# *Cross-border Collaboration: Enabling Cross-border Clusters to Support Innovation*

**The goal of this research was to investigate the characteristics that enable cross-border collaboration initiatives to develop into cross-border clusters that support smart specialisation strategies. The research focuses on how to remove barriers to traditional collaboration and promote company adherence to smart specialization plans. The analysis is based on a cross-border cluster development project in the Nouvelle Aquitaine-Basque Country-Navarre cross-border area (NAEN). We identified six critical capacities that cross-border collaboration projects must pursue to support the emergence of cross-border clusters. This was done by combining lessons learnt from the case study with theoretical contributions from the literature on territorial competitiveness, clusters, and cooperation.**

*El objetivo de esta investigación es conocer cuáles son las características que permiten que las iniciativas de colaboración transfronteriza se conviertan en clústeres transfronterizos que apoyen estrategias de especialización inteligente. La investigación se centra en cómo eliminar las barreras a la colaboración tradicional y promover la adhesión de las empresas a las estrategias de especialización. El análisis se basa en un proyecto de desarrollo de clústeres transfronterizos en la zona transfronteriza Nueva Aquitania-País Vasco-Navarra (NAEN). Identificamos seis capacidades críticas que los proyectos de colaboración transfronteriza deben perseguir para apoyar el surgimiento de clústeres transfronterizos combinando las lecciones aprendidas del estudio de caso con contribuciones teóricas de la literatura sobre competitividad territorial, clústeres y cooperación.*

Ikerketa honen helburua mugaz gaindiko lankidetza-ekimenak espezializazio adimenduneko estrategiak babesten dituzten mugaz gaindiko kluster bihurtzea ahalbidetzen duten ezaugarriak ezagutzea da. Ikerketaren ardatza da nola ezabatu lankidetza tradizionalaren oztopoak eta nola sustatu enpresak espezializazio-estrategietara atxikitzea. Azterketa Akitania Berria-Euskadi-Nafarroa (NAEN) mugaz gaindiko eremuan mugaz gaindiko klusterrak garatzeko proiektu batean oinarritzen da. Mugaz gaindiko lankidetza-proiektuek mugaz gaindiko klusterrak sortzen laguntzeko lortu behar dituzten sei gaitasun kritiko identifikatzen ditugu, kasuaren azterketatik ikasitako ikasgaiak eta literaturak lurralde-lehiakortasunari, klusterrei eta lankidetzari buruz egindako ekarpen teorikoak konbinatuz.

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## *Table of contents*



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## 1. INTRODUCTION

The consensus that territory matters when it comes to competitiveness and innovation has grown steadily over the past two decades, influenced largely by territory-based concepts, such as regional innovation systems and clusters (Foray, 2015; Alcalde *et al.*, 2017). On the one hand, regional innovation systems (RIS) stress the systemic and place-based nature of innovation while highlighting the importance of interaction between companies and knowledge organisations in producing strong innovation results (Tödtling & Trippl, 2005; Martin & Trippl, 2014), while on the other, clusters emphasize the powerful combination of competition and cooperation among companies and other stakeholders involved in related economic activities in the same geographical area. Both views have been defended by the European Commission and have shaped current regional competitiveness and innovation policy.

The Research and Innovation Strategies for Smart Specialization Research (RIS3) are territory-based innovation policies that involve cooperation between different regional stakeholders (business, government, research and civil society) identifying regional specialization priorities and beyond with other regions to take advantage of complementarities and similarities (Foray *et al.*, 2012).

McCann & Ortega-Argilés (2015) assert that effective smart specialization policies should address the embeddedness of regional activities, encourage relatedness through specialized diversification, and promote connectivity to facilitate knowledge exchange and collaboration within and between regions. Embeddedness emphasizes aligning policies with regional strengths and needs, while relatedness involves diversifying into technologies closely linked to existing capabilities, fostering growth through specialized diversification. Connectivity focuses on enhancing knowledge exchange within and between regions, acknowledging spatial interactions. Interregional cooperation within Smart Specialization Strategies (S3) holds significance for diversification and innovation by introducing new resources, fostering knowledge recombination among actors, and driving innovation through idea generation (Santoalha, 2019). However, there is a limited development of a cross-border or interregional perspective on the Research and Innovation Strategies for Smart Specialisation (RIS3), despite the recent success of the S3 concept in the EU and globally (Santoalha, 2019; Uyarra *et al.*, 2018). The emphasis on the outward-looking aspect and the idea of cooperation in Smart Specialisation has seen limited exploration and application of these concepts at the cross-border or interregional levels (Kruse and Wedemeier, 2022).

The outward-looking approach of Smart Specialisation Strategies (S3) faces challenges due to administrative, political, and institutional obstacles, hindering its effective implementation (Uyarra *et al.*, 2018). This complexity arises from the inherent mismatch between economic policies and administrative boundaries, underscoring the difficulties in seamlessly aligning regional strategies with broader external perspectives.

Similarly, clusters may naturally spill over into neighbouring regions, and global value chains that involve strong production and innovation relationships between neighbouring and other more distant regions. In fact, this is explicitly recognized in the concept of RIS proposed by Cooke (2004, p. 3), who conceptualized RIS as "interacting subsystems of generation and exploitation of knowledge linked to global, national and other regional systems", and underlined the importance of avoiding "lock-ins" within a region.

In Europe, it is a reality that production and innovation capacities are geographically fragmented compared to other parts of the world. Indeed, there is a need to facilitate scaling and achieve a critical mass through collaboration between European regions (Frenken *et al.*, 2007; Neffke *et al.*, 2011; Alcalde *et al.*, 2017). More

generally, interregional collaboration is critical to overcoming the fragmentation of innovation efforts and to ensuring that innovation synergies and opportunities for cross-fertilization between sectors and technologies are fully exploited.

More specifically, as the OECD report (2013) recognized, the potential of cross-border cooperation in terms of innovation represents a qualitative leap in traditional cross-border collaboration practices. It means moving from a competitive paradigm that focuses on the disadvantages and barriers associated with border regions, to a new relational approach that considers the potential of these neighbouring regions for growth through innovation (Lundquist &Trippl, 2013). Innovation is an interactive process involving interaction between companies, educational agents, knowledge infrastructures, and / or communities of users. In a process of this complexity, proximity is decisive when it comes to promoting "face-to-face" interaction, reinforcing trust between agents and giving innovation results a greater impact (Lundvall *et al.*, 1988). In addition, it must not be forgotten that innovation with a cross-border partner requires a degree of openness to the outside, which can be a first step towards internationalization in small and medium-sized companies, or multinational associations. In any case, as in all types of collaboration, the complementarity between the knowledge and technology provided by each of the partners is decisive in determining the potential for generating critical mass and the success of cross-border collaboration.

By contrast, the obstacles to cross-border collaboration – which are closely linked to the type of proximity (geographical, sociocultural, cognitive, institutional, organisational) between the constituent territories of the cross-border region (Lundquist and Trippl, 2013; Makkonen and Williams, 2017; Makkonen *et al.*, 2018, Knoben and Oerlemans, 2006) – have been arranged by the OECD (2013) into three blocks: framework conditions, innovation system and governance and policies (Navarro, 2018).

The **framework conditions** refer to geographic accessibility and territorial planning (rural/urban, population density, etc.), sociocultural proximity (language, organisational practices and values, etc.), and institutional proximity (tax systems, labour markets, etc.)

The **innovation system** is where proximity and complementarity enter industrial structures and knowledge bases, business innovation models, and knowledge infrastructures.

**Governance and policies** refers to administrative structures and powers, organisational structures and other shareholder participation, as well as the culture and orientation of innovation policies.

To tackle the challenge of economic growth, many European territories rely on cross-border cooperation in innovation as a key element of territorial competitive-

ness. There are several cross-border territories that are more advanced in terms of cross-border innovation cooperation due to their strategic vision of collaboration and greater political commitment as well as to the instruments and joint innovation policies that have been developed to guarantee their success.

Territorial cooperation programmes (such as Interreg) are acting as catalysts for cross-border business cooperation in innovation in cross-border areas with a less well- established tradition of cooperation than those mentioned previously (Masana, 2020). For example, in the cross-border areas of Finland-Estonia; the Bothnian Arc; and Hedmark-Dalarna, projects developed around business cooperation in innovation are beginning to germinate as a result of European funding. However, caution should be exercised when using funds from European programmes to drive cross-border cooperation when other sounder motivations exist.

The case study takes place in the cross-border region of NAEN (Nouvelle Aquitaine-Basque Country-Navarre), by conducting empirical research addressing three cross-border clusters' members—mostly small and medium-sized organisations.

Based on the data provided by the members of these three established cross-border clusters, an in-depth exploration of how business cooperation unfolds in the cross-border context is explored while also unveiling six important competences that are needed to put in place for fostering an effective cross-border cooperation to support innovation. Valuable insights from this case might be applicable for regions facing similar circumstances as the notion that small companies, despite geographical proximity, encounter limitations in capacities or mechanisms for collaboration is a recurring theme that we believe may resonate across various contexts. Therefore, our analysis aspires to contribute not just to the understanding of this specific NAEN region but also to offer insights that transcend geographical boundaries, providing valuable guidance for fostering effective cross-border cooperation to support innovation in a variety of settings.

The paper is structured as follows: Introduction, Theoretical framework, Methodology, the Case (and analytical framework), Contribution to the Theory (and discussion), and Conclusion.

## 2. THEORETICAL FRAMEWORK

The contributions to this section came from three research fields.

### 2.1. Territorial Competitiveness

Continuous learning and innovation have become a vital strategy for sustaining competitiveness, growth and prosperity in the face of continued globalisation and rapidly changing technology. Many studies have shown that the regional envi-

ronment plays a critical role in the development of new knowledge and how it is used in the economy. The regional innovation system approach has made significant contributions in this regard, highlighting the critical role of physical proximity and favourable regional institutional arrangements for innovation activities (Trippl 2006; Opazo-Basáez *et al.*, 2020; Sisti & Goena, 2020).

Cross-border areas — that is, regions that span one or more national borders – have increased significantly in number and importance. This broad definition encompasses all types of cross-border contexts, regardless of size, geographical location, history, culture, or socioeconomic status. However, these cross-border locations can also vary widely (Lundquist &Trippl, 2013).

Internal heterogeneity in cross-border areas has a significant impact on the potential for and restrictions to the formation of a well-integrated socio-economic system. Many cross-border regions have very different economic histories, technological trajectories, innovation capacities, institutional setups and positions in their respective countries' regional systems, not to mention different social dynamics, political visions, governance structures, modes of regulation, and cultural identities (Anderson & O'Dowd, 1999; Trippl, 2010).

The phenomena of cross-border regionalization are varied and complicated. Regionalization takes shape along national borders and requires cross-border connections and collaboration between public and private players. The process takes place in a 'grey zone' between civil and public law, with informal and formal networks emerging among a diverse range of actors, from individuals and businesses to universities, industrial organisations, trade unions, political parties, and cultural organisations (Jönson *et al.*, 2000).

The range and degree of impediments and proximities that exist in cross-border regions influence the potential and prospects for successful policy interventions in these areas. While physical distance and some manifestations of institutional distance (such as laws and regulations) can be easily addressed, cognitive distance and cultural or linguistic differences are unlikely to go away and can only be reduced over time, necessitating enormous efforts on the part of policy actors and other stakeholders (Lundquist & Trippl, 2013).

In recent years, research into the openness and interconnectedness of regional systems has amplify these "inward-looking" region-centred views. This new perspective has made its way into policy circles, where it has had a considerable influence on the debate regarding new policy approaches such as smart specialization. Being able to move beyond traditional inward-looking regional innovation strategies that focus primarily on boosting intra-regional connections is a key component of these new approaches (Miöerner *et al.*, 2018).

Adopting a complementary outward-looking strategy to innovation policy and establishing inter-regional collaboration as an element of strategic policy may have a number of advantages, such as increasing the critical mass of players and innovative activities, introducing novel combinations of related and unconnected information, and providing greater access to regionally limited research facilities, production skills, and funding (OECD, 2013; Uyarra *et al.*, 2014).

In order to reap the benefits of inter-regional potential for innovation in cross-border sectors, substantial know-how needs to flow between the neighbouring regions. This can involve such things as purchasing patents, new machinery, knowledge-intensive services, collaborating for innovation through R&D and innovation partnerships, as well as knowledge flows through labour and student mobility, informal interactions, and so on (Trippl *et al.*, 2009).

### 2.2. The literature on collaboration

The importance of cooperation is not a new phenomenon. The benefits of intra- and inter-organisational cooperation in innovation and business profitability have been discussed for years (Hervás-Oliver *et al.*, 2021; Doloreux, & Shearmur, 2022). As posited by Henry Chesbrough (Chesbrough, 2003), companies need to balance their internal innovation capacity (by developing a competitive position based on the exploitation of internal knowledge) with external market agents (by exploring and collaborating with sources outside the company (competitors, customers, technology centres, etc.), which cannot all be generated within the company.

Collaboration, however, is not linear, and researchers have concluded that the final impact of external knowledge acquisition on performance depends on many elements: theoretical assumptions; context; the specifics of knowledge and its sources; the type of innovation; and the type of performance variable analysed (Alcalde-Heras; 2014).

Other scholars have focused on the geographical localisation of the innovation agents businesses inter-act and collaborate with (Fitjar and Rodriguez-Pose, 2013; Parrilli-Alcalde-Heras, 2016). In small economies, for example, foreign collaboration networks allow companies to overcome myopic approaches and seek new resources outside the domestic sphere. However, local networks involve short distances between collaborators, which benefits the generation of externalities in cooperation: short distances allow different agents to meet easily, favours the development and generation of contacts and information, and facilitates the exchange of tacit knowledge (Doloreux, & Shearmur, 2022; Parrilli & Alcalde-Heras, 2016).

Finally, collaboration in cross-border areas has one important particularity: there is a conjunction between the two geographical factors: they are cross-border or foreign collaborations that can be considered close, as they are located a short distance from each other.

### 2.3. The literature on clusters

Researchers argue that spatial clustering of economic entities within the same geographical area (including cross-border areas) promotes the growth of their innovative activity by facilitating knowledge dissemination, mutual learning, and adaptation through the effects of knowledge spillovers (Breschi & Lissoni, 2001; Caragliu & Nijkamp, 2016) and innovation diffusion.

Several scholars (Braczyk, *et al.*, 1998; Roper, 2007) have focused on collaboration between companies located in border regions. Economic inconsistencies and poor levels of human capital characterise border regions (Mitko, *et al.*, 2003; Petrakos & Tsiapa, 2001). As such, cross-border collaboration may play a critical role in bridging the gaps often found in these areas while producing dynamic and beneficial regional growth at the same time (Raposo *et al.*, 2014).

The main source of radical innovation comes from cross-sectoral knowledge spillovers according to Delgado *et al.* (2016) who conducted studies on the spatial-networking of linked businesses (e.g., by inputs, technology, markets, etc.) and found that players who engaged performed better.

Intensified cross-border collaboration strengthens production networks, establishes cross-sectoral clusters across national borders, and kickstarts the creation of a unified cross-border regional innovation system. The strong public interest in cross-fertilization and synergies leads to the emergence of cross-border areas, aided by the execution of bilateral agreements, norms, and laws, as well as by the creation of a unified institutional setting (Mikhaylov, 2019).

Clusters, defined as "*geographical proximate groups of interconnected companies and associated institutions in a particular field, linked by commonalities and externalities*" (Ketels & Huggins, 2011, p.215), are of interest in the development of cross-border alliances for improving competitiveness. Clusters are an innovative type of coopetition, in which rivalry between business partners with partial convergence of goals is regarded as a game that benefits all participants while excluding none of them from the market (Vanhaverbeke, 2001).

Cross sectoral connectivity, which is inherent in the cluster concept, is a crucial determinant for the creation of critical mass for transformative activities (see Foray *et al.*, 2012). Furthermore, clusters frequently bring the players of the quadruple helix together, which is critical for cooperative leadership in the entrepreneurial discovery process. In a strong parallel to the definition of clusters, Foray (2015) concludes that a mid-grained level of aggregation – the level at which activities group together a certain number of firms and partners who collectively explore and discover a new pathway to transformation – should be given preference in the process of developing and implementing RIS3.

However, cross-border industry clusters are seldom explored in the literature, and there is only a fundamental grasp of cross-border industry clustering. Clusters are not bound by borders, but are frequently spread throughout many areas, facilitating cross-regional collaboration, which is typically advantageous for achieving critical mass in transformational operations. These considerations highlight the importance of cluster initiatives as an organised version of the cluster concept in the development and implementation of RIS3 (Lazzeretti *et al.*, 2019). Clusters are also seen as typical benefactors and direct recipients of RIS3-enhanced innovation. Indeed, RIS3 is seen as "*an inevitable by-product*" of "creating a thriving inventive cluster" (Foray, 2015, p.59); and the whole process of identifying and collaboratively examining new areas of possibility "*may provide the basis for [new] local resource concentration*," (Foray, 2015, p.15). This viewpoint emphasises RIS3's ability to stimulate entrepreneurship, spillovers, and innovation at the cluster level.

## 3. METHODOLOGY

A case study was used in the empirical part of this paper because it considers the contextual conditions pertaining to a phenomenon (Yin, 2009) and helps understand present dynamics in specific contexts (Eisenhardt, 1989; Yin, 2009). Flyvbjerg (2006) examined common misconceptions about case studies and concluded that social science could benefit from a greater number of good case studies. Following his arguments, we believe that single cases with context-dependent knowledge can contribute to the theory too. The analytical framework presented in this paper is not a normative piece on how interregional collaboration should be, but we do consider that it provides a consistent framework for practitioners to reflect on their practice and also represents a contribution towards integrating ambidexterity in policy network theory. Moreover, despite the belief that case studies are difficult to summarise, we have constructed an analytical framework for doing so. Consequently, the approach to case studies adopted in this paper and inspired by Flyvbjerg (2006) bridges the gap between theory and practice by seeking relevance not only for academics but also for practitioners and opening the way for new analysis in other cases. The methodological approach for bridging theory and practice proposed by Flyvbjerg (2006) is action research and praxis, materialised through a co-creative process where researchers bring mostly theoretical knowledge from the field and practitioners provide mostly experiential knowledge. The analytical framework is then constructed through a discussion of concrete problems using the theoretical concepts.

The Competitiv'eko project implemented in the Nouvelle Aquitaine-Basque Country-Navarre cross-border area (NAEN) from 2016 to 2019 is funded by POCTEFA,the European territorial cooperation programme aimed at strengthening the economic and social integration of the area. A collection of intermediate business, regional development and research partners from the NAEN cross-border re-

gion were responsible for developing the Competitiv'eko project. These included the Bayonne Chamber of Commerce – who were in charge of the project – the Gipuzkoa Chamber of Commerce; the Development Agency of Navarre, Sodena; and Orkestra, the Basque Institute of Competitiveness, a research centre that specialises in regional competitiveness.

The project drew attention around Europe as a successful example of Smart Specialisation-based cross-border cooperation at a time when the debate on the future of interregional cooperation for the period 2021-2027 was in full swing. In 2018, the project partners attended different events across Europe where they presented the results as a local, cross-border, interregional example of cooperation that combined RIS3 with industrial activities. The same year, they also took part in a discussion on regional development through Smart Specialisation for cross-border regions, and explained how cooperation on Smart Specialisation was already happening in the NAEN cross-border area. In 2020, the project was nominated for a REGIOSTARS award for innovative good practice in regional development, and was considered a potential inspiration for other regions and project managers.

As it is later described in the case study description, three cross-border clusters, referred to as Klusteuro clusters, were established within the Competitiv'eko project in distinct areas to cultivate an ecosystem for cross-border collaboration among companies and organizations. These areas were strategically chosen based on the synergies and complementarities outlined in the respective regional Smart Specialization Strategies of the involved regions. The identified areas of focus encompassed additive manufacturing, artificial intelligence, big data, and medical devices, as detailed in Alcalde and Lorenz (2019).

These three Klusteuro clusters formed the foundation for an in-depth exploration of how business cooperation unfolds in the cross-border context. The investigation delved into the expectations of organizations participating in these clusters concerning innovation and cross-border collaboration. Additionally, the study examined the clustering aspects perceived as opportunities for overcoming barriers to cross-border cooperation.

The empirical research methodology employed a combination of questionnaires and online interviews administered to organizations actively involved in the Klusteuro clusters. Qualitative information was gathered during a mid-term webinar, providing a platform for participants to reflect on the challenges and barriers to cross-border cooperation. All the Klusteuro members were individually approached through personalized emails or phone calls by both the cluster facilitators and the Orkestra team.

Thus, the 36 entities that comprise Klusteuro constitute the study universe, sixteen of which actively participate in the online questionnaire. Among the Klusteuro clusters, participants from the cluster on additive manufacturing had the highest

level of participation, representing more than half of the sample, a third of the organizations were participants of the medical devices cluster and the rest members of the Big data cluster.

The majority of the questionnaire respondents' organizations were situated in New Aquitaine and the Basque Country, with 43.75% each, while only 12.5% were based in Navarre. Over half of the surveyed organizations had more than 50 employees, a quarter had between 6 and 15 employees and the rest up to 5 employees.

The collected data serves as a valuable source of information, offering insights into the expectations of organizations with a medium-term track record in participating in cross-border clusters. This dataset forms the basis for understanding the key features required to strengthen cross-border cooperation.

Different sources were used to collect the data for this study. Workshops were held with network managers where they discussed their challenges from a theoretical perspective, which informed the construction of the analytical framework.

Following the first draft of the framework, in order to collect specific data on the proposals it made, in-depth semi-structured interviews were conducted with the network managers between 2019 and 2021. The interviewees later sent quantitative data and complementary documents (reports and presentations), which were also used for the case study.

## 4. INTRODUCTION TO THE CASE STUDY

### *Background, aims and scope of the Competitiv'eko project*

As noted by Alcalde and Lorenz (2019), the Competitiv'eko project came about in response to a number of challenges previously detected at both the European and local levels in the NAEN cross-border area. Firstly, some scholars were concerned about fragmentation in the region's innovation efforts and pointed to interregional cooperation as a means of overcoming it (Frenken *et al.*, 2007; Neffke *et al.*, 2011; Alcalde *et al.*, 2017). Secondly, through their work fostering cross-border cluster collaboration between 2013 and 2016 and the interaction with cluster organisations from both sides of the border, the researchers observed that despite the cluster associations' efforts for encouraging cross border cooperation, there were still low levels of business cross-border collaboration and awareness of the business and technological resources that were available on the opposite side of the border. In the course of the three-year study, they examined the competitive factors and constellation of actors involved in fostering cross-border collaboration with a view to providing better insight into cross-border territorial competitiveness. Some of this work involved analysing innovative activity by studying patents, as well as analysing economic specialisation and clusters. The findings sparked a conversation among the actors in the cross-border territory (i.e. the Chambers of Commerce, clusters, local develop-

ment agencies, and companies, among others) that came up with the conclusion that in order to foster real collaborative projects, it would be necessary to work directly with the business field to delve into their motivations for engaging ion cross border cooperation. As Alcalde and Lorenz reported (2019), the analytical studies were used as a catalyst for reflecting on potential areas for cross-border inter-cluster collaboration. One of the main conclusions of the research was that cluster-based cross-border cooperation was not producing the expected results in terms of identifying concrete projects. Therefore, to move forward with the implementation of real collaborative projects, there was a need to explore and experiment directly with the business field.

***Stages of the Competitiv´eko project***

Launched in early 2017, the Competitiv'eko project aimed to analyse the region's territorial competitiveness and diagnose its business innovation needs. The objective was to lay the foundations for a sustainable model of cross-border business collaboration. One of the criteria considered when designing the project was to look for synergies in existing public resources for industrialisation and innovation policies (RIS 3 strategies) in the territories in question. In particular, this allowed a shift from a competitive paradigm based on the barriers and disadvantages associated with border regions, to a new relational approach that took into account the potential of these neighbouring regions to grow through innovation. The analysis of the regions' territorial competitiveness and RIS3 policies allowed potential areas of joint collaboration to be identified. This ultimately turned out to be useful for identifying broad areas of cooperation, but proved limited when making decisions on which specific areas might be of greater business interest.

For this reason, a selection and prioritisation process was designed to ensure that the process incorporated multiple perspectives and that the areas of action were defined as precisely as possible. This second phase involved around 80 organisations working with the Competitiv'eko project partners to create cross-border value chains in the three areas of interest (big data, advanced manufacturing and medical devices). The process of co-creating value chains involved a first phase to identify the relevant actors, technologies and capacities, and to understand how they were interrelated. The second phase was complemented with a bottom-up approach to identifying the innovation needs of the companies (see Table 1) involving 116 interviews held in companies, technology centres and clusters in the three territories.

*Table 1.* **IDENTIFICATION OF AREAS OF CROSS-BORDER SPECIALISATION: TOP-DOWN AND BOTTOM-UP SELECTION PROCESS BASED ON THE INITIAL RIS3 ANALYSIS**

| | STAGE 1: AREAS OF CROSS-BORDER SPECIALISATION[(a)] (PRELIMINARY INTEREST) | STAGE 2: APPROACH TO THE SELECTION OF NEEDS | | STAGE 3: FINAL SELECTION |
|---|---|---|---|---|
| | | Top down | Bottom -up | |
| AREA OF SPECIALISATION 1 | Advanced manufacturing | Advanced manufacturing – Automobile / Electric vehicle / Light materials / Mobility – Sustainable development) | 16 themes grouped into 4 fields (top-down) | ADDITIVALLEY: Cross-border consortium of knowledge and multisectoral supply in Additive Manufacturing |
| AREA OF SPECIALISATION 2 | Energy | Energy (Onshore Wind / Storage / Offshore Wind / Smart Grids) | | |
| AREA OF SPECIALISATION 3 | Health | Health (Medical Devices / Advanced Manufacturing / E-Health / Big Data (cross-cutting theme) | | INNOVMEDICA ALLIANCE: cross-border consortium of innovative tailor-made solutions in health |
| AREA OF SPECIALISATION 4 | Agro-food | Agri-food (advanced manufacturing agri-food industry / Big Data / Conservation techniques (freezing) / Energy-Health Combination / 4th range (raw ready for use) and 5th range (cooked)) | | AGRO-FOOD DIGITAL: Cross-border consortium for the digitalisation of agri-food with a healthy-functional-personalised focus |
| METHODOLOGY AND TYPE OF ANALYSIS | Qualitative analysis (RIS3) | Reflection dynamics (strategic and piloting Committees) | Qualitative analysis (116 interviews) | Internal reflection of the consortium to define priorities for Competitiv'eko [(b)] |

*(a) The analysis identified specific spaces of interest in detail and divided by the different regions. This column reflects the domain titles as defined at the time.*

*(b) For each of the 16 areas of interest, aspects such as the impacted sectors, the transversal axes, the key technologies KEY ENABLING TECHNOLOGIES (KETs) impacted, and the existing driving and innovative companies were analysed.*

*Source:* Own elaboration.

During the third phase, which took place from the end of 2017 to mid-2018, the consortium worked closely with companies and science and technology centres to build cross-border clusters. This involved the joint process of creating the clusters, identifying shared objectives, and establishing roadmaps for potential collaboration. The sequence of this co-creation process is described on Table 2. The cooperative nature of the approach unveiled innovative and collaborative business opportunities for different socioeconomic agents, with the sustainability of the clusters constantly in mind. In other words, the participative process produced much more than a one-off solution for the development of a particular product or service. Through constructive dialogue, the advantages of collaboration were used to generate mutual and collective knowledge, and advance in the development of the dynamic capacities necessary for a new competitive phase (Cavazos, 2016).

*Table 2.* **COMPETITIV'EKO CO-CREATION PROCESS**

| YEAR | NUMBER WKS | WORKSHOP OBJECTIVES | INNOMED CONSORTIUM | BIG DATIA (*) | ADDITIVALLEY |
|---|---|---|---|---|---|
| 2017 | 1 | Introduce Competitiv'eko mission and objectives.<br>Identify working teams. | 4th October 2017, Bayonne: 36 organisations. | 7th November 2017, Pamplona: 28 organisations | 12th December 2017, Donostia: 67 organisations |
| 2018 | 2 | Meet the participating organisations.<br>Identify issues of joint interest. | 1st March 2018, Pamplona: 51 organisations | 18th February 2018, BIG DATA, Donostia, 12 organisations | 21st March 2018, Bayonne: 43 organisations |
| | 3 | Presentation cluster adhesion conditions.<br>Outline the action plan. | 3rd October 2018, Bayonne: 28 organisations | 12th June 2018, Bidart: 14 organisations | 11th September 2018, Pamplona: 29 organisations |
| | 4 | Constitution of the cluster.<br>Share development of the action plan. | 20th November, Pamplona: 25 organisations | 20th September, Pamplona: 14 organisations | 13th December 2018, Donostia: 23 organisations |

.../...

| YEAR | NUMBER WKS | WORKSHOP OBJECTIVES | INNOMED CONSORTIUM | BIG DATIA (*) | ADDITIVALLEY |
|---|---|---|---|---|---|
| 2019 | 5 | Constitution of the cluster. Share development of the action plan. | 12th February 2019, Donostia: 24 organisations | | 10 & 11 April 2019, Donostia: 26 organisations |
| | 6 | Hybridization and synergies. | 29th January 2019, Bayonne | | |

** Some institutions belong to more than one cluster.*

*Source:* Own elaboration.

The cross-border clusters created during the co-creation process focused on specific industries and business areas and addressed the innovation needs of potential cross-border collaborations. The three clusters were created in 2019 and each of them addressed a different thematic area related to smart specialisation strategies.

By the time the project finished in May 2019, a core group of member organisations had committed to paying a yearly membership fee of between 437 and 1,875 euros –depending on their size – to the three clusters. The clusters remain open to new members. Currently, they are funded by the Nouvelle-Aquitaine – Euskadi – Navarre Euroregion (NAEN Euroregion)[1], whose mission it is to develop the cross-border area. The Chamber of Commerce, Sodena and the NAEN Euroregion are responsible for facilitating cross-border business cooperation among the three clusters collectively known as Klusteuro[2]. The members meet every two weeks to share information and make decisions on cooperation priorities and needs. They continue to identify new opportunities for internationalisation and growth in the cross-border areas of interest; organising networking activities to detect new industrial, commercial and technological opportunities in the area; connecting cluster members with opportunities; and, raising awareness of the cluster within the NAEN cross-border region and beyond (through a dedicated website, visits to fair trades and catalogues, etc.).

1 The Euroregion NAEN is an EGTC, which is defined as: "a European legal instrument designed to facilitate and promote cross-border, transnational and interregional cooperation. Unlike the structures which governed this kind of cooperation before 2007, the EGTC is a legal entity and as such, will enable regional and local authorities and other public bodies from different member states to set up cooperation groupings with a legal personality." Extracted from https://ec.europa.eu/, 22 December 2021.

2 https://www.klusteuro.eu/en/

### *Results*

We studied the impact of the Klusteuro cluster group and identified the lessons learnt for the future development and implementation of similar cross-border initiatives. Quantitative methodology was used involving a telephone survey of the participating companies and organisations. The fieldwork took place between October and November 2021.

*Table 3.* **THE THREE CROSS-BORDER CLUSTERS OF COMPETITIV'EKO**

| | CROSS-BORDER AREA OF INTEREST | PARTNERS | TOTAL NUMBER OF INSTITUTIONS (2021)* | TOTAL NUMBER OF INTERVIEWED INSTITUTIONS |
|---|---|---|---|---|
| ADDITIVALLEY | Advanced manufacturing - additive manufacturing | Companies, technology and training centres and clusters | 8 | 9 |
| BIGDATIA | Advanced manufacturing - big data and artificial intelligence | | 13 | 2 |
| INNOVMEDICA ALLIANCE | Health - medical devices | | 15 | 5 |

** Some institutions belong to more than one cluster.*

*Source:* own elaboration.

The following table shows the reasons the member organisations of the cross-border cluster gave in the survey for participating in the cluster (1 being 'not very important' and 5 being 'very important').

The highest scores are highlighted in green. As the table suggests, the main reason the ADDITIVALLEY and INNOVMEDICA ALLIANCE clusters gave for joining was to 'work together towards shared objectives' while BIG DATIA cited 'information exchange' as their main motivation.

*Table 4.* **REASONS FOR PARTICIPATING IN CLUSTERS**

| | INFORMATION EXCHANGE | ALIGNING ACTIVITIES FOR EFFECTIVE RESULTS | SHARING RESOURCES TO ACHIEVE SHAREABLE RESULTS | WORKING TOGETHER WITH SHARED OBJECTIVES |
|---|---|---|---|---|
| ADDITIVALLEY | 4,1 | 3,67 | 3,56 | 4,33 |
| BIGDATIA | 4,50 | 4,00 | 3,50 | 3,50 |
| INNOVMEDICA ALLIANCE | 4,20 | 3,40 | 4,20 | 4,60 |

*Source:* Own elaboration.

The following tables summarise the results of the survey of the member organisations of the cross-border clusters. Table 5 shows how important the organisations consider each cross-border barrier (1 being 'not very important' and 5 being 'very important'); and the importance of participation in the clusters in overcoming them (1 being 'not at all important' and 4 being 'decisive).

Regarding barriers to cross-border collaboration, the organisations deemed that participation in the three clusters helped them bridge organisational and social barriers, in other words, barriers to social networking in general. This is consistent with the literature which posits that physical distance and certain manifestations of institutional distance (such as laws and regulations) can be easily dismantled, but cognitive distance and cultural or linguistic differences can only be reduced over time, requiring enormous effort on the part of policy actors and other stakeholders (Lundquist & Trippl, 2013).

According to the organisations interviewed in the ADDITIVALLEY cluster, clustering has helped to overcome the 'geographical barrier', defined here as border and customs formalities, and travel times. Meanwhile, the organisations in the BIGDATIA cluster felt that participation had helped them to overcome institutional and cultural barriers, such as laws and regulations, access to support from local and regional authorities and local business associations (chambers, clusters, agencies, etc.), as well as language barriers, and differences in business culture, norms, values and customs.

*Table 5.* **CLUSTERING AS AN OPPORTUNITY TO OVERCOME BARRIERS TO CROSS-BORDER COOPERATION**

| | IMPORTANCE OF GEOGRAPHICAL BARRIERS BEFORE CLUSTERING | CLUSTERING HELPS TO FACE GEOGRAPHICAL BARRIERS | IMPORTANCE OF INSTITUTIONAL AND CULTURAL BARRIERS BEFORE CLUSTERING | CLUSTERING HELPS TO FACE INSTITUTIONAL AND CULTURAL BARRIERS | IMPORTANCE OF TECHNOLOGICAL AND EDUCATIONAL BARRIERS BEFORE CLUSTERING | CLUSTERINGS HELP TO FACE TECHNOLOGICAL AND EDUCATIONAL BARRIERS | IMPORTANCE OF ORGANIZATIONAL AND SOCIAL BARRIERS BEFORE CLUSTERING | CLUSTERING HELPS TO FACE ORGANIZATIONAL AND SOCIAL BARRIERS |
|---|---|---|---|---|---|---|---|---|
| ADDITIVALLEY | 1,81 | 2 | 2,43 | 2,39 | 2,15 | 1,81 | 1,94 | 2,83 |
| BIGDATIA | 2,13 | 1,8 | 2,17 | 2,3 | 2,4 | 1,93 | 1,8 | 3,1 |
| INNOVMEDICA ALLIANCE | 2,15 | 1,89 | 2,47 | 2,37 | 2,22 | 1,7 | 1,72 | 2,61 |

*Source:* Own elaboration.

Table 6 shows how Klusteuro members ranked each type of innovation in terms of the degree of intensity with which it was being developed within the organisations before joining the cluster (1 being 'not intensively at all'; and 4 being 'very intensively'); and also in terms of the importance of each type of innovation in the cluster (1 being 'not important at all'; and 5 being 'very important').

Regarding how cross-border collaboration stimulates innovation, the members of the three clusters considered that participating in a cluster is an opportunity to innovate products and/or services. As Uyarra *et al.* (2014) states, cross-border collaboration involves increasing the critical mass of players and innovative activities, as well as creating novel combinations of related and unconnected information, increasing access to regionally limited research facilities, production skills, and funding.

The medical devices cluster (INNOVMEDICA ALLIANCE) also gave its members the opportunity to innovate their business models (production, distribution

and commercialisation), organisation (new business practices for organising procedures, work methods and decision-making, as well as new ways of organising external relations) and marketing (product design, product positioning and promotion pricing). Finally, being part of the BIGDATIA cluster was seen as an opportunity to develop organisational innovation.

In general, the organisations surveyed had innovated much more in products and services than in other areas before joining Klusteuro. The organisations also reported medium intensity innovation in product design and production methods (a type of organisational innovation). However, while organisational innovation, business model innovation, and marketing strategy innovation were not common in the organisations surveyed, they were identified as targets that should be developed in the cluster. In other words, the opportunity to try out new, more unusual types of innovation (other than product and service innovation) motivates these organisations to participate in cross-border clusters. Finally, regarding product and service innovation, the fact that the organisations that took part in the survey were members of cross-border clusters means they already attached great importance to product innovation, followed by service innovation.

*Table 6.* **CLUSTERING AS AN OPPORTUNITY FOR INNOVATION**

| | PRODUCT OR SERVICE INNOVATION BEFORE CLUSTERING | CLUSTERING AN OPPORTUNITY FOR PRODUCT OR SERVICE INNOVATION | BUSINESS MODEL INNOVATION BEFORE CLUSTERING | CLUSTERING AN OPPORTUNITY FOR BUSINESS MODEL INNOVATION | ORGANIZATIONAL INNOVATION BEFORE CLUSTERING | CLUSTERING AN OPPORTUNITY FOR ORGANIZATIONAL INNOVATION | MARKETING INNOVATION BEFORE CLUSTERING | CLUSTERING AN OPPORTUNITY FOR MARKETING INNOVATION |
|---|---|---|---|---|---|---|---|---|
| ADDITIVALLEY | 3,17 | 3,78 | 2,07 | 1,67 | 2,22 | 1,93 | 1,89 | 1,5 |
| BIGDATIA | 3,6 | 3,8 | 2,27 | 2,13 | 2,27 | 2,4 | 1,65 | 1,55 |
| INNOVMEDICA ALLIANCE | 3 | 4,11 | 2 | 2,07 | 2 | 2,44 | 1,67 | 2,17 |

*Source:* Own elaboration.

## 5. CONTRIBUTION TO THE THEORY

This section presents the analytical framework which contributes to the theory on cross-border collaboration and describes the features that influence the emergence of cross-border industry clusters. We do not propose this framework as a recipe, but rather as a tool that can invite reflection on some meaningful features of cross-border collaboration. Following the method described in the Methodology section, this framework combines lessons learnt from the case study with theory from the literature on territorial competitiveness, clusters, and cooperation.

In our case study, cross-border industry clusters are considered live, dynamic platforms of connected knowledge-based activities shared by complementary partners in a close geographical environment, where success lies in the opportunity to leverage the expertise of its members to enhance the overall competitiveness of the group.

On the basis that cross-border collaboration provides the necessary support for cross-border clusters to emerge successfully, we propose the following competences as the ones cross-border collaboration projects should pursue to foster innovation and overcome traditional cross-border collaboration barriers:

- Adaptability: As different analysts claim, when promoting cross-border collaboration initiatives, it is important to give companies a greater role, as divergences in business and regional priorities may arise due to territorial competition logics, as happened in the case of Competitiv'eko. This is why it is important to combine bottom-up and top-down analyses so as to identify specific opportunity niches which would be considered win-win situations by all the territories involved. This is related to the concept of shared leadership (Alcalde-Heras *et al.*, 2020) defined as a collective process where sole leaders or absolute power have no place, and participants feel part of the system because of the collaborative process. This sense of belonging facilitates recognition of responsibility in critical or conflict situations. As Sotarauta (2005) states, it is this sharedness or dispersedness among the actors that causes the mission to be accomplished.

- Territorial connection: The exploration of the cross-border RIS3 analysis was perceived as an important tool for identifying shared innovation opportunities and facilitating the creation of cross-border value chains. Since the European Commission promoted the Research and Innovation Strategies for Smart Specialisation (RIS3) as a framework for territorially-based innovation policy in 2016, these strategies have been at the centre of the comparative analysis of the business conditions of the three territories (Foray, 2012). As argued in Alcalde and Lorenz (2019) and Lorenz and Oleaga (2020), the regional innovation strategies set out in each regional RIS3 of the NAEN cross-border area reflect regional choices made based on regional strengths, and can therefore be a good starting point for identifying cross-border business opportunities. Understanding and reflecting on

the similarities, differences and implementation trajectories of these strategies were key in identifying potential areas for cross-border cooperation in the project. Ferraro and Costamagna (2000) outline the important role that connections and relations between institutions can play in local development processes. In the same vein, according to Alcalde-Heras *et al.* (2020), well-articulated synergy-based behaviour on the part of institutions diminishes uncertainty, fosters learning processes, and encourages knowledge exchange and the development of competences. To this end, through its Strategic Committee, Competitiv'eko set up a cross-border policy dialogue space to facilitate dialogue on policy, the sharing of knowledge and territorial interests regarding cross-border collaboration opportunities. The Committee – which still exists – was made up of senior officials from the three regional governments with competences in regional specialisation strategies and / or economic development. The space acts as a forum for knowledge sharing and discussion on territorial policy interests regarding opportunities for cross-border collaboration.

- The network management group profile: This feature of the analytical framework emerged from a discussion with network managers on how their professional capacities affected the development of the project. Significant differences in the professional backgrounds of the managers in the group were apparent from the outset of the study. The diversity of their backgrounds – which included Chambers of Commerce, public administration, and universities (research institutes) – ensured a good balance of technical and analytical know-how within the group, allowing the project to pursue direct and immediate impact in the short term, while building a solid analytical base for long-term sustainability (Alcalde *et al.*, 2020).

- Facilitation: The aim of facilitation is to create trustful relationships among the organisations located within the geographical border. As such, the Chambers of Commerce and Sodena were responsible for facilitating and networking, and identifying business capabilities on both sides of the border. Specifically, the project began by bringing together partners based on mutual interests, and sharing and understanding all the partners' motivations, strengths and weaknesses with a view to identifying a basis for developing the collaboration. This facilitation process was critical to advancing cooperation between the companies and accomplished the following: it explored potential collaborations, encouraged discussion among the different stakeholders, helped reach conclusions (finding common ground), improved communication and transparency between all the parties, and arranged the necessary connections and mediation and negotiation skills. As we have already seen, the facilitator's role is expected to be able to bring about change and move things forward by: creating value-supporting trustful relations, fostering transparency of information and providing a strategic course of action for developing cross-border clusters (Williamson & Meyer, 2012).

- Openness: Throughout the project a strong emphasis was placed on identifying real innovation needs on which to base cross-border collaborations. Around 2,000 people from over 250 organisations (companies, knowledge organisations, government and civil society representatives) were involved in the exchange of knowledge and ideas, by participating in workshops, meetings and virtual meetings and reflecting on technologies, competences and qualifications, as well as on business models and future market needs. Following this exchange of ideas, areas of joint opportunity and potential innovation projects were identified. One particularly noteworthy aspect was the project's success at integrating a wide and diverse range of partners (from research centres, universities, Chambers of commerce, business associations etc.) who contributed a combination of analytical and technical expertise. This made it possible to build an ambidextrous cluster capable of benefitting from identified opportunities, and exploring future opportunities by connecting with other socioeconomic areas (Alcalde *et al.*, 2020). Network composition in terms of partner diversity has already been studied in the literature on collaboration (Parrilli and Heras, 2016; Perry-Smith, 2006). Homogeneous members tend to provide a type of knowledge that can lead to competency traps and a lack of novel sources (Boschma, 2005), while membership diversity facilitates the innovative process by enabling the network to make novel associations and links (Cohen and Levinthal, 1990). Thus, having a variety of organisational profiles is more effective in terms of discovering new activities and markets (Nieto and Santamaría, 2010), while homogeneous networks are more likely to remain focused on working on current market opportunities.

- Accelerators: The role of accelerators is to provide companies with fast returns on investment in order to capture value from the collaboration initiative. This capability involves supporting the development of new business, i.e., providing a battery of services, preparing the organisation for scalability, liquidity and longer product lifecycles (Chesbrough 2012). Similarly, according to the definition developed by Cohen and Hochberg (2014), accelerators can provide training, mentoring, connections and access to financial resources through small-scale impact investors, not only for new ventures but also at different stages of a firm's life cycle. In our case study, we observed companies hosting networking activities to get to know the industrial, commercial and technological opportunities available in the area; connecting opportunities with capabilities within the cluster's member institutions; and actively raising awareness of the cluster within the NAEN cross-border region. Regarding funding, the Euroregion has co-financed – together with private contributions from 26 partners – the new start-up stage of the clusters that have in operation since 2019.

## 6. CONCLUSION

Territorial cooperation programmes (such as Interreg) act as catalysts for cross-border business cooperation in innovation in cross-border areas (Masana, 2020). Cross-sectoral connectivity, an inherent aspect of the cluster concept, is a crucial determinant in the creation of critical mass for transformative activities (Foray *et al.*, 2012). Furthermore, clusters frequently bring the players of the quadruple helix together, which is critical for cooperative leadership in the entrepreneurial discovery process. However, cross-border industry clusters are seldom explored in the literature, and there is only a fundamental grasp of cross-border industry clustering. Clusters are not bound by borders, but are frequently spread over several different areas, facilitating cross-regional collaboration, which is typically advantageous for achieving critical mass in transformational operations. These considerations highlight the importance of cluster initiatives as an organised version of the cluster concept in the development and implementation of S3 (Lazzeretti *et al.*, 2019). In this study we attempted to explore the features that allow cross-border collaboration initiatives to evolve into cross-border clusters, overcome traditional collaboration barriers and support business adhesion to smart specialisation strategies. Specifically, by combining lessons from the case study with theoretical contributions from the literature on territorial competitiveness, clusters, and cooperation, we identified six important competences – adaptability, territorial connection, profile of the network management group, facilitation, openness, acceleration – that cross-border collaboration projects must pursue in order to support the emergence of cross-border clusters (Miörner *et al.*, 2018).

The proposed features for the emergence of cross-border industry clusters and their role in the cross-border dimension offer fertile ground for further exploration within the smart specialization literature. In particular, the framework closely aligns with the principles outlined in the Smart Specialisation conceptual framework by McCann and Ortega-Argilés (2015). Consequently, several potential future research areas emerge:

First, by exploring how to recognize and accommodate divergences in business and regional priorities, stakeholders can navigate territorial competition logics and identify mutually beneficial opportunities. This approach resonates with the concept of *embeddedness*, which underscores the importance of integrating economic activities within the local context. Second, leveraging regional innovation strategies as a foundation for collaboration, stakeholders can capitalize on existing regional strengths and opportunities while also addressing common challenges. This emphasis on shared priorities and opportunities reflects the *relatedness* principle, which advocates for diversifying into technologies closely aligned with existing regional capabilities. Finally, the network aspect highlights the importance of diversity in expertise and experience within collaboration initiatives. By bringing together individuals from various professional backgrounds, including firms, Chambers of Com-

merce, public administration, and universities, collaboration efforts can benefit from a rich blend of technical and analytical know-how. This diversity aligns with the *connectivity* dimension, which emphasizes the importance of knowledge exchange and collaboration within and between regions.

In spite of being an exploratory analysis, we should underscore the novelty of this initiative within our territory, considering that the pursuit of cross-border innovation within the business field is relatively limited and has been an emerging effort in recent years. Furthermore, unlike European initiatives that primarily concentrate on expansive interregional partnerships, this initiative specifically targets small companies. These smaller entities often fall outside the purview of broader policies, particularly those initiated at the European level. The organizational capacities of these smaller companies lag behind their larger counterparts, and frequently, clusters play a pivotal role as staunch supporters of these smaller enterprises.

Regarding the significance of this initiative beyond our region, the added value lies in comprehending how we can enhance support for these companies and organizations. This scenario might be replicated in other cross-border territories, where geographical proximity allows for effective cooperation, yet there may be limited capacities or limitations and future implications of the study.

While single case studies have limitations in terms of direct generalisation, detailed analysis of concrete experiences in a specific context offers opportunities for learning and provides information that is applicable to other places. In this respect, the detailed analysis of the Competitiv'eko case provides interesting insights that could be used as a benchmark for other networks and territorial contexts. Indeed, it would be interesting for future research to explore whether or not the networking capacities underlined in this specific Interreg cross-border project are relevant to other international projects and/or organisations working in different industrial/business areas or regional contexts. Additionally, it is considered that future research could advance in the identification of the role of interregional cooperation in value chains.

From a policy-making and a business practice perspective, some critical implications can be drawn. The results may help to design more effective cross-border policies aimed at achieving feasible results and that stress the importance of using collaboration strategies to enhance firms' competitiveness. Finally, this study may also help managers of inter-regional networks to identify potential weaknesses in collaboration projects and design effective governance mechanisms.

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