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## Cross-border cooperation to strengthen innovation and knowledge transfer: An Iberian case

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This study seeks to find out the main achievements of a cross-border cooperation project (INESPO III) in terms of innovation and university-firm knowledge transfer in a region situated in the central region of Portugal and Castile and León, Spain. To achieve this aim, research of a qualitative and exploratory nature was chosen, that is, case study method. Data collection was based on seven interviews with several project actors, and content analysis was also used. Through interviews with project beneficiaries, empirical evidence suggests that this type of cooperation allows access to new sources of external knowledge, with the network benefiting globally from each partner's type of specialization. This study makes an important contribution to the literature on cross-border cooperation by extending its field of research to knowledge transfer and innovation, analysing a project that has produced good results. It can be determinant for government institutions responsible for administering cross-border incentive systems, and for partner networks in drawing process of similar projects for benefit of their own regions, besides the clear academic interest in business cooperation networks. Final results and main contributions of the project are also presented.

**Keywords:** cross-border cooperation; cross-border regions; innovation; knowledge transfer; networks

### 1. Introduction

The concept of Cross-Border Region (CBR) has gained prominence in politics and academic discourse in various areas, such as management, geography, sociology, international relations and political and international economy (Medeiros 2015; Perkmann and Sum 2002). These regions represent around 40% of the total population and 60% of the European Union (EU) territory and have considerable relevance at various levels (Sousa 2013). For Perkmann and Sum (2002), the CBR is a territorial unit comprising various adjoining sub-national units between two or more countries, while Perkmann (2003, 156) defines it 'as a more or less institutionalized collaboration between contiguous sub-national authorities across national borders'.

Various CBRs share connections, history and cultural elements, as a consequence of globalization. Irrespective of their size, level of organization, development and financial capacity, these regions are being established to cope with social and economic problems in order to attract investment, carry out large-scale infrastructure projects and obtain

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equipment, exchanges and political stability (Klatt and Herrmann 2011; Sousa 2013; Tosun et al. 2005).

Furthermore, the single European market has created opportunities, incentives and financial support for this new type of cooperation, where the aim is to eliminate barriers associated with borders, achieve integration and territorial cohesion, with exponential cross-border movements and a delineated strategy being seen in recent years (Kurowska-Pysz et al. 2018; Sousa 2013).

In this context, numerous programmes and initiatives have been launched with the express aim of opening up new spatial perspectives for cooperation between cities and regions in various domains of economic development and regional policy, creating communities that aim to spread innovation, promote economic development, firm creation and strategies to revitalize the territory (Interreg 2015; Medeiros 2010; Scott 2010; Scott and Liikanen 2010; POCTEP 2019).

In this connection, in 1990, the European Community launched the INTERREG cross-border cooperation (CBC) programme to break down barriers in territories and prepare them for the challenges of integration. The aim is Cooperation, Collaboration and Community Engagement, providing better political practices and creating an environment and opportunities for innovation, in the belief that levels of regional development can be achieved through cross-border cooperation and exchanging experiences (POCTEP 2019).

The importance of CBC programmes can be seen in the exponential growth of cross-border structures, impacting on development in various territorial dimensions (social cohesion, economic competitiveness, territorial governance, planning and sustainability for inhabitants) in less developed and peripheral areas (Medeiros 2010; Medeiros 2015; Scott and Liikanen 2010; Sousa 2013; Yoder 2003). Kurowska-Pysz et al. (2018), Smallbone and Welter (2012), and Rosenfeld (1996) also point out that in business, these cooperative relationships allied to the elimination of barriers represent a growth opportunity based on internationalization and access to new markets, with government agencies being responsible for stimulating the development of cross-border operations and accelerating forms of collaboration, generally designated as networks.

Countries that encourage innovative performance in links between firms, universities and governments manage to acquire greater competitive capacity (Marques, Caraça, and Diz 2006), setting out from the principle that regions' prosperity is not something inherited but rather the result of human creative effort (Porter 1999).

Regarding academic research, some typologies of cross-border cooperation can be identified and described, namely: (a) as a means to overcome barriers with other territories (Yoder 2003); (b) in cross-border tourism (Makkonen et al. 2018; Tosun et al. 2005); (c) in improving commercial relations (Obadia 2008); (d) in improving citizens' standard of living (Klatt and Herrmann 2011; Smallbone and Welter 2012); (e) as a stimulus of cross-border entrepreneurship (Smallbone and Welter 2012); (f) in firms' increased innovative performance and R&D (López et al. 2015); and also (g) in accessibility and transport (Medeiros 2019).

Simultaneously, this analysis revealed gaps in the literature regarding studies associating CBC with the stimulus for innovation and knowledge transfer (KT), with no study being identified so far as establishing that connection objectively. To fill this gap, therefore, this study aims to analyse the achievement of the cross-border cooperation project of INESPO III – University-Firm Knowledge Transfer Network (0252\_INESPO\_III\_3\_P), in the region of central Portugal and Castile and León in Spain, concerning the strengthening of innovation and also knowledge transfer. This is a project financed by

the INTERREG V-A (POCTEP) 2014–2020 Programme, as part of the axis of intelligent growth for innovation

In addition, in the 2014–2020 period, POCTEP approved several projects to promote companies' innovation, entrepreneurship and competitiveness, especially in some specific sectors (e.g. agriculture) that mainly involve regional development associations and business associations as beneficiaries. No approved project was found to involve universities and focus on innovation and knowledge transfer during the period, and for this reason, we consider INESPO III as an innovative project.

In parallel, considering the third launch of this project and the previous 11 years of this partner network, the aim is to find out the main motivations for cooperation and future perspectives, analysing in greater detail the contribution of INESPO III activities in the universities included in the project. In an exploratory and qualitative case study, interviews are held with the principal people in each university and business confederation involved, aiming to contribute to strengthening the literature in the area of CBC and also providing some insights for project managers.

## **2. Literature review**

### **2.1. Cross-border regions: levels and effects**

For Sousa (2013), CBRs are territories with special flows of exchange in the social, economic and political sphere and places of multiple activities, where the intensity of transactions evolves over time. Lundén (2006, 7–8) claims 'a border is an area running parallel to and on both sides of the boundary, which is a line without an area'.

In general, these regions are unfavorably positioned, which leads to the isolation from economic and political life characteristic of remote areas and associated with administrative disadvantages (European Commission 1996, 5). CBRs are at a disadvantage, ill-prepared for new rules and face some difficulties in adapting to new political environments (Dimitrov et al. 2003; Petrakos 2001). Dimitrov et al. (2003) mention that these regions present low rates of competitiveness due to the lack of opportunities and factors such as: (i) low population density and the lack of economic consolidation, (ii) an isolated, peripheral location in relation to economic centres, (iii) physical limitations regarding goods and markets, (iv) poor infrastructure, and finally, and (v) lower levels of economic development.

Strihan (2008) adds that CBRs should be understood as areas of interference rather than disadvantaged divisions or areas. These regions can be represented and described as networks of links between firms and other social bodies, and interaction should be considered.

There is agreement that regions should learn from each other and exploit complementary skills in seeking out joint projects, leading to both informal cooperation and other relationships with high levels of commitment, and they should be formed of various actors in society (Scott and Liikanen 2010; Sousa 2013; Mascaranhas, Ferreira, and Marques 2018). Being affected by a lack of opportunities and restrictions in developing entrepreneurial activity, these regions should implement policies that facilitate cross-border integration and maximize the gains of cooperation (Dimitrov et al. 2003; Smallbone and Welter 2012).

The current economic panorama based on high levels of competitiveness requires forms of cooperation between regions, with cross-border cooperation gaining relevance, especially in Europe, where several successful examples are recorded.

In this connection, there is a need for strong territorial collaboration between less developed regions aiming to achieve higher socio-economic standards so that the influence of these regions will grow overall via strategies in line with economic development, infrastructure and environmental matters (Medeiros 2015; Scott 2010; Scott and Liikanen 2010). CBC has great potential and added value in constructing a network, as the main driver of the process of territorial cooperation in Europe (Strihan 2008). Regarding the allocation of funding and the involvement of entities, CBRs account for 74% of funding in European territorial cooperation for 2014–2020 (Medeiros 2015).

Cooperation can be understood as the joining of partners in order to solve problems and achieve common objectives, assuming that organisations cooperate if there are good market opportunities (Klatt and Herrmann 2011; Obadia 2008). CBC presents specificities, with Medeiros (2015) considering this as a process of collaboration between different territories in geographical locations and can involve partners from different spheres and of different scales through joint projects and mutual experiences.

In turn, Sousa (2013) defines CBC as a type of concerted action between public and/or private institutions in cross-border regions in two or more states, stimulated by geographical, economic, cultural and political aspects, in order to establish good relationships between neighbours and solve common problems.

CBC is a voluntary process, where the uniting of countries allows joint action in order to achieve a common purpose and benefit. Although it creates interdependence, it does not require a formal agreement and each territorial unit retains its sovereignty intact (Sousa 2013). Knippschild and Vock (2017) add that CBC should focus on maximizing regional assets and minimizing regional disadvantages.

CBC makes a significant contribution to territorial cohesion, allowing these regions to become economies' centre of gravity. It is also a good indicator of regions' stability, through solving common problems and identifying opportunities for development, promotion of the region, infrastructure, opening up new markets, the environment, culture and political stability, also reducing the competition between them (Scott and Liikanen 2010; Smallbone and Welter 2012; Sousa 2013; Turnock, Turnock, and Le 2002).

This political procedure aims to promote territorial integration (Knippschild 2011) by reducing barriers, promoting territorial development, helping to lessen the disadvantages of the border, overcome problems of the periphery and improve inhabitants' standard of living (Medeiros 2015). It can provide fertile ground for territorial cooperation and institutional innovation, but can be a complex phenomenon due to the involvement of various actors (Sousa 2013; Mascaranhas, Ferreira, and Marques 2018), including universities, environmental groups, cultural associations, chambers of commerce, business confederations and even non-governmental bodies (Turnock, Turnock, and Le 2002).

The matter of the barrier effect is very important, since this can have a negative effect on firms' performance in cross-border regions. Better cooperation policies rather than investment in infrastructure can develop economies more, improving frontier regions' economic environment and making them more attractive for economic activity (Dimitrov et al. 2003; Klatt and Herrmann 2011; Medeiros 2015).

For Kurowska-Pysz et al. (2018), three key elements are catalysts in developing cross-border cooperation: (1) the model of cooperation adopted, (2) the cooperating organizations, and (3) the implementation of cross-border activities.

In turn, Medeiros (2015) emphasizes that collaboration can be (i) Global, with collaboration between countries in different continents (e.g. OECD), (ii) Transnational, between places located in different countries in the same continent (e.g. EU and macro-regional policies), (iii) Cross-border, that is, between border areas, located in two or more

countries, and (iv) Intra-state, collaboration between places and bodies situated in the same country (e.g. collaboration between metropolitan regions, agreements between local authorities, etc.). Scott and Liikanen (2010) also refer to cooperation as being a project occurring at three levels: transnational, inter-state and local/regional, each with its own specificities.

Many other benefits arising from CBT are described in the literature. Yoder (2003) suggests that the incentive for cross-border cooperation is also seen as a means to overcome barriers between the EU and other territories with historical rivalry (e.g. Eastern Europe), while Dimitrov et al. (2003) analyse the effect of CBC, concluding that firms have high levels of interaction compared to national averages.

Smallbone and Welter (2012) introduced the concept of Cross-border Entrepreneurship, referring to entrepreneurial activity taking place along international borders, typically involving various forms of cooperation. This brings the regions and firms involved numerous benefits, namely access to new markets, capital, technology, know-how and a workforce, acting as a stimulus for entrepreneurship as a result of the emerging opportunities.

International operations are increasingly a pre-requisite for the survival, competitiveness and growth of undertakings, where the partner's size and previous experience of cooperation are more important factors than distance (Huber and Huber 2010; Muzychenko 2008; Scott 2010). Government agencies and foundations have tried to stimulate forms of collaboration between firms and network initiatives in order to boost the economy and help increase competitiveness (Rosenfeld 1996).

## **2.2. Innovation and knowledge transfer in cross-border cooperation**

Lorenz (2010, 72) highlights that 'innovation can be defined as a new or an improved product, process, or organisational structure, that is perceived as new by the innovator and is successfully implemented in the organisation or at least once successfully introduced into the market'.

Innovation is also labelled according to its novelty value, being (i) radically new products, services or processes, or (ii) continuous incremental improvements in existing products (Garcia and Calantone 2002). For Porter (1999), innovation is shown in product design, in the new production process, in the new marketing approach, and in training methods, which to a great extent can be incremental.

It can begin with an idea, being supported by a culture of innovation and processed with creative vigour. Its result can be new products or processes that create value and conquer new markets, where these ideas can only be transformed in innovation by an entrepreneurial person who promotes them and makes them a reality (Lorenz 2010). For Drucker (2002), 'innovation is a specific function of the entrepreneur' and for Segarra-Blasco and Arauzo-Carod (2008), it is related to a firm's capacity to absorb external information, knowledge and technology.

Karanassios and Pazarskis (2006) emphasize that entrepreneurship is the main driver of innovation, growth and development, with a positive correlation being found between entrepreneurship and economic performance, in firms' survival, job creation and technological change, among other aspects.

It is in this way that industries are able to innovate and improve dictate a country's competitiveness. Between governments and firms, there is a tendency to accelerate policies promoting innovation as a way to achieve competitiveness, with cooperative attitudes with different partners emerging as a way to increase organisations' innovative

performance regarding R&D (Knippschild and Vock 2017; López et al. 2015; Porter 1999).

The creation of networks and the intensified efficiency of interactions between the different agents is essential for the emergence of innovation systems, and firms and universities are found to be the actors most willing to innovate and spread knowledge (Marques, Caraça, and Diz 2006; Pinto, De Noronha, and Faustino 2015).

Forming cooperative bonds with external partners is a necessary strategy to make up for the lack of experience in some areas, as one organisation rarely has complete experience (Lam 1997). According to Pinto, De Noronha, and Faustino (2015), increased cooperation can generate knowledge flows outside organisations, implying a greater need for channels that facilitate shared knowledge networks.

In particular, the spread of innovation in CBC processes is commonly related to knowledge transfer, whereby existing technology, products, services and best practices are passed from one side of the border to the other (Knippschild and Vock 2017; Lorenz 2010). Knippschild and Vock (2017) consider vital the process that emphasizes the transnational exchange of ideas and experiences, sharing knowledge and expanding the partner network's horizons, and simultaneously contributing to the aims of European cohesion.

Makkonen et al. (2018) point out the importance of financing programmes that have an important function in stimulating KT and innovation. Societies that stimulate processes linking firms and universities tend to increase their knowledge base, creating environments that favour networks, creating trustworthy links, the exchange and share of knowledge and a faster spread of information (Marques, Caraça, and Diz 2006; Pinto, De Noronha, and Faustino 2015; Segarra-Blasco and Arauzo-Carod 2008). In addition, Segarra-Blasco and Arauzo-Carod (2008) mention that encouraging cooperation agreements between firms and organisations and publishing is a good way to develop R&D activities.

Knowledge is a crucial part of innovation, with universities being institutions that produce it, spreading science and technology. Universities are also relevant in industrial innovations, in that they provide human capital and a place where new undertakings emerge, being a driving force and a promoter of multiple networks (Marques, Caraça, and Diz 2006).

Etzkowitz and Leydesdorff (2000) use the Triple Helix model to interpret changes in society and in the knowledge-based economy and modern universities. The model suggests that innovation is created by the combination of relationships between universities, industry and government, besides combinations produced by networks, communication and mutual exchange.

The dynamics of university relationships and networking as a support for innovation in regional business originate sustainable cooperation networks, solving problems and issues related to the lack of resources, politics, culture and socio-economic aspects, but above all have resulted in the appearance of new organizations (Marques, Caraça, and Diz 2006; Smallbone and Welter 2012). For Lam (1997), these knowledge structures and work systems influence the success of collaborative undertakings, above all in globalized and highly competitive environments.

López et al. (2015) note that Portuguese and Spanish universities, in particular, are characterized by having a little tradition of bonds with industry. Nevertheless, in recent years various policies have been developed focused on creating networks between universities and industry, but these still show low levels of R&D activity compared to other European countries (Segarra-Blasco and Arauzo-Carod 2008).

The determinants of cooperation in R&D agreements normally involve relations between organizations that aim to innovate, with firms operating in high-technology

sectors being more likely to cooperate with external partners (Segarra-Blasco and Arauzo-Carod 2008).

The study by Klofsten and Jones-Evans (1996) highlights a considerable number of studies claiming that stimulation of Technology-based Firms (TBFs) is an excellent way to transfer technology efficiently from the university to industry.

### **3. Research methodology**

#### **3.1. *The emergence of the INTERREG programme as the study context***

The INTERREG programme is seen as determinant in reducing the barrier effect and achieving objectives proposed regarding improved living standards for citizens, where the emphasis is on initiating and maintaining cross-border interactions (Medeiros 2015; Strihan 2008).

This programme subsidises local cross-border projects undertaken in collaboration by local authorities and other organisations located on the border. The programme's objective includes helping local and regional governments in all of Europe to create environments and opportunities to share solutions, ensuring that investment efforts and implementation of innovation lead to integration and a sustainable impact for people and places (POCTEP 2019; Perkmann 2003).

INTERREG aims to obtain the maximum return on the 359 million euros provided by the European Regional Development Fund (ERDF) for 2014–2020, giving regional and local public authorities in all of Europe the opportunity to share ideas and experiences concerning public policies and the best strategies for their communities. It involves the 28 EU member states and Switzerland with co-financing up to 85% in categories such as (1) Research and Innovation, (2) SME Competitiveness, (3) Green Economy and (4) Environment and Resource Efficiency (POCTEP 2019).

In particular, the INTERREG V-A Spain-Portugal (POCTEP) 2014–2020 programme is the result of a favourable experience which since 1990 has involved the border between the two countries. Formed of 37 NUT III in both countries and six areas of cooperation, it promotes development on the longest border in the EU, aiming to improve the quality of life of the inhabitants of this area (POCTEP 2019). It contemplates actions in favour of research, development and innovation, highlighting the creation of networks, promoting entrepreneurship and stimulating employment, technology transfer, university-firm cooperation and research.

Studies such as the one by Harguindéguy and Bray (2009) have investigated the achievements of INTERREG programmes, specifically in the cooperation initiatives between France and Spain between 2000 and 2003, concluding that these empower territories.

Regarding the border in question, Portugal–Spain (PSBR), Medeiros (2010) emphasizes its stability for the last 800 years or so, contributing to strengthening the *back-to-back*. This is the longest border in the EU (1234 km) and has a significant population (2.1 million Portuguese and 3.5 Spaniards), showing high levels of socio-economic vulnerability and numerous challenges in job creation, growth and the sustainability of public services. From early on, it has benefited from INTERREG funding and the barrier effect has been reduced notably.

#### **3.2. *Type of study and case selection***

To achieve the aim of this study, research of a qualitative and exploratory nature was chosen. According to Malhora (2004), the aim of this type of research is to make

contributions and understand the problem accurately, identifying relevant actions and also consisting of interviews with experts in a given area.

As a case study, it was decided to choose the partner network forming the INESPO III project (Innovation Network Spain-Portugal) due to easy access to effective data collection and the project's success. The INESPO III project is a university-firm knowledge transfer network in the region of Portugal and Castile and León (Spain). This project is co-financed by ERDF (European Regional Development Fund) through the INTERREG V-A Spain-Portugal (POCTEP) 2014–2020 programme with a total eligible cost of 719.791,60€, belonging to the priority axis of Intelligent growth through cross-border cooperation to stimulate innovation.

This project is formed of a network of nine partners organised in two areas of cooperation of POCTEP – Castile and León/Central Portugal, beginning in July 2017 and ended in December 2019, led and coordinated by a Portuguese university. Standing out among the objectives is the contribution to the economic growth and development of the cross-border region, the stimulation of emerging regional firms' competitiveness, affirming both regions as driving agents of innovation, job creation and technological valorization, and accelerated transfer of university-firm knowledge to society in general.

The third project in the series updated the objectives and activities to ensure its merit and recognition by the project's managing body. The consortium for cooperation goes back around 11 years, not only in the first cases of INESPO (I and II) but also seeking complementarities in emerging technological areas, knowing the core competences of each teaching institution.

The project has a total of six activities, coordinated individually by each partner according to their core competences, namely: Innovation (General Council of the University of Salamanca – FGUSAL), Protection (University of Aveiro – UA), Entrepreneurship (BI) and Technological Valorisation (General Council of the University of León and Firms – FGULEM), besides activities of Management, Coordination and Communication, which are BI's responsibility.

In this study, it was possible to register the contribution and interview the project's beneficiaries, except for FGUSAL and the Business Council of Castile and León – CECALE.

### **3.3. *Data collection and analysis***

Primary data was collected in order to have complete knowledge of the issue studied, together with the qualitative method, which according to Malhora (2004), seeks the qualitative understanding underlying the reasons and motivations of the main actors involved in the INESPO III project. Corbin and Stauss (2008, 12) state that 'qualitative research allows researchers to get the inner experience of participants, to determine how meanings are formed through and in culture, and to discover rather than test variables'.

Within this typology, the case study method was adopted here, as the aim is to understand a single complex event, its context thoroughly, and its circumstances, capturing various nuances, patterns and elements that other research does not consider (Stake 1995; Yin 2009).

Data were gathered through a single script administered to each of the nine people in charge of the entities involved in the INESPO III project during a meeting of the group held in May 2019 at UPSA. Each interview was recorded and lasted an average of 15 minutes.

Considering the end of the project in December 2019 and the POCTEP project closure rules, a global report was prepared by the project leader (Portuguese university) with the collaboration of all partners. It was possible to consult this report and extract some relevant data as indicators of achievement and productivity, which complemented the interviews with partners through triangulation.

Analysis of the literature review led to establishing some topics to be investigated in this empirical study, and which were revealed to be important in formulating the questions developed. Collaboration was requested of those responsible for developing and implementing the INESPO III project in each institution belonging to the consortium, in order to respond openly to four wide-ranging questions:

- (i) What are the main reasons/motivations for cooperating in a cross-border project?
- (ii) In your view, what is the role of cooperation in strengthening innovation and knowledge transfer?
- (iii) What are the main benefits the INESPO project provided over the series?
- (iv) Indicate the added value of this partner network and future perspectives for cooperation?

These questions gave rise to four themes presented below (Section 4), which are in line with the study aims described in the introduction. Table 1 presents the consortium of the INESPO III project. It is noted that each beneficiary belonging to the consortium designated one member who is in close contact with the project, to be part of and contribute to developing this empirical research.

#### 4. Empirical evidence and content analysis

Analysis of the case study data follows the recommendations of Yin (2009), for whom the ideas to structure should emerge from the literature review and reveal gaps and interesting

Table 1. INESPO III consortium.

Interviewee/ Country	Partner	Training	Post
E1/PT	UBI – University of Beira Interior (Leader and Coordinator)	Management	Lecturer
E2/ES	FGUSAL – General Council of the Univeristy of Salamanca	Management	Manager of Senior Projects
E3/ES	FGULEM – General Council of the University of León and Firms	Industrial Engineering	Manager of Senior Projects
E4/PT	UA – University of Aveiro	Communication	Manager of Senior Projects
E5/PT	CEC/CCIC – Business Council of the Central Region	Economics	Manager of Internationaliza-tion
E6/ES	FGUVA – General Council of the University of Valladolid	Industrial Engineering	Manager of Senior Projects
E7/ES	UPSA – Catholic University of Salamanca	Management	Manager of Senior Projects
E8/PT	UC – University of Coimbra	Economics	Manager of Senior Projects
E9/ES	CECALE – Business Council of Castile and León	Economics	Project Manager

topics for research. Now, the content of the four topics/themes addressed and identified in this study will be analysed: (1) Reasons and motivations for cross-border cooperation, (2) Role of cooperation in innovation and knowledge transfer, (3) Main benefits of INESPO, and (4) Added value of the cooperation and future perspectives.

#### **4.1. *Reasons and motivations for cross-border cooperation***

As observed in [Table 1](#), the partners of INESPO III, the great majority of whom are managers of senior projects, have wide experience of project management, being involved in various types including those of a cross-border nature. Confirming this great experience through belonging to various consortia, the interviewees provide a wide range of contributions regarding the reasons and motivations for this type of cooperation.

E1, E3, E4, E6 and E7 refer, similarly, to the exchange of good ideas, the exchange of experiences in order to train members of the academic community and specialists in technology. As the leader of the project, E1 highlights as reasons ‘the exchange of good practices which means participants’ greater ability, improving the level of results of all those involved’; where E3 contributes, emphasizing this exchange allows these entities ‘to have a greater regional achievement, similarly, on both sides of the border’. In fact, permanent cooperation between consortium members made it possible to finish the project and exceed all indicators and deliverables, namely: main achievement indicator – the number of companies that cooperate with research centres was 103 (objective: 40).

Besides this, all six activities of the project were carried out, as a result of successful cooperation between members, namely, knowledge transfer, entrepreneurship, innovation activities, achieving a large number of participants in trainer courses, prototype support, business plans, workshops, mentoring and coaching sessions. All these events and deliverables exceed the project objectives (see [Appendix](#)), and the financial support and CBC originated more than 140 patent requests from members, arising from INESPO III initiatives.

Also, in this connection, E6 reinforces the importance of ‘sharing experiences and good practices among partners in similar situations and dealing with the same issues’. E3 also says that it is essential to ‘strengthen bonds of cooperation so as to improve performance among researchers and solve common problems’. Indeed, Scott and Liikanen (2010), Turnock, Turnock, and Le (2002) and Sousa (2013) note that one of the motivations for cooperating is to solve common problems and encourage development opportunities in cross-border regions.

E7 stresses that ‘(...) this type of collaboration favours the exchange of good practices among researchers, being a good contribution to the spread of scientific knowledge, placing universities at the vanguard’. Knippschild and Vock (2017) also conclude that this transnational exchange of ideas and experiences allows knowledge-sharing.

Another of the reasons mentioned by E7 is related to ‘strengthening relationships regarding innovation with other centres of knowledge’. E4 reinforces the ‘interest in knowing about the work done by the Spanish partners in the area of knowledge transfer (...) and by stimulating entrepreneurship and the creation of TBFs’. E7 also underlines the stimulus for R&D activities in areas with different approaches. Indeed, Knippschild and Vock (2017) showed the bonuses of spreading technology on the other side of the border as a way to transfer knowledge.

Klofsten and Jones-Evans (1996) also developed a model of stimulating the creation and growth of TBFs (Technology-based Firms) due to their importance and impact on the economy. In general, entrepreneurship policies should focus on producing entrepreneurs and obtaining more firms (Karanassios and Pazarskis 2006). As an example, the INESPO

III project was planned by elements from all partners, whose competences complemented each other in designing a prototype contest (Prototransfer – market-oriented Cross-border Prototype Competition) to simulate and accelerate KT to the market, encouraging students, researchers and teachers in each university involved to identify innovation ideas in laboratories with short-term commercialization potential. The INESPO III consortium received 83 applications and has supported 21 (three at each university).

The business confederation E5 highlights as motivations ‘the level of stimulation of creativity in developing new ideas and projects, sharing the risk, making institutions more competitive, (...) giving access to another type of human capital and infrastructure. There is clear expansion of the levels of partners’ knowledge’. In addition, E5 and E7 confirm and consider advantageous the sharing of resources in certain activities and gains in visibility. As indicated above, the economy of both regions was impacted by the large number of companies (103) that cooperated in INESPO III, as well as the large number of patent requests (140) and the business models developed (46) in the entrepreneurship education programme (Iberian CEBT – Technology-based Entrepreneurial Course), which can be transformed in the short term into TBFs located in both regions and generate economic growth, development, qualified employment and competitiveness.

It is also noted that cross-border projects register motivations of economic growth and development in the areas in question (mentioned by E1 and E5), as stated by Medeiros (2010), Scott and Liikanen (2010) and Yoder (2003). There are also motivations for cooperation in terms of the financial incentives granted – indicated especially by E1 and E7, and also revealed in the study by Makkonen et al. (2018), above all due to their importance in stimulating knowledge transfer and innovation.

#### **4.2. Role of cooperation in strengthening innovation and knowledge transfer**

Regarding innovation and knowledge transfer, the interviewees contributed with various types of complementary opinions. E1, E5 and E7 highlight that innovation is a complex process, requiring interaction and learning among various scientific-technological entities for effective knowledge transfer, as described by Lorenz (2010).

For E1, ‘from the viewpoint of open innovation, cooperation is essential in order to access external sources of knowledge, innovation and more effective knowledge transfer’, coinciding with what is reported by Segarra-Blasco and Arauzo-Carod (2008) and Pinto, De Noronha, and Faustino (2015), namely concerning the capacity to absorb external knowledge and technology as being determinant.

E3 sets out from the principle that university-firm knowledge transfer is fundamental, where

at the cross-border level, it allows creation of a network that promotes simultaneously innovation in universities and firms in two regions with common problems. This type of cooperation can improve the efficiency and synergies of research centres, providing know-how and conditions to develop innovative technology (...).

Marques, Caraça, and Diz (2006) and Pinto, De Noronha, and Faustino (2015) refer to the creation of networks and interaction among various types of economic agents as determinant in creating favourable conditions for innovation.

Besides the roles already reported, E4 adds that in this respect,

(...) it can give dynamics to joint projects, informing about the research carried out in the different universities, revealing the business situation in the two countries, (...) providing the results of R&D already developed and protected, contributing to innovation and firms' competitiveness.

As reported, universities have an important role in producing science and knowledge and also as a starting point for new technological undertakings (Marques, Caraça, and Diz 2006), and so the university-industry relationship suggested by Etzkowitz and Leydesdorff (2000) should be considered.

E5 underlines that 'the greater the cooperation between countries and regions, the greater the capacity to develop new ideas/products/services, increasing and accelerating the share of knowledge (...)', while for E6, it 'enhances perspectives, generating ideas with a greater achievement'. In INESPO III planning, all the knowledge and experience of Portuguese and Spanish partners (teachers, researchers and project managers) were decisive in designing innovative programmes for more effective innovation and knowledge transfer than on previous occasions (I and II). More events were introduced (e.g. Design Thinking, Lean Start Up or Intellectual Property Workshop) and all the others were improved (e.g. CEBT Ibérico and Prototransfer). According to E5 and E6, multidisciplinary teams can achieve better results in promoting innovation and knowledge transfer, as well as different points of view in solving common cross-border problems.

Finally, E8 stresses once more that no entities hold all types of knowledge: '(...) cooperation is also increasingly oriented towards specialization and the only way to raise R&D projects to benefit economies and the market'. Lam (1997) adds that the lack of experience in certain areas due to growing specialization can be resolved through cooperation; and particularly in INESPO III, specialization was decisive in coordinating each activity of the project.

### **4.3. Main benefits of INESPO**

On this topic, there is marked agreement as to the benefits of the series of three INESPO projects in all these cross-border institutions, in terms of an increased number of patents requested (one of the indicators of the project's productivity) and also in the TBFs created, reported in the article by Raposo, Madeira, and Nave (2018) and also in the interviews held with E1, E3, E4 and E8.

For E1, the INESPO project allowed '(...) the creation of an intensified and innovative culture of training programmes, workshops, networking in the scientific community, in areas such as entrepreneurship, business innovation, patent protection and technological valorisation.'

In turn, E4 adds that participation in this series

was beneficial, where creation of the network itself even allowed the design of new projects and good knowledge-sharing. This project allowed validation of a considerable number of inventions and technologies, through the financing of prototypes and training actions for the academic community and specialists.

E6 considers that the main benefit is related to the creation of synergies, which otherwise would not be achieved, and for E7, the project's effect on the universities in both regions through a series of actions. '(...) improved the indicators of protection of the results of research and transfer, besides providing training for HR'.

All the partners in INESPO III highlight two actions as being most relevant in the whole project programme: Iberian CEBT and Prototransfer. However, leader E1 also emphasizes the range of activities with innovation seminars directed to local firms, workshops to valorize technologies, workshops and consultancy on intellectual property rights, and workshops on lean start-ups and design thinking. All these actions are directed to researchers, university spin-offs, start-ups in the region, technology transfer specialists and the academic community in general.

#### **4.4. *Added value of cooperation and future perspectives***

The interviewees are unanimous that regarding future perspectives of cooperation, there is a clear interest in maintaining the consortium's structure, to be fulfilled shortly with the development of new cross-border applications, albeit in other strategic axes.

E4 highlights that

the network represents 9 years of joint work, combining know-how and experiences in the different areas of intervention of the knowledge-transfer departments, which would be difficult to achieve individually. I also consider it pertinent to replicate some actions that ensure the consortium will produce effects, namely the Iberian CEBT, the Prototransfer and some actions of specialist training.

E3 adds that there were benefits from this network including universities and more especially the two business confederations, thereby '(...) firms' demand for technology with the technology supply of the universities on both sides of the border', with this being reinforced by E8. E5 is of the opinion that 'this networking allowed the creation of a multidisciplinary work team with added value, complementing each other in various areas', while E8 goes on to underline the spirit of mutual help towards commercial valorization of the results of research in the region's universities, of good practices and accumulated experience.

Finally, E1 mentions that the value of this network goes towards 'stimulating processes of knowledge transfer and innovation, encouraging potentialities in parallel in both cross-border agents. These are economically disadvantaged areas, and this allows reaching a critical mass, which individually presents increased difficulties'.

#### **4.5. *Synthesis of results***

Table 2 summarises the main ideas revealed by the partner network and their opinions, according to the four topics identified. Some similar points of view were recorded on some topics, and these are indicated immediately after the table.

### **5. Conclusion, contributions and implications**

In the vast majority of cases, cross-border regions are disadvantaged in terms of competitiveness and economic development compared to other economic centres in their countries. Strategically, barriers imposed by frontiers must be dismantled, in order to accelerate processes of European integration and political, economic and social cohesion in these areas (Dimitrov et al. 2003; Scott and Liikanen 2010; Smallbone and Welter 2012; Yoder, 2003).

Table 2. Synthesis of key ideas of INESPO III partners.

Partners	Reasons/ motivations <sup>a</sup>	Role of cooperation in innovation and KT <sup>b</sup>	Benefits of the INESPO project <sup>c</sup>	Added value of the network <sup>d</sup>
BI (E1)	Exchange of good practices; Improved level of results by all partners;	Access to external knowledge sources; More effective knowledge transfer;	Access to training programmes and workshops. Creation of networking;	Stimulate knowledge transfer, encouraging agents' potentialities;
FGULEM (E3)	Greater regional achievement; Improved performance by researchers;	Equal promotion of innovation in universities and firms;		Join firms' demand for technology with that supplied by universities;
UA (E4)	Knowing about the work done in the neighbouring country to stimulate entrepreneurship;	Giving dynamics to joint projects; Knowing the situation for other partners and countries;	Greater share of knowledge and joint planning of other projects;	Joining know-how and experiences in various areas;
CEC/ CCIC (E5)	Stimulate creativity in ideas/projects and make institutions more creative;	Greater capacity to develop new ideas; Accelerate KT;		Creation of a multidisciplinary team who complement each other;
FGUVA (E6)	Sharing experiences to overcome the same problems;	Create multidisciplinary teams to achieve better results of Innovation and KT;	Creation of synergies,	
UPSA (E7)	Greater achievement on the spread of scientific knowledge;		Improve indicators of protection of KT results and HR training;	
UC (E8)		Cooperation oriented to specialization as a way to raise R&D projects;		Mutual help towards commercial valorization of research results;

<sup>a</sup>Exchange of good practices and experiences (E1, E3, E4, E6 and E7);

<sup>b</sup>Innovation requires interaction and learning among entities (E1, E5 and E7);

<sup>c</sup>Increased number of patent requests and TBFs created (all partners);

<sup>d</sup>Intention to maintain the consortium in the future in order to cooperate in other strategic axes (all partners).

Therefore, structural programmes have been created to stimulate the creation of networks along the border, aiming to find solutions to problems and challenges affecting both sides, with INTERREG being the most relevant and most studied.

This study identified some levels of cross-border cooperation, following the general absence of studies in which cross-border cooperation was carried out aiming to strengthen innovation and acceleration of knowledge transfer in these regions.

In this connection, an analysis was made of the INESPO III project – University-Firm Knowledge Transfer Network of the Central Region of Portugal and Castile and León, Spain – financed through the INTERREG programme, interviewing the main people involved about questions such as the reasons/motivations for cross-border cooperation, the role of this type of cooperation in innovation and knowledge transfer, the benefits provided by the project and the value added of this partner network.

The empirical evidence led to the conclusion that cooperation in the INESPO III project allowed the exchange of good innovation and knowledge transfer practices, besides exchanges of experience and clear improvements in productivity indicators, such as the number of patent requests and firms created originating in universities. This project also promoted both regions as dynamic centres of innovative activities, increasing the visibility and competitiveness of all the institutions involved, stimulating entrepreneurship. As concluded by Audretsch, Keilbach, and Lehmann (2006), regions that provide conditions for the creation of these firms usually show higher levels of growth and a positive impact on economic outputs.

As for innovation, considered a complex phenomenon, this requires permanent interaction in order to access external knowledge, which can be achieved more easily and effectively through cooperation. It became clear that each partner being able to contribute with knowledge from their areas of specialization (Lam 1997) means benefiting from synergies, potentializing the consortium's collective efficiency and effective attainment of the project's objectives.

Then again, despite being cross-border areas in similar contexts, the situation of the university institutions is very different. Another advantage lies, therefore, in finding out about R&D processes, encouraging joint growth and knowledge transfer, so that the institutions and regions can learn from each other as suggested by Scott and Liikanen (2010) and Sousa (2013).

The financial component and the support granted to institutions through the INTERREG programme is another of the stimuli associated with cooperation. Ultimately, the creation of successful networks stimulated by this programme means the same group of partners intends to work together in the future, even in other strategic axes, contributing to the development of the cross-border region. Here, an innovative and successful project in the context of INTERREG VA Spain – Portugal (POCTEP) was found to have implemented a number of activities and exceeded all productivity indicators set regarding the number of cooperating companies and patent applications.

This study makes an important contribution to the literature on cross-border cooperation by extending its field of research to knowledge transfer and innovation. As practical implications, INESPO III can be useful as a model to implement in other European cross-border regions that face similar problems, providing a structure of actions to implement over more than two years. This can be particularly useful to encourage academics to carry out research on cross-border cooperation effects and achievements concerning knowledge transfer and innovation and also to give project managers inspiration to design their own projects.

The study is not without limitations. Firstly, despite the INESPOIII project having a small number of beneficiaries, it was not possible to obtain answers from all of them, namely FGUSAL and CECALE, which could have made a significant contribution and provided a more representative view of firms in Castile and León.

As for future lines of research, it would also be interesting to study the effect of cooperation (cross-border and not only) on stimulating entrepreneurship and start-up creation, as well as projects directed towards the production of innovation. An investigation

involving more than one similar project supported by INTERREG would be extremely useful.

In the future, public or private institutions that intend to integrate this type of network should consider the fact that within a given area, good levels of partner specialization can make the difference in the final results hoped for.

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## Appendix

In this section, we present the structure of the INESPO III project for each activity, as well as expected initial and final results for all partners.

Activity/Coordinator	Action	Expected No.	Obtained No.
1. INESPO INNOVA Coordinator: FGUSAL	Prototransfer – N° of applications received	21	83
	Prototransfer – N° of prototypes supported	21	21
	Innovation Seminars for Entrepreneurs – N° of seminars	6	7
	Innovation Seminars for Entrepreneurs – N° of participants	–	166
2. INESPO PROTECTION Coordinator: UA	Intellectual Property Rights (PR) – N° of Workshops	24	32
	Intellectual Property Rights – N° of participants	–	580
	Intellectual PR – N° of individual mentorings	12	153
	Kits IP4Lab – N° of kits to provide information about PR, forms, etc	7	36
	‘How to communicate Science and Inventions?’ – N° of Workshops	6	6
	‘How to communicate Science and Inventions?’ – N° of participants	–	204
3. INESPO ENTREPRENEUR Coordinator: BI	Design Thinking – N° of workshops	6	6
	Design Thinking – N° of participants	42	116
	Lean Start Up – N° of workshops	6	6
	Lean Start Up – N° of participants	42	118
	Iberian CEBT – N° of participants	–	103
	Iberian CEBT – N° of Business Plans	21	46
	Iberian CEBT – Iberian final	1	1
4. INESPO VALORIZE Coordinator: FGULEM	Go-to-Market Plans – N° of entrepreneurs supported	7	7
	Licensing agreement negotiation process (Workshop) – N° of project managers of participating partners	21	26
	Licensing agreement negotiation process (Workshop) – N° of participants (students, researchers and teachers)	–	66
	Valorization of Technologies – N° of workshops	6	7
	Valorization of Technologies – N° of participants	42	113
	Indicator C026 – N° of companies cooperating in the project	40	103
5. Management and Coordination	N° of Patent applications	–	140

Note: The project budget remained unchanged, but it was possible to carry out a greater number of actions.