side. The responses have been sorted by categories and questions. Table B.1 in Appendix B shows the resulting overview. The responses to question 1 have been removed for privacy reasons.

### 5.3.1 Comparing the Companies and their Activities

Each of the interviewed companies has its own unique combination of characteristics such as company size, industry and operations. Demcon and 3T are both technology development companies in the high-tech industry. Both develop innovative products for external customers, where the larger company Demcon is more focused on mechatronics, and the smaller 3T is specialised in the co-development of electronics and embedded systems. KTR Benelux is the sales and project engineering department of their mother company in Rheine, which is a large player in drive systems, hydraulics and other mechanical industries. KTR Benelux applies centrally developed technologies to projects in their region, as do their other subsidiaries around the world. 5ahead is a small fully innovation-oriented start-up of its international mother company ELA Container. The start-up finds new innovative services and applications for ELA Container's products.

In general, it can be stated that most of these companies are active in the technical sector, and provide a service relating to already-developed or to-be-developed technologies or products. Demcon and 3T can best be characterised as development-outsourcing companies, while KTR Benelux operates as what could be called a technology applicator. 5ahead is more focuses purely on innovative applications in new or existing markets, relating to an already developed product.

The following sections cover the responses of the four cases in detail, comparing and contrasting the different views and experiences. The topics are covered in the same order as they were during the interviews. For clarity and convenience reasons, an overview summarising the responses of the four companies is given and depicted in Table 5.1. The table shows whether the companies engage in each of the six previously hypothesised cross-border activities, with a short explanation.

	5ahead	Demcon	KTR	3T
CB Strategy	Yes, Transnational strategy	Yes, active CB strategy, Transnational strategy	Yes, Transnational strategy	No international strategy, focused on the Netherlands
CB Operations	Yes, active establishment across border	Yes, active establishment across border	Yes, active establishment across border	No, mother company does
CB Employees	Yes, small but very diverse team, including German and Dutch	Yes, Dutch-German cross-border employee profile	No, although Belgian employee for cross-border business	Yes, very international diverse team
CB Suppliers	No, not a large supplier network, only for prototyping	Yes, national and cross-border suppliers.	No, no supplier network needed as a sales department	No, not many suppliers as the company focuses on development phase
CB Institutions	Yes, cross-border company interacting with the University of Twente,	Yes, Dutch and German subsidiaries interact with local universities.	No, no interaction as a sales department	No, although clear collaboration with University of Twente
CB Collaboration	Yes, company collaborating with other cross-border companies	Yes, collaborates in a cross-border network, illustrated by examples	No, although open to it, company mainly focuses on the Netherlands	No, although open to it, company focuses on the Netherlands.

Table 5.1: An overview summarising each company’s engagement in different cross-border activities

### 5.3.2 Cross-Border Strategy: Transnational Although Diverse

5ahead arguably has the broadest target group, focusing on whatever sector is potentially beneficial, whether that is logistics, production, construction or the medical industry. This broad target group is explained to stretch throughout Europe and even the world whenever it is possible. In that sense, the company does have a cross-border target group, although it is not specifically aimed at this cross-border region. KTR has a similar international target group, although their subsidiaries each focus on the country they are located in, the same holds for KTR Benelux itself, as they generally only focus on the Netherlands and Belgium. 3T and Demcon’s target groups are defined by companies that do not have the capabilities or time to develop a product themselves, each in their respective industries. The larger company Demcon specialises in a larger variety of high-tech industries than 3T, which generally specialises in embedded systems and electronics. Demcon’s target group also stretches across the border to Germany, and they are engaged with German customers, even though this might not always be so easy. 3T is mainly focused on the Netherlands, as they find there are enough opportunities for their company in the Netherlands alone. However, the German market was described as an upcoming market for their company, due to a recent acquisition by a company that is also active in Germany.

Naturally, all companies mentioned they had to deal with some form of competition. Demcon and 3T could even be seen as competitors, were there not a slight difference in their specialised industries. As a large player in the market, Demcon deals with plenty of competitors, however, many of these were mentioned to find it difficult to replicate Demcon’s high quality

in such a broad variety of industries. Nevertheless, Demcon does deal with some competition from across the border as well, although these are typically companies simply selling products across the border, and not of the same scale as Demcon. The same holds for KTR Benelux, as they mention their competitors, both Dutch and German, do not pose a major threat because they operate in different ways and do not have a portfolio as wide as KTR. However, as a relatively small-scale technology development company when compared to the other companies analysed, 3T does have some large competitors in the Dutch market. However, they separate themselves from the competitors by offering close-contact co-development, carefully listening to the client's wishes. The company is not overly focused on Germany, nor do they deal with any important German competitors. The furthest outlier regarding competition is 5ahead, as the interviewee mentioned an "unfair advantage", distinguishing them from competitors.

Summarising the companies' activities in regard to cross-border strategy, it can be stated that three out of four interviewed companies are actively engaged across the border. Demcon, KTR and 5ahead can be argued to have a transnational strategy, where in the cases of Demcon and 5ahead, this can be argued to be a cross-border strategy. From its headquarters in Enschede, Demcon has aimed to enter and compete on the German market as well, and in doing so has even set up a subsidiary in Münster.

5ahead is an innovation-focused start-up of its mother company across the border in Germany. Since their products are developed centrally in Germany, it can be argued that 5ahead is also of a transnational nature. Even though the company develops new services and applications at an international level, its conscious establishment across the border does bring them into more effective contact with the local business climate in the Netherlands. In that sense, it can be argued that their strategy could also be named a cross-border strategy, even though their target group is very international, and not only Dutch-German.

KTR is also active on both sides of the Dutch-German border (also in many other countries) and can be argued to be a perfect example of a modern transnational company. Its strategy is to centrally develop high-quality products, which are sold in regional economies through local subsidiaries. These subsidiaries, such as KTR Benelux, mainly focus on their own country when finding projects and customers. This way, local national markets are effectively engaged. In doing so, the subsidiaries frequently keep in touch with the other departments of the organisation. Although the company has what is seemingly a perfect transnational strategy, on the other hand, it can be argued that it is not necessarily a cross-border strategy, as the focus of the subsidiaries remains on the national markets they are established in.

Unlike the other companies interviewed, 3T is mainly focused on the Netherlands and is not actively trying to engage the German market. Even though their new owning company Kendrion is creating more options for the contacts for 3T in Germany, the focus has remained on the Netherlands recently. According to the interviewee, the reason for this is that the Netherlands already provides plenty of opportunities for the company.

### **5.3.3 Cross-Border Operations: Networks over Borders**

The three companies with a cross-border strategy are the same companies that have cross-border operations, although the companies' operations networks differ slightly. The companies are all located near the Dutch-German border, three in Enschede, near the University of Twente, and one nearby in Hengelo. 5ahead and KTR Benelux share a transnational nature: Their mother companies are located in Haren and Rheine respectively, where product development takes place. In both cases, the subsidiaries actively chose to locate across the border. 5ahead sees the benefits that the innovative environment of the University of Twente brings with it, while KTR Benelux's reason is to engage the Dutch and Belgian markets more effectively. Both companies maintain contact with their German headquarters and other subsidiaries, although 5ahead seems to operate more individually as an innovation-oriented start-up.

Where KTR and 5ahead demonstrate the establishment of German firms across the border into the Netherlands, Demcon shows its counterpart: A Dutch firm located in Germany. Demcon is located mainly in Enschede, within the cross-border region, as well as in other technical university cities within the Netherlands. Besides that, Demcon has located in Münster through an acquisition. This has proven a first step in trying to adapt to the German market and attracting work from German customers. The interviewee explained that in many situations, German firms still like to deal with other "German GmbHs".

The company 3T itself is located in Enschede and Eindhoven, both technical university cities in the Netherlands, close to the German border. Its new owning company Kendrion is located in both the Netherlands and Germany, and therefore provides an entrance into the German market. Nevertheless, the interviewee pointed out the company is located in Enschede as a result of its background, tracing back to the University of Twente located in close proximity. Therefore, its location close to the border is not necessarily motivated by opportunities for cross-border activity.

### **5.3.4 Cross-Border Employees: Internationally Talented Profiles**

The majority of interviewed companies mentioned their teams consisted of a multitude of diverse nationalities. At 5ahead, the small team consists of employees that each have a different background, both in terms of nationality and career. 3T has a similar employee profile, where there is a growing number of international employees from countries all around the world. The interviewee mentioned that in the high-tech sector, there is not enough local talent to meet the industry's demands, so international employees are attracted to solve this mismatch. Demcon demonstrates the case of a company that capitalises on the entire cross-border region's labour market. The interviewee explained there are many German employees at Demcon Enschede, and that there is frequent interaction and cooperation between their Enschede firms and the new Münster subsidiary.



KTR Benelux contrasts these three companies. The company consists primarily of Dutch employees and one Belgian employee. This matches KTR Benelux's transnational strategy, as their specific subsidiary aims to promote regional adaptation and effective engagement of the Dutch and Belgian markets. Especially the Belgian employee's usefulness in engaging Belgian companies was highlighted to be of great value to the company. Besides, KTR's other subsidiaries in Germany consist of mainly German employees, with whom there was explained to be occasional contact. However, it was not mentioned that there are German employees active at KTR Benelux itself.

### **5.3.5 Cross-Border Suppliers: Small Networks**

Out of the investigated companies, only Demcon seemed to be actively engaged with a network of suppliers. As a technology developer that also produces products, they rely on a supplier network, mostly in the country of establishment. It was mentioned that the Dutch subsidiaries rely mostly on Dutch suppliers, and the German subsidiaries mostly on a German network of suppliers. However, Demcon Enschede was mentioned to also be engaged with German suppliers. In that sense, Demcon's supplier network does have a cross-border nature. Moreover, the interviewee explained that Dutch suppliers are in general better at developing, whereas German suppliers are better at producing. This indicates a motive for engaging with cross-border suppliers could be a speciality or expertise within a certain industry or practice: Profiting from quality found across the border.

Like Demcon, 3T is also a technology developer. However, it was mentioned that 3T generally focuses on the development of the technology only, and not necessarily on the production. Therefore the company does not deal with many suppliers, besides a number of companies within a local national context. In the end, the interviewee mentioned that because of their customer-oriented co-development approach, approaching a certain supplier comes down to the customer's preference.

In the interview at 5ahead, it was explained that the company, in general, does not have an extensive supplier network either. In 5ahead's case, as a fully innovation-oriented company, the only suppliers they could need would come to play in the prototyping stage. To stay ahead, the interviewee explained that 5ahead selects suppliers based on their speed, they do not necessarily need to be the best or the cheapest, as being innovative requires businesses to be quick.

Where 5ahead is an innovation-oriented company, KTR Benelux is fully sales-oriented. Because of this, KTR Benelux also does not have a supplier network. Without a doubt, KTR's central production subsidiaries in Rheine have an extensive supplier network. However, whether this network stretches over any geographical borders was not mentioned.

### **5.3.6 Cross-Border Institutions: University Collaboration**

Even though all four interviewed companies are located in close proximity of the University of Twente, three out of four companies show clear interaction with the university or other academic institutions. The outlier of the four is KTR Benelux, which as a strict sales department of KTR, does not interact with universities or research institutes. A contrast to this is 5ahead, which is located on the University of Twente's campus. 5ahead profits from its innovative environment and the network of other start-ups located there, according to the interviewee. Furthermore, the company is engaged in a number of student projects, and the interviewee mentioned that 5ahead is eager to provide thesis opportunities and supervision. As a start-up of a German company, that chose to locate near a technical university across the border, this can be argued to be a clear demonstration of engaging a cross-border institution.

Technology developer 3T has its roots deep in the University of Twente, as it originally arose from an initiative involving the university. It has maintained this relationship through collaborations such as the sponsorship of the popular student teams Solar Team Twente and Solar Boat Twente, thesis supervision, and collaborations with the study associations to try and interact with students of the university. Although 3T clearly interacts with institutions, these are ordinary clustering interactions and not yet of a cross-border nature.

From the interview at Demcon can be concluded that the company intensely collaborates with universities. Demcon does so through research projects and through theses. It was mentioned that Demcon relies on universities such as the University of Twente for the more fundamental, theoretical research. This knowledge then transfers to companies such as Demcon, who apply it in practice. Demcon is located in all major technical university cities of the Netherlands, profiting from each university's innovative environment. In Münster, where Demcon has recently also located, there is also a university that they seem to interact with. However, the interviewee mentioned that it is unfortunately not a technical university. As Demcon is still one company and seems to interact with knowledge institutes regardless of the country, this can be argued to somewhat resemble cross-border institutional interaction.

### **5.3.7 Cross-Border Collaboration: Engaged and Open-Minded**

Out of the different forms of cross-border activities studied, cross-border collaboration is shown to be the most complex and diverse topic. Some of the companies studied are active in cross-border collaboration, while others are not at all. Nevertheless, all interviewees had experience in dealing with people and companies from across the border. Furthermore, all companies were found to be open to all sorts of collaboration, including cross-border collaboration.

Demcon is an example of a company that is actively engaged in cross-border collaboration. This was illustrated by a recent example relating to the integration of a certain technology, done in cooperation with a company from across the border that had experience with the technology.

The interviewee mentioned that projects such as this arise from their existing network, which they aim to extend whenever possible. Therefore, as mentioned by the interviewee, Demcon is always open to new projects and collaborations and is flexible in this.

This is also the attitude of 5ahead, which as a company from across the border, aims to collaborate and interact with companies in the Netherlands. The company aims to establish a network and form partnerships with other companies through these interactions. Similar to Demcon, 5ahead is open to more collaboration projects and ready for new opportunities. An example of a recent collaboration with the University of Twente was given to highlight this.

The companies KTR Benelux and 3T contrast Demcon and 5ahead, as their focus has remained on customers and companies in the Netherlands. Despite this, both companies are open to collaboration in general, whether this is across the border or not. However, both companies have a target group that does not include Germany, so these types of cross-border collaborations are arguably less relevant.

What makes this category of cross-border activity complex and interesting is that in all cases, the interviews turned into a discussion about conducting business across the Dutch-German border. The explained differences in culture and business climates were similar in all cases. Generally, on the German side, a formal, precise, structured and hierarchical culture exists, while the Dutch side is more flexible, innovative and risk-taking. These insights align with the discussion and keynotes of the Digital Summit Euregio, as is explained in section 5.1.2.

### **5.3.8 General Cross-Border Activity: Border as an Opportunity**

To conclude the interviews, two general questions relating to cross-border activity were asked. The first question aimed to uncover whether the interviewees, as representatives of their respective companies, believe that engaging in cross-border activities can lead to a competitive advantage over others in the region that do not do so. In a general context, the interviewees agree that this is indeed the case. One of the interviewees mentioned that you need to actively put time, effort and money into it, while another mentioned that you always need to be engaged in a cross-border manner because if you are not, you will be "thrown back". A nuance was given by a final interviewee, who highlighted that engaging in cross-border activities does have to align with the set goals of the company and that it needs to "make sense". However, the same interviewee did agree that, since Germany is part of the region, it cannot be neglected.

Furthermore, all interviewees do agree that the border should not be viewed as a border, but as an opportunity. Despite this and although two of the interviewees mentioned that on a personal level, they did not experience a border anymore, all agreed that there is still a border up to some degree. This border consists of a (decreasing) language barrier, cultural differences, and possibly deviating expectations. One of the interviewees explained that the existence of the border is precisely what makes it an opportunity: Many companies do not dare to cross the border, and so companies that do dare to cross it can profit from that.

# 6 Discussion

## 6.1 The Cross-Border Region: EUREGIO

The EUREGIO has commonly been referred to as the oldest and one of the most developed cross-border regions in the world.<sup>222</sup> Its overarching governing institute EUREGIO has been active for decades in promoting cross-border collaboration between the Netherlands and Germany. The interview conducted with a representative of EUREGIO, as well as the multiple presentations and discussions at the Digital Summit EUREGIO event, show that the CBRIS EUREGIO does not only exist in theory.

From the top level, at the organisation EUREGIO itself, many initiatives are taken to integrate both sides of the cross-border region. By means of networking initiatives, raising awareness, effective interreg-funded projects and more, the organisation aims to prevent the border from being an obstacle in a wide range of activities. The Digital Summit EUREGIO conference showed that a large number of companies (especially technology-related ones) shared EUREGIO's eagerness to collaborate in a cross-border manner. The present German and Dutch companies each clearly realised their cross-border counterpart has a unique identity, culture, language and overall way of doing business. Despite this, all representatives present spoke of these differences in a positive manner, describing them as complementary and synergistic. The general opinion at the conference was that the future of Dutch-German collaboration was very promising. Even a number of focus industries - referred to as "cross-border clusters" - were pointed out: Advanced Manufacturing & Robotics, Energy, Med-Tech and Circular Economy.

Whether these positive thoughts are reflected in practice, at the company level, is the result of the four case studies completed at a number of technology firms: 5ahead, Demcon, KTR Benelux, and 3T. Each of these companies was selected because they appeared to have a high likelihood of being engaged in cross-border activities. In the end, it can be stated that the will to collaborate at a cross-border level is indeed reflected in practice by observed activities and motives. However, it also appears that cross-border activities are not always relevant for companies, as this relevance strongly depends on the company's strategy and operations.

## 6.2 Cross-Border Activities: From Theory to Practice

The theoretical framework constructed from the prior literature study was able to be tested effectively. The hypothesised model and cross-border activities were able to be recognised in a practical environment. Therefore, it can be stated that the knowledge gained from Porter's cluster theory, the triple helix model, RIS studies, as well as their cross-border applications served their purpose in providing a foundation to support and help understand the results.

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<sup>222</sup>See Perkmann, 2007, p. 258.

As was predicted in section 2.1.1.2, Porter's theory, as well as Rugman and D'Cruz's double diamond model, were indeed useful in supporting arguments relating to competitive advantage. Interviewees commented on this topic frequently and agreed with literature that cross-border activity may lead to competitive advantage.

All theories contributed to constructing an effective theoretical framework in the sense that they agree that interactions between different actors and actor groups lead to innovation and other potential benefits. Based on this common argument, the six originally proposed forms of cross-border activity were hypothesised (section 3.1). Furthermore, these theories and the aforementioned common argument led to the inclusion of the three benefits in the model. As these benefits could be identified in the empirical data from the interviews, it can be argued that the chosen theories were indeed a useful foundation. Moreover, their unique perspectives helped give a more three-dimensional view of cluster theory and regional innovation systems.

In general, it can be stated that all six hypothesised categories of cross-border activities were observed. This exploratory research has pointed out that, although some activities were practised more frequently than others, all these categories are indeed forms of cross-border activities in practice. The interviewed companies agreed that engaging in cross-border activities is an important part of an international strategy, and the majority believed it could even lead to a competitive advantage over competitors. This finding agrees with research showing that a cross-border status can be advantageous for clusters and companies.<sup>223</sup>

The interviewed companies each had a clear strategy, where some of them actively tried to engage the other side of the cross-border region, and others kept to their assigned national target group. Three of the companies even had operations spread over both sides of the border region, whereas the majority of the companies did not have a large cross-border network of suppliers. Having said this, whether a company has certain operations or a supplier network in place heavily relies on its role within the overarching organisation. For example, a sales department such as KTR Benelux or an innovation-focused start-up such as 5ahead does not require any suppliers. Therefore, stating that these companies do not deal with cross-border suppliers is logical as it is irrelevant in their cases. In the case of a future study, it would perhaps be a good idea to study companies that are even more similar in terms of their function (such as strictly technology development companies or only manufacturing companies). That way, there are fewer factors influencing the resulting engagement in cross-border activities.

Three out of four companies had a very diverse team of employees. The interviewees from these companies each also explained the benefits these international employees brought to the company. However, a distinction must be made between international employees and cross-border employees (the studied activity). In this thesis, cross-border employees refers to employees that have been attracted from the other side of the border, for whatever reason. Although the interviewees mentioned that employees from Germany were surely represented within these international employee pools, in most cases the interviewees referred to international employees

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<sup>223</sup>See Zashév, 2012, pp. 203–204.

being beneficial in general, and not specifically cross-border employees. Therefore, it cannot fully be stated that cross-border employees are any more effective than 'regular' international employees. Although some examples were given that highlighted that cross-border employees could benefit a company wanting to operate across the border, through for example the knowledge of the cross-border market, culture and language. Further study is required to pinpoint whether international employees from across the border can outperform regular international employees, within the context of a certain cross-border region.

A number of the interviewed companies also collaborated with institutions such as universities, or even other companies. This was, however, mostly on a national regional level, and not across the border. Some of the interviewees mentioned their company had occasionally collaborated with cross-border parties and companies, but this was not very common. Nevertheless, all interviewees did seem to be experienced in doing business with parties from across the border and shared a similar view on what to take into account when engaging in cross-border collaboration. These were especially elements relating to the language barrier and cultural differences.

### **6.3 Motives for Cross-Border Activities: Sales and More**

It was observed that the interviewees clearly realised the potential benefits of cross-border activities, which was reflected in their motives for doing so. Although the specific motives deviate per activity, they seem to correlate with Porter's clustering benefits.<sup>224</sup> Some of the interviewees for example mentioned attracting cross-border employees (or international talent in general) for their background-specific talent and skill sets. In essence, this motive of attracting these cross-border employees is a productivity and innovation-stimulating benefit. Furthermore, engaging with suppliers, institutions or other companies across the border could also lead to these clustering effects. The interviewees especially seemed to realise innovation and productivity benefits could occur from cross-border activities.

Although companies seem to understand cluster-like benefits, it can be argued that their main motive is extra sales. Across the border lies an entire market that companies see as an opportunity for expanding their business, leading to more sales as a benefit. Looking at this from a more Porterian perspective, the companies maintaining a transnational strategy aim to effectively engage the local regional market (which differs on each side of the border), while keeping a central and efficient production, leading to Porter's described benefits: A central productivity increase, but also an increase in innovation and business formation through effective local adaptation.

Therefore, it can be argued that the motives that interviewed companies have for engaging in cross-border activities are expanding sales to a cross-border market, as well as enjoying the lined

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<sup>224</sup>See for example Porter, 1998, pp. 81–84.

out by Porter's cluster theory, triple helix theory and RIS studies: Innovation, productivity and business formation. This is not strange, as the hypothesised cross-border activity categories are largely based on these theories. Thus it makes sense to end up with these theories again after the empirical study.

In general, whether the companies were engaged in a specific cross-border activity or not, the interviewees all seemed to agree that each of the activities could be potentially rewarding. Nevertheless, not all companies were engaged in all activities. While sometimes the interviewees agreed that it could be important for their respective companies to start looking into these activities, in other situations the interviewees argued that it was simply out of their companies' scopes. For example, a subsidiary assigned to adapt to a national market does not need to focus on the bordering country's market, as its existing sister company is already specialised to do so.

When relating the observations of the case studies back to the hypothesised model in Figure 3.2, it can be stated that the model holds. However, the model is arguably more accurate when it includes the additional benefit *Sales*. From a clustering perspective the three benefits *Innovation*, *Productivity* and *New Business Formation* make sense. However, the expansion to a cross-border market was observed to be a substantial part of the companies' reasoning for engaging in the said cross-border activities. Therefore, *Sales*, is added to the hypothesised benefits in the revised model (Figure 6.1).

All companies showed to be engaged in at least some of the hypothesised cross-border activities, although some noticeably more than others. This was to be expected as preparatory study into the operations of the companies already pointed them out as potentially interesting (from a cross-border perspective). Nevertheless, this reasonably exploratory research has succeeded in identifying the hypothesised cross-border activities and benefits in practice. Consequently, this research can be used as evidence to support that besides ordinary national activities, companies also experience additional sales, clustering and internationalisation benefits such as innovation and productivity increases from a range of cross-border activities.

During the study, no additional categories of cross-border activities were discovered. Perhaps in future, an even more open interview structure, or a strictly observatory study could help to uncover even more of these activity categories. Besides underlining the benefits and motives behind cross-border activities, the interviewees also mentioned some clear barriers hindering cross-border activity. These narrow down to the existence of a medium language barrier, as well as a moderate cultural difference, which aligns with Klatt and Herrmann's findings.<sup>225</sup> Studies such as Makkonen et al. (2018) have pointed out that these "dissimilarities between the adjacent sides of the border ... do impact the level of cross-border cooperation (negatively)".<sup>226</sup> Therefore, it could be argued that the proposed model could benefit from the inclusion of these "hindering" factors as well (See Figure 6.1). It must be noted that research points out there

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<sup>225</sup>See Table 1 in Klatt and Herrmann, 2011, p. 76.

<sup>226</sup>Makkonen et al., 2018, p. 1962.

are more forms of hindering factors, such as legal, administrative or macro-economic factors.<sup>227</sup> However, as these were not shown by the results of this study, are not included in the model.

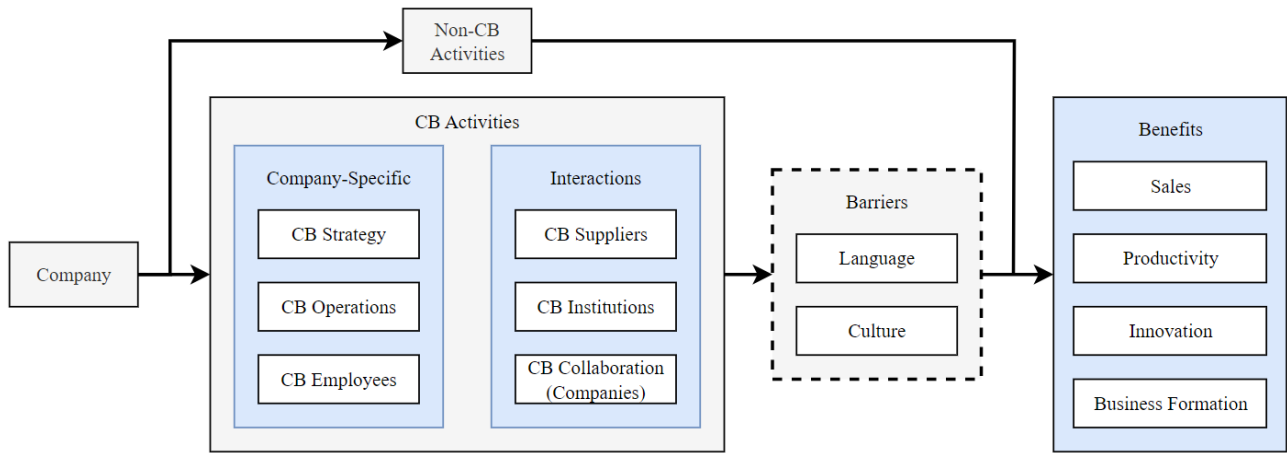


Figure 6.1: Revised model showing the observed cross-border activities, benefits, and barriers  
Source: Own illustration

## 6.4 Generalisability, Representativeness and Bias

Even though the cases show that the theorised cross-border activities and benefits translate to practice, this research alone is arguably not sufficient to generalise the findings. The reason for this is the limited number of cases studied (see Table A.3). Because of this limitation, these results alone should not be used to generalise the findings until more future research is conducted. Moreover, research into cross-border activity in other cross-border regions should be conducted to provide comparison material. The results may not fully translate to other cross-border regions, especially since the EUREGIO is one of the most developed of its kind.

The case studies have been selected from the same industry, within the same region, to be able to find similar empirical data. This approach benefits the ability to find patterns and similarities in the dataset. However, it also has the disadvantage that it is limited to one industry. Therefore, these results hold within the context of engineering/technology companies in the EUREGIO. Additional research is required for further generalisability of the results to other sectors and geographical contexts. Nevertheless, this thesis and its results should provide a solid base that can be expanded on effectively in future.

A final point of discussion is that the interviews and possibly also the results have a slight bias towards the positive side of cross-border activity. The reason why this should be noted is that this research has given attention to finding motives and benefits of cross-border activities while omitting motives for refraining from them and possible disadvantages. It could be argued that disadvantages are included in the results in the form of the 'barriers': Language and culture. However, it should be taken into consideration that more disadvantages may exist.

<sup>227</sup>See Leick, 2011, pp. 171–172.



# 7 Cross-Border Competitive Advantage

The conducted case studies have shown that companies within the EUREGIO are engaged in a variety of cross-border activities, for a number of reasons. Companies in the EUREGIO have been found to engage in all cross-border activities hypothesised in the theoretical framework: The company-specific cross-border activities *Strategy*, *Operations* and *Employees*, as well as cross-border interactions with *Suppliers*, *Institutions* and companies (*Collaboration*). Although some of the activities were observed more frequently than others, and some companies were engaged in cross-border activities more intensely than others, this research has shown that all six categories are represented in practice.

In general, all interviewees agreed that cross-border activity can lead to a competitive advantage, especially over companies that do not engage in them. However, which cross-border activities will benefit a certain company was shown to depend heavily on the company's goal and strategy. The specific motives that companies had for engaging in specific cross-border activities can especially be narrowed down to sales, but also to productivity and innovation benefits. Therefore, it can be argued that the benefits companies see in specific cross-border activities relate to the cluster benefits originally proposed by Porter.<sup>228</sup> Besides benefits, two moderate barriers hindering cross-border activities were observed: Language and culture. These barriers have been included in a revised model depicted in Figure 6.1 in the previous section.

Thus, from a managerial point-of-view, it can be concluded that engaging in cross-border activities can be a unique and rewarding opportunity for a company, especially one that can overcome the barrier imposed by a different language and culture. However, engaging in cross-border activities should align with the company's general strategy and goal, and should not be forced. Although there does not appear to be a fully developed Porterian technology cluster yet in the EUREGIO, companies do see the benefits of cross-border activities. Therefore, companies that see opportunities across the border would be recommended to engage in them to set up a long-term advantage over competitors that are hesitant to do so yet.

A recommendation for future research is to gather even more empirical data through more case studies, interviews or quantitative studies. This additional empirical evidence can then be used to confirm the results and conclusions of this reasonably exploratory, qualitative research. Furthermore, studies willing to dive deeper into detecting specific cross-border clusters within the EUREGIO could consider assessing the four key industries mentioned at the EUREGIO Digital Summit: Advanced Manufacturing and robotics, Energy, Med-Tech and Circular Economy. Another recommendation is to research whether the results of this thesis transfer to contexts of different cross-border regions around the world. Lastly, research into what policy measures could help companies in cross-border regions to engage further in cross-border activities is predicted to be a useful study, as this could be beneficial for regions willing to increase cross-border activity.

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<sup>228</sup>See Porter, 1990; and Porter, 1998.

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# A Interviews

## A.1 EUREGIO Interview Questions

<b>Semi-structured interview, with the following base questions:</b>	
<b>Category</b>	Interview Questions
General	<ol style="list-style-type: none"> <li>1. What is your function within EUREGIO and what do you do on a daily base?</li> <li>2. How would you describe EUREGIO as a cross-border organisation?</li> <li>3. What are the main goals that EUREGIO tries to accomplish for the region?</li> </ol>
Regional Innovation System	<ol style="list-style-type: none"> <li>4. How does EUREGIO try to promote certain industries? Could you name a few successful projects regarding this?</li> <li>5. How does EUREGIO work together with organisations such as companies, universities and municipalities in creating a regional innovation system?</li> </ol>
Clusters	<ol style="list-style-type: none"> <li>6. What types of companies are partners of EUREGIO?</li> <li>7. Are there any industries that stand out or are highly represented?</li> <li>8. Would you describe these industries as cross-border industries? As in: Do these industries collaborate with organisations and partners over the border?</li> </ol>
Cross-Border Companies	<ol style="list-style-type: none"> <li>9. Are there companies within the EUREGIO that are actively show cross-border behaviour?</li> <li>10. If yes, in what ways do these companies show cross-border behaviour? For example: Accessing an international market, acquiring employees from over the border, or collaborating in cross-border projects with other companies.</li> <li>11. Which companies are these?</li> </ol>

Table A.1: Overview of the prepared EUREGIO interview questions divided into categories

## A.2 Company Interview Questions

<b>Semi-structured interview, with the following base questions:</b>	
<b>Category</b>	<b>Interview Questions</b>
Introduction	<ol style="list-style-type: none"> <li>1. What is your function within the company? And what do you do on a daily base?</li> <li>2. How would you describe your company and its operations?</li> </ol>
CB Strategy	<ol style="list-style-type: none"> <li>3. How would you describe the target group of your products/services?</li> <li>4. Does this target group stretch over national borders?               <ul style="list-style-type: none"> <li>(Yes) How do you make sure you appeal to this target group?</li> <li>(Yes) What are the difficulties in trying to effectively engage this cross-border target group?</li> <li>(No) What would you think is the reason why your company has not engaged with this group yet?</li> </ul> </li> <li>5. Where are your largest competitors situated?</li> <li>6. Are there any companies from across the border that pose a threat?</li> </ol>
CB Operations	<ol style="list-style-type: none"> <li>7. Where are the operations of your company situated? Are they all in one location, or are they distributed? Over the border?</li> <li>8. What is the reason for this?</li> </ol>
CB Employees	<ol style="list-style-type: none"> <li>9. Do you have any international employees? And if so, from where?               <ul style="list-style-type: none"> <li>(Yes) Do you think these employees provide your company with particular advantages?</li> <li>(No) Would you consider attracting employees from over the border?</li> </ul> </li> </ol>
CB Suppliers	<ol style="list-style-type: none"> <li>10. Where are the majority of your suppliers situated?</li> <li>11. What makes these suppliers interesting for your company?</li> </ol>
CB Institutions	<ol style="list-style-type: none"> <li>12. Does your company collaborate with any institutions such as universities or research institutes?</li> </ol>
CB Collaboration	<ol style="list-style-type: none"> <li>13. Have you or has your company engaged in cross-border collaboration projects recently? And do you have any examples?</li> <li>14. How do you find or even interact with companies from across the border? Is this different than for local companies?</li> <li>15. Would your company be open to engage in more collaboration projects?</li> <li>16. Are you familiar with this region's cross-border organisation EUREGIO and its projects?</li> </ol>
General CB	<ol style="list-style-type: none"> <li>17. Do you believe engaging in cross-border activities gives you a competitive advantage over others in the region that do not do this?</li> <li>18. Do you see the border as an obstacle that needs to be overcome, or as an opportunity? How does the company think about this?</li> </ol>

Table A.2: Overview of the prepared company interview questions divided into categories

### A.3 Interviews, Interview Lengths and Questions

Interview	Length	Interview Questions
EUREGIO	34 min	Appendix A.1
Digital Summit EUREGIO	45 min	Panel Discussion
5ahead	37 min	Appendix A.2
Demcon	33 min	Appendix A.2
KTR	46 min	Appendix A.2
3T	24 min	Appendix A.2

Table A.3: Overview of interviews held, lengths and questions asked



# B Company Interview Responses

Company interview responses:				
Sahead	Demcon	KTR	3T	
Introduction	1. What is your function within the company? And what do you do on a daily base?			
	2. How would you describe your company and its operations?			
Sahead is an innovation-oriented start-up, finding new ways to engage future customers through innovative use of container units.	Demcon develops technologies for third parties, along with some production and selling their own products on a global scale.	KTR is a project engineering company specialised in coupling and drive systems, hydraulics, and brake systems.	3T co-develops embedded systems and electronics together with their customers. They can also supply these products to customers	
CB Strategy	3. How would you describe the target group of your products/services?			
	Very broad, whatever sector is potentially beneficial, could be logistics, production, construction etc.	“companies that want to have certain technologies developed, who cannot do that on their own, or not quickly enough.”	A broad target group consisting of different applications of coupling systems in industries.	Companies that want to have a technology developed in the field of embedded systems and electronics, but also other sectors such as medical devices.
	4. Does this target group stretch over national borders?			
	The target group stretches throughout Europe and even the entire world.	The target group is very broad, in a variety of sectors, also across borders.	KTR's target group covers an international landscape, in which their many international subsidiaries each focus on their own countries.	Yes, but the focus is on the Netherlands, although a recent acquisition is making Germany a more relevant target group.

Table B.1: Company responses to the interview questions

	<b>5ahead</b>	<b>Demcon</b>	<b>KTR</b>	<b>3T</b>
CB Strategy		5. Where are your largest competitors situated?		
	“Unfair advantage”, no real competitors due to the advantage of inside information from the mother company.	Competitors situated on both sides of the border, but many companies find Demcon’s technology development difficult.	Some competitors, but they do not pose a major threat as they operate in different ways.	The large competitors are located in the Netherlands. Some are within the region.
		6. Are there any companies from across the border that pose a threat?		
	See above.	No particular companies mentioned, besides ordinary companies selling products across the border.	Also some German competitors, but these operate differently.	Although some German competitors exist, these do not receive a lot of attention.
CB Operations		7. Where are the operations of your company situated? Are they all in one location, or are they distributed? Over the border?		
	ELA-Container mostly in Germany, especially Haren. Also located in 10 other European countries. 5ahead only located in Enschede.	Mostly located in Enschede, but also other technical university cities of the Netherlands. Also located in Münster.	Product development mainly in Rheine, whereas their sales and project engineering departments are spread out through the world.	Located in Enschede and Eindhoven, while their owning company Kendrion is located throughout the Netherlands and Germany.
	ELA-Container is very international, so wants to be located internationally. 5ahead profits from the innovative milieu of the University of Twente across the border.	Demcon is located in these cities because of technical universities and the advantages they bring. Located in Germany to attract work from German customers, Germans like a “German GmbH”.	Central development of technologies, while having regional adaptation and effectively engaging markets through local subsidiaries.	3T was arose from a subsidised initiative at the University of Twente, and is therefore still located in Enschede.
		8. What is the reason for this?		

Table B.1: Company responses to the interview questions (Continued)

	<b>5ahead</b>	<b>Demcon</b>	<b>KTR</b>	<b>3T</b>
CB Employees	<p>9. Do you have any international employees? And if so, from where?</p>			
	Yes, German, Dutch, Austrian, and South-African, each with a different background.	There are many German employees at Demcon Enschede, and there is frequent interaction and cooperation between Enschede and Münster.	One Belgian employee. Besides that no international employees, which is not necessary due to their focus on the Netherlands and Belgium.	A large and growing number of international employees, from countries all around the world.
	<p>10. Where are the majority of your suppliers situated?</p>			
	No real suppliers, only for prototyping, wherever they are from.	Supplier networks mostly in the country of location, but Demcon also has suppliers from over the border.	KTR Benelux does not have suppliers, as production and storage happens centrally in Rheine.	3T does not have a large supplier network as they generally cover the production is sometimes done within the region or anywhere else according to the client's wishes.
CB Suppliers	<p>11. What makes these suppliers interesting for your company?</p>			
	Suppliers need to be fast. Not necessarily the best or cheapest.	Suppliers aid in the production and/or development of products. Dutch suppliers are in general better at developing and German suppliers better at producing.	See above.	Not specified, although the importance of the customer's preference was mentioned.
	<p>12. Does your company collaborate with any institutions such as universities or research institutes?</p>			
CB Institutions	Yes, located on a university campus and engaged in a number of student projects. Not yet any theses opportunities, but very eager to do so soon.	Intensive collaboration with universities in research projects, but also through theses.	KTR Benelux is a sales department, so not much involved in the development of products or research.	3T's roots lie in the University of Twente. The company still collaborates with the institute through sponsorships, thesis supervision and collaboration with study-associations.

Table B.1: Company responses to the interview questions (Continued)

<b>Sahead</b>	<b>Demcon</b>	<b>KTR</b>	<b>3T</b>
13. Have you or has your company engaged in cross-border collaboration projects recently? And do you have any examples?	Contacts with companies in the Netherlands to set up a network, and partnerships with other companies.	Demcon is engaged in cross-border collaboration with companies, illustrated by a recent example relating to the integration of tech.	No recent collaboration. There is sufficient work available in the Netherlands.
14. How do you find or even interact with companies from across the border? Is this different than for local companies?	The existing network and extending it whenever possible.	There are some differences when dealing with German companies. However KTR Benelux generally deals with Dutch and Belgian customers.	In these cases usually the contacts are established through the owner company Kendrion, which has a broad network in Germany.
-			
15. Would your company be open to engage in more collaboration projects?	Sahead is open to more collaboration projects, always looking for new networking opportunities, and collaboration projects with for example the UT.	Yes, always open for “new projects, a new collaboration, and flexible in potential ways of collaboration.”	The company is open to cross-border collaboration, but the interviewee mentioned it needs to make sense. When it does, these collaborations tend to form.
16. Are you familiar with this region’s cross-border organisation EUREGIO and its projects?	Did know EUREGIO. However, more contact with Oost NL. Sahead has engaged in cross-border presentations and events.	Yes, do know EUREGIO but mentioned it is not very applicable to Demcon as a large company.	Yes, but not actively in contact.

CB Collaboration

Table B.1: Company responses to the interview questions (Continued)

<b>Sahead</b>	<b>Demcon</b>	<b>KTR</b>	<b>3T</b>
General CB			
<p>17. Do you believe engaging in cross-border activities gives you a competitive advantage over others in the region that do not do this?</p> <p>Not very applicable to Sahead. However, in general, yes.</p>	<p>Definitely, you need to actively put time, effort and money into that.</p>	<p>You always need to be engaged in a cross-border manner, if you are not then you will be “thrown back”.</p>	<p>That depends on the goals set by the company. However, Germany remains part of the region, and has potential, so it cannot be neglected.</p>
<p>18. Do you see the border as an obstacle that needs to be overcome, or as an opportunity? How does the company think about this?</p> <p>Personally, the interviewee does not see a border, as they speak both languages. However, in general, there is unfortunately a language barrier.</p>	<p>It remains a border that you need to cross. However, since many companies do not cross the border, companies that do dare to cross it can profit from that.</p>	<p>You need to be active across the border. The physical barrier does not exist anymore, the language barrier is decreasing, although a small cultural difference remains.</p>	<p>An opportunity, not an obstacle. Aligned expectations are important in this regard.</p>

Table B.1: Company responses to the interview questions (Continued)