

PAPER

(Preliminar Research)

Title: Microeconomic impact of European regional innovation policies in the period 2007-2020 in Andalusia: evidence through business innovation indicators

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Abstract:

We carried out an assessment of the impact of European regional innovation policies on the main indicators of business innovation in Andalusia. As a Convergence Objective Autonomous Community of the European Union, Andalusia benefited from a significant volume of resources between the 2007-2013 and 2014-2020 programming periods. The proposed analysis seeks to identify the impact of participation in this programme on the basis of the main microeconomic indicators available (projects, funds received, evolution of spending on research and development, innovation, patents, collaboration networks, turnover, etc.). This impact is broken down taking into account the sector, size of companies, location, etc. The results show an uneven impact depending on business characteristics and highlight the existence of a significant leakage of resources to other territories. These results will also allow recommendations to be made for the future implementation of research, development and innovation policies.

Key Words: Innovation policy evaluation, firms and innovation policy, Technology Fund, firm size and innovation, regional development

JEL Classificarion: O38, R58

1- Introduction

In the 2007-2013 programming period, there was a progressive reduction in the Structural Funds (FFEE), aimed at reducing disparities between European regions, which particularly affected the former Objective 1 or Convergence Objective regions, as was the case of Andalusia. At the same time, there has also been a reorientation of the type of programmes and actions prioritised. In this sense, in the 2007-2013 period, a specific Technology Fund (TF) was set up in Spain for the Spanish Autonomous Communities (ACs), especially aimed at the Convergence Objective ACs, which saw a large reduction in the common EEF. This FT had more than 2,000 million euros earmarked for the promotion of research, development and innovation (R+D+i) of companies, considered as one of the key agents of innovation systems, which are particularly weak in this type of territories. The 2014-2020 period had a similar programme for Smart Growth, also endowed with significant amounts. This orientation of innovation policies is currently essential to generate sustainable growth, also taking into account that companies do not act in isolation in the territory, but interact with the rest of the agents. Because of the importance attributed to the design of these policies, we have selected for this study the Innterconecta programme, aimed specifically at companies, which mobilised a large amount of TF resources for Andalusia in the first period alone, and which continued in the following period.

It is a fact that the investment capacity of the Andalusian business network, made up mainly of small and medium-sized enterprises (SMEs), was severely weakened by the long crisis. The possibility of undertaking innovative projects was limited due to the deep economic crisis. These effects are even more accentuated in the case of Andalusia if we take into account the budget restrictions in the area of R&D&I carried out by the public administrations as a result of the austerity policies undertaken during this period. In order to find out the impact of FT in Andalusia in this context, we have carried out this research. Our aim is to analyse the extent to which the planning, design and application of business R&D&I programmes in the region, financed by this FT, had a positive impact on the innovative capacity of the business fabric and the extent to which their implementation reveals design errors or problems of management and valorisation.

Methodology and data used in the study

In order to evaluate the results, a microeconomic analysis of the impact of these innovation policies is proposed. In contrast to the usual macroeconomic approaches, this paper deals with the impact of the programme analysed by studying what has happened at the level of the companies participating in the projects financed.

The study has a microeconomic and empirical character insofar as it focuses on the analysis of the innovation indicators of the companies participating in the first ERDF-Innterconecta calls of the Operational Programme Technological Fund in Andalusia. This objective will also be achieved by means of analysis and synthesis exercises, temporal analysis and data interrelation, which will allow the combination of qualitative and quantitative analysis.

The empirical study starts precisely from the cross-referencing of quantitative data obtained from a plurality of sources: data from the different R&D statistics to contextualise the situation in the territory, data obtained from official bodies such as the Galician Institute of Statistics (IGE), the Spanish Institute of Statistics (INE), Eurostat, the Ministry of Finance and European Funding of the Andalusian Regional Government, the Spanish and European Patent Offices and the State Administration; data on the companies participating in the calls analysed, provided by the CDTI and constructed with information obtained throughout the research; data on the classification of projects by thematic area and derived from the same, produced during the course of the work; and finally, data on economic-financial performance indicators for companies participating and not participating in FEDER-Innterconecta, provided by ARDÁN.

In what follows, the text is structured as follows: the second section briefly presents the conceptual framework highlighting the importance of European business innovation policies in peripheral and less developed regions; the third section describes the FT, the Smart Growth programme and the Innterconecta programme as part of business innovation policies in Andalusia; the fourth section provides a general analysis of the programme's results; the fifth section assesses the impact on the main indicators of business innovation, taking into account the leakage of resources; finally, the sixth section draws the conclusions and recommendations derived from this study.

2- Business innovation policies in less developed regions

Nowadays, traditional productive factors (availability of natural resources, cheap labour or capital) do not offer lasting competitive advantages, as advances in liberalisation, transport and information technologies mean that these resources are within everyone's reach and do not provide a clear advantage to those who possess them (Navarro, 2009). As a consequence, innovation policies become crucially important, especially when other public policies (such as industrial policy, fiscal policies, etc.) are challenged (Rodrik, 2007; Vence, 2007).

The regional dimension in R&D policies

Interactions between the different agents of the innovation system are key, above all, to facilitate learning and the circulation of applied and tacit knowledge, which is why innovation processes benefit from the proximity of organisations (Lundvall, 1992; Cooke, 1998; Boschma, 2005). From this perspective, the regional dimension makes it possible to define policies to support the competitiveness of its productive fabric because it has a better knowledge of its needs and capacities, which makes it possible to fine-tune the instruments and measures to strengthen the interaction between the industrial fabric and the other elements of the regional innovation system (RIS). These policies must be anchored in the territory and be context-sensitive, i.e. they will take into account the characteristics of the regions and their different pre-conditions and innovation capacities, seeking a design, means and system conditions that optimise their results (Brujin & Lagendijk, 2005; Vence, 2007; Martin & Trippl, 2013).

As a consequence of the above approach, there is a general consensus that there is no standard innovation policy that can be applied to all types of regions (Isaksen, 2001; Nauwelaers & Wintjes, 2003; Tödting & Trippl, 2005; Boschma, 2009; McCann & Ortega-Argilés, 2011; Asheim, Moodysson, & Tödting, 2011; Camagni & Capello, 2012; Sande, 2020). In fact, this type of analysis gave rise to a new generation of regional policies based on "smart specialisation strategies" (S3), originating from the specific characteristics and resources of territories, as well as their capabilities and innovation potential (Barca, 2009; European Commission, 2010, 2011; OECD, 2011). Despite this, it is less clear what should be similar and what should be different in these policies depending on the context (Martin & Trippl, 2013), or how to prevent this commitment to S3 from neglecting the necessary efforts for productive diversification (Cooke, 2012; 2018).

This concern for innovation at regional level is linked to the awareness that economic growth and competition in the regions depend to a large extent on the capacity of local companies to innovate (Cooke, 2001), although there is not always a direct relationship between the implementation of innovation policies and business growth (Sande, 2022a). In this context, and in order to promote the decentralisation of R&D activities and address the needs of small companies -which are the majority in the Galician business fabric-, it would be necessary to create agreements, clusters, networks and cooperative organisations (Cooke, 2009).

When analysing innovation policy at regional level in a reality of multi-level governments, it is necessary - and also complex - to distinguish the policies defined at each of the levels of government. As P. Cooke points out:

“...thus, contrary to the mandates of policy makers in the hierarchy of multi-level governance - from regions, through national agencies, to the supranational "global controllers" of the European Commission - that economic development thrives on specialisation, we see a variety of successful adjustment practices based on exactly the opposite. This has meant diversification, innovation and extension of technical capabilities from one industry to another, showing a "related variety" of sorts that fulfils the Schumpeterian view that innovation arises from the recombination of largely existing knowledge and equipment to create commercially new "solutions" or "propositions" for the market" (Cooke, 2018, 138).

The importance of business incentives

In line with the growing importance of designing, planning and implementing business innovation, there has recently also been a growing interest in the choice of the most efficient instruments.

To support innovation within companies, two types of instruments stand out from the rest: direct public spending measures - which include subsidies, loans and the like - and the granting of tax incentives - which do not involve direct public spending, but do involve fiscal expenditure insofar as they imply a lower collection of tax revenue. However, it is the needs identified in innovation systems that will determine the suitability of the incentives chosen (European Commission, 2006).

3- The Technology Fund, the Intelligent Growth programme and the role of ERDF-*Innterconecta* calls for proposals

The Lisbon European Council in 2000 set the strategic goal for 2010 for the EU to become "the most competitive and dynamic knowledge-based economy in the world" (Lisbon Strategy). The European Council reviewed the Lisbon Strategy in spring 2005 with the aim of revitalising it, including two lines of action: on the one hand, to develop research, education and innovation in all its forms, and on the other hand, to strengthen innovation policy. In this way, an investment in R&D of 3% of GDP was to be achieved.

In the process of drawing up the Multiannual Programming for the 2007-2013 period, and in a context in which Spain was to cease to be the main recipient country of FFEE in favour of Poland, the Council established that the first country would receive an additional allocation of 2,000 million euros of ERDF resources for a TF aimed at improving R&D by and for the benefit of companies, especially in the Convergence Objective regions. This programme was then followed by a further programme called Intelligent Growth, also endowed with substantial amounts.

The Technology Fund

As indicated by Sande & Vence (2019), the "Operational Programme for R&D&I by and for the benefit of Companies - Technology Fund" was created as a special ERDF fund earmarked for the promotion of business R&D&I, constituting a key tool for overcoming the weaknesses of the Science-Technology-Business System (SCTE), and which would allow it to be structured in such a way as to be able to take advantage of the economic and social opportunities offered by technological development. The main weaknesses detected in the Spanish SCTE were (Ministry of Economy and Finance, 2007): the low consideration of R&D&I as an element of competitiveness by the business sector, insufficient training and qualification of human resources in R&D&I, the lack of financial and human resources to innovate, the scarce culture of collaboration between innovative agents (companies, research centres and universities), the scarce knowledge of innovation transfer activities, the lack of use by companies of the public R&D system and the lack of cooperation between SMEs to promote innovative projects.

In addition, in order to achieve the ultimate objective set by Lisbon - to promote R&D&I activity and increase business participation - the TF established a series of intermediate objectives:

- a) To contribute to a better articulation of the Spanish R&D&I system and to a better integration of the same, including with the set of regional Innovation Systems, and of the latter among themselves;
- b) Support innovative entrepreneurial behaviour, especially in the Convergence Objective regions - with a greater backwardness in this field - as well as among broader sectors of companies, with a preference for SMEs;
- c) Support the transfer of research results to enterprises, so that research activity can be translated into increased competition and social welfare;
- d) To broaden the base of the Spanish SCTE by attracting SMEs to research and innovation activity.

Another cross-cutting objective was added, which consisted of encouraging equality between women and men in the field of R&D and innovation.

An inherent condition of the FFEE is that they are aimed at the territories with the lowest level of development. Specifically, the FT aimed at promoting business R+D+i had a distribution of resources approved by the European Council (Ministry of Economy and Finance, 2007): 70% for the Convergence Objective regions of Andalusia, Andalusia, Extremadura and Castilla La Mancha; 5% for the Phasing-out regions (statistical effect); 15% for the Phasing-in regions (growth effect) and 10% for the Competitiveness Objective regions. The allocation per region was planned in proportion to its R&D expenditure. Thus, the Operational Programme had €2,248.45 million for the whole of Spain, with Andalusia receiving €405.59 million.

Given that in this timeframe Andalusia presented a need for economic development and a situation of technological backwardness compared to the most advanced regions of the EU (Hollanders, Eres-Sadki & Kanerva, 2016), it was necessary to pay special attention to the effectiveness and efficiency of the technological policies applied in the territory.

The Smart Growth Programme

The Smart Growth Operational Programme, which is co-financed by the ERDF under the Cohesion Policy, is one of the multi-regional programmes to be invested in Galicia in the 2014-2020 period.

The OP, with a total planned cost of 5,863.2 million euros at national level and an ERDF assistance of 3,939.2 million euros, will support the following priority axes:

1. Boosting research, technological development and innovation (ERDF: 2,894.7 million euros).
2. Improving the use, quality and access to information and communication technologies (ERDF: 748.3 million).
3. Improving the competitiveness of SMEs (ERDF: EUR 268.6 million).
4. Technical assistance (ERDF: EUR 27.6 million).

The first 3 Axes will have public and private co-financing, while Axis 4 will only be co-financed by public capital.

The group of "more developed regions" would share through this programme a total of EUR 1,778.3 million of ERDF assistance at national level. The group of "regions in transition", including Andalusia, would receive 2,021.4 million euros of ERDF assistance, while the group of "less developed regions" would receive 139.5 million euros of ERDF assistance for their investments.

The ERDF-Innterconecta calls for proposals

As mentioned above, the FT was created to promote business R&D&I, especially in the Convergence Objective territories. Its management was mainly centralised in the Centre for Technological and Industrial Development (CDTI). In particular, through the FEDER-Innterconecta call for proposals, support was given to integrated experimental development projects of a strategic nature, large in size and aimed at developing innovative technologies in technological areas of the future with international economic and commercial projection. Industrial research projects were also considered (CDTI, 2013). All thematic areas were eligible as long as they stimulated job creation, had a high technological level and allowed participants to increase the added value of their activities (Ministry of Economy and Competitiveness, 2013).

The relevance of these calls is evident if we take into account the funding amounts of the first two editions in 2011 and 2013, which reached 262 M€ for the Convergence Objective territories: Andalusia with 150 M€¹, Galicia with 105 M€² and Extremadura with 7 M€³.

The approach to applications for funds under this programme required the formalisation of an Economic Interest Grouping (EIG) or Consortium made up of at least three autonomous companies, one of which must be large or medium-sized and the other small or medium-sized, in accordance with the definitions standardised by the European Commission. If there is no small enterprise in an EIG, one must participate in the form of subcontracting. The maximum number of companies allowed in such a grouping was ten. In addition, the significant participation of at least one research organisation in the form of subcontracting by one or more of the member companies was required. The maximum duration of the projects was three and two calendar years respectively for the first two calls analysed (Ministry of Science and Innovation, 2012), in both cases allowing the participation of foreign companies and organisations.

The objectives stated in the ERDF-Innterconecta calls in Andalusia covered a wide range of objectives:

- Support for large R&D projects,
- Increasing R&D expenditure by companies,
- The use of existing infrastructures,
- The greater involvement of agents and the promotion of an innovative culture,
- Mobilisation of SMEs, and
- The internationalisation of innovation.

To achieve this, it was proposed to support the following thematic areas with potential for future economic development: agri-food and marine resources, bio-health technologies, ICT, production technologies, energy, construction, environment and transport/automobiles.

¹ Andalucía: 100 M€ la primera convocatoria y 50 M€ la segunda

² Andalucía: 30 M€ la primera convocatoria y 75 M€ en la segunda

³ Extremadura: Únicamente participa en la segunda convocatoria

Subsequently, the CDTI launched three more calls for proposals under the name Innterconecta: the third was launched in mid-2015 and was endowed with €110 million, and in 2016 and 2018 the fourth and fifth calls for proposals were published with €50 million each. They are already being carried out in the framework of the new programming period. These calls also present disparities in target territories (the classification of regions changes) and thematic areas, and while the first two are public grants included in the R&D&I Programme Oriented to the Challenges of Society - in the framework of the State Plan for Scientific and Technical Research and Innovation 2013-2016 (known as the State R&D&I Plan) -, the third is born in the framework of the State Plan for Scientific and Technical Research and Innovation 2017-2020. The grants awarded will be co-financed by ERDF funds, but through the Smart Growth Operational Programme 2014-2020.

4- General analysis of Innterconecta calls for proposals in Andalusia

Below we will analyse the most relevant data extracted from the projects of activities requested and approved in the first and second calls of the Innterconecta programme in Andalusia. For this purpose, we conducted a study of the project database and systematised the most relevant information on each of them. Based on these project files, we analysed the key elements of each project. Firstly, the economic amount of the projects, the type of agents involved and the technological areas and, secondly, we will focus on the networks formed.

Size and characteristics of approved projects: type of actors, amount of projects and technological areas.

The total number of projects applied for in the first two Innterconecta calls was XXX. However, the number of projects finally approved was (XX), with a total of xxx direct participants (xxx companies and xxx research organisations). Although the number of applications for participation was increasing, this increase is much smaller than the number of approved projects, which more than tripled.

We classified the participating actors according to their nature (company or technology centre/research organisation) and their size. The average number of participants per approved project was XXX, slightly higher than the average number of projects requested. In line with the profile of the calls, companies predominate (XXX on average) as opposed to research organisations (XXX). A breakdown of the companies

by size shows that X% were SMEs and the remaining X% were large companies. Within each project, the participating companies could have different roles, distinguishing between leading companies (greater prominence, responsibility and resources managed) and partner companies.

5- Evolución comparada de los indicadores de I+D+i de las empresas participantes y no participantes en *Innterconecta I y II*

The Innterconecta programme had a significant budget allocation within the context of the resources mobilised by Andalusian R&D&I, so the expected results of its implementation should also be significant (although some of the effects will have to be assessed in the long term). In order to approximate its impact, we tried to analyse the behaviour of the companies participating in this programme in terms of the main R&D&I indicators. The behaviour analysed for these companies is obviously also influenced by another series of factors, such as the deep economic crisis, the existence of other public and personal initiatives, regulatory changes, or even the different individual management of the entities, among others.

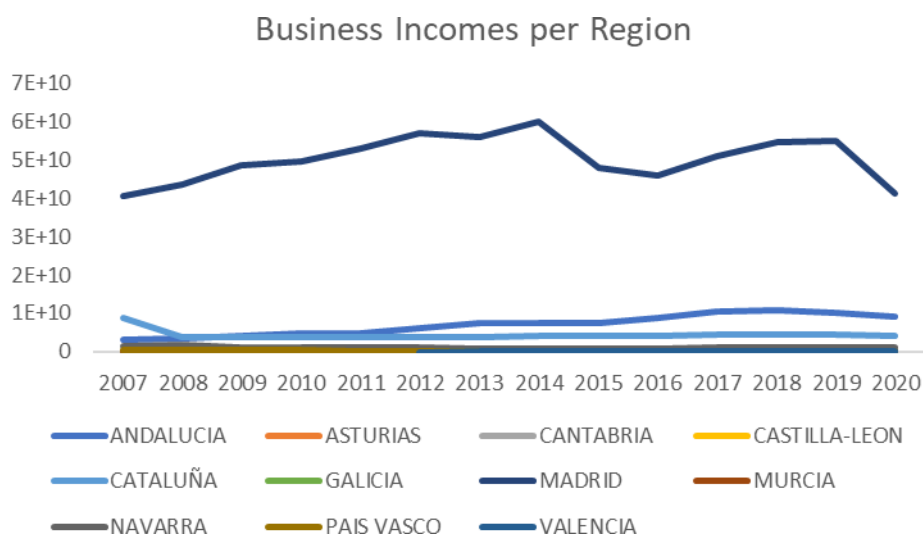
General data on the evolution of indicators

We studied the evolution of the following economic indicators of the innovative activity of companies in the period 2007-2020: revenue, gross value added (GVA), employment, productivity, economic profitability, R&D effort, R&D investment and total R&D expenditure. The information prepared is based on company accounting information extracted from the ARDÁN database. It should be noted that the analysis of the evolution of companies in this period presented an additional difficulty caused by the deep economic crisis that began in 2008 and broke any regularity in the different variables. This makes it particularly difficult to identify the sensitivity of company variables to participation in the Innterconecta programme projects.

The different business entities participating in the different modalities were identified and it was possible to differentiate XXX companies. Of these companies, information was available for XXX of them -XXX Andalusian and XX from outside Andalusia-, from which the general data for this part of the study is extracted and which account for X% of the total number identified. These companies received annual subsidies between 2012 and 2019, so the impact (if any) on the indicators should reflect changes with

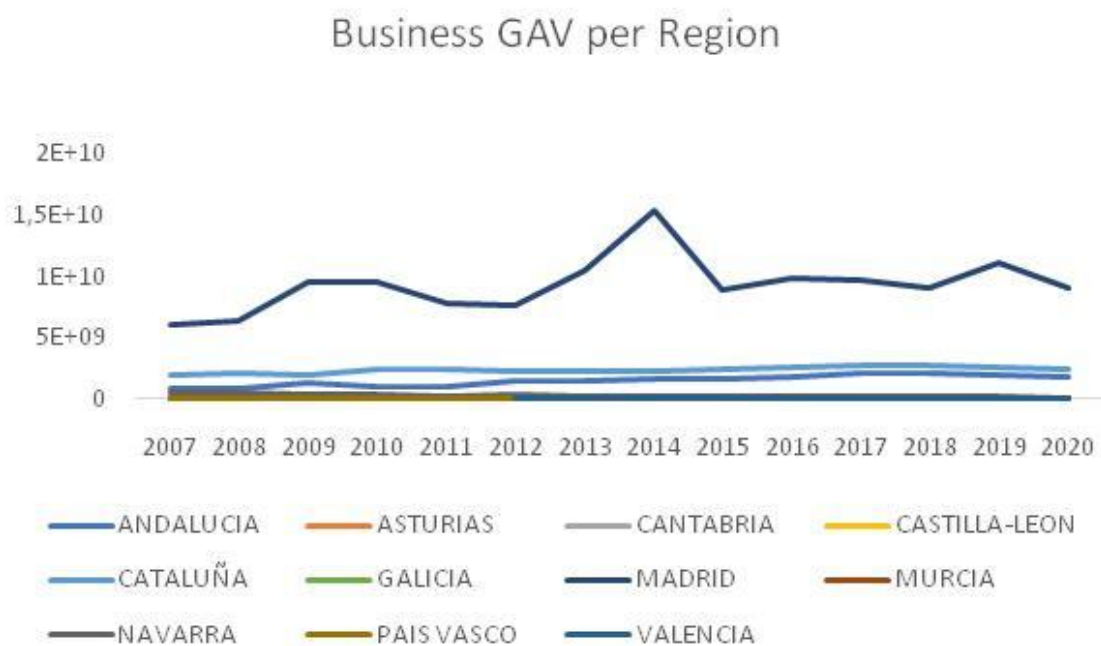
respect to previous years or, in some aspects, will become apparent in subsequent years. The regionalised data on the evolution of the main indicators selected for the study are shown graphically below.

Graph 1: Evolution of Income, companies participating in Innterconecta-Andalusia, by region (M€)



Source: Own elaboration based on data from Ardán and CDTI

Graph 2: Evolution of GVA, companies participating in Innterconecta-Andalusia, by región (M€)



Source: Own elaboration based on data from Ardán and CDTI

Graph 3: Evolution of number of employees, companies participating in Innterconecta-Andalusia, by region



Source: Own elaboration based on data from Ardán and CDTI

Graph 4: Evolution of Profitability, companies participating in Innterconecta-Andalusia, by region (%)



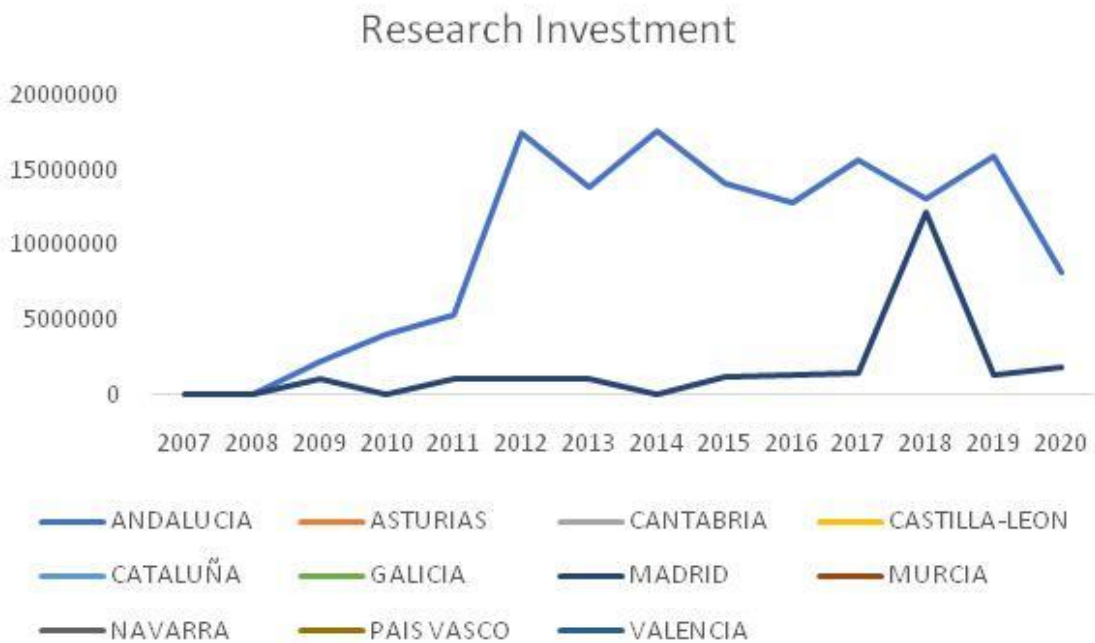
Source: Own elaboration based on data from Ardán and CDTI

Graph 5: Evolution of Result of the Year, companies participating in Innterconecta-Andalusia, by region (M€)



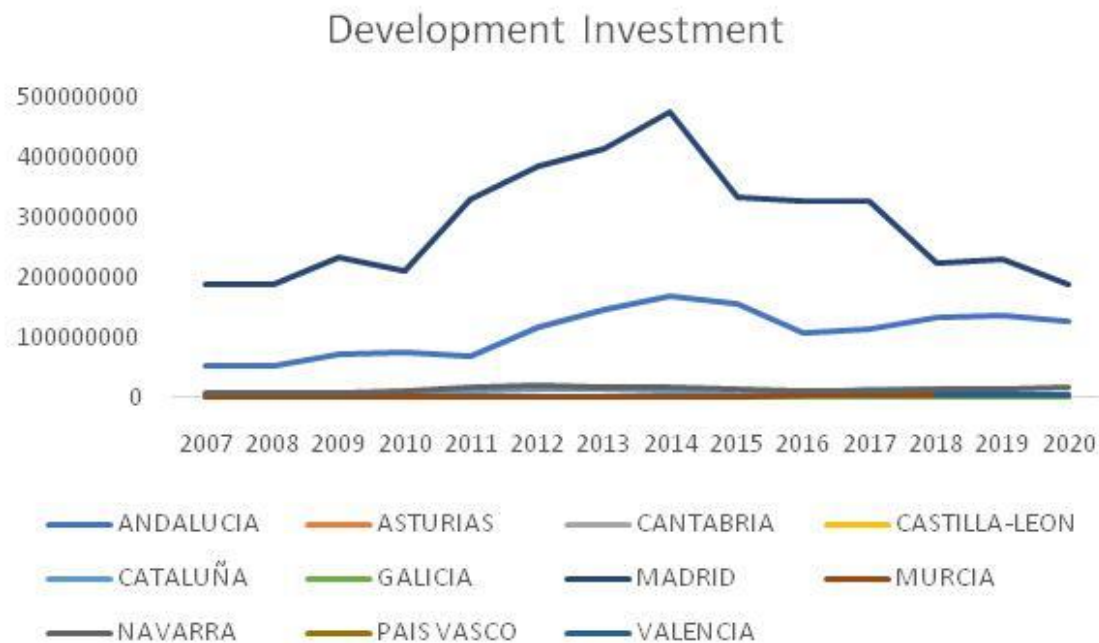
Source: Own elaboration based on data from Ardán and CDTI

Graph 6: Evolution of Research Investment, companies participating in Innterconecta-Andalusia, by region (M€)



Source: Own elaboration based on data from Ardán and CDTI

Graph 7: Evolution of Development Investment, companies participating in Innterconecta-Andalusia, by region (M€)



Source: Own elaboration based on data from Ardán and CDTI

6- Conclusions

The FT and Smart Growth programmes to boost technological development in Andalusia in the periods 2007-2013 and 2014-2020 raised high expectations for the development of the Andalusian Innovation System. The general conclusion we can draw from the implementation of these programmes is that the achievements were much more modest than expected and did not prevent the volume of R&D and innovation expenditure in Andalusia from experiencing a serious decline during the years corresponding to the financial crisis that began in 2008.

As for the achievement of the specific objectives of the Innterconecta programme, we can conclude that the results are equally modest and uneven. Some of the objectives were achieved while others were not. We will begin by summarising those objectives that can be considered to have been at least partially achieved.

One of the objectives set out in the Innterconecta calls for proposals was to mobilise large R&D projects. The grants awarded under the Innterconecta programme in Andalusia reached a subsidised amount per project of close to €5m, so these must certainly be considered large. The fact of opting for large projects did not allow a greater number of actions to be carried out and did not improve access to SMEs - for example, in Galicia the size of the projects funded is average, being projects of

approximately one million euros (Sande & Vence, 2021). However, the size of the

Andalusian projects could favour technological capacity in some sectors in a more significant way. However, according to Sande (2022b), the size of the projects may not have facilitated the integration of micro-SMEs, which may be relevant in emerging sectors, which would contribute to strengthening the diversification of the productive fabric.

As for the microeconomic impact for the participating companies, we can see the uneven evolution in the R&D&I indicators of the companies in the second part of the programming period, coinciding with the implementation of Innterconecta.

Los programas FT y Crecimiento Inteligente para impulsar el desarrollo tecnológico en Andalucía en los períodos 2007-2013 y 2014-2020 levantaron unas altas expectativas de cara al desarrollo del Sistema Andaluz de Innovación. La conclusión general que podemos extraer de la implementación de estos programas es que las realizaciones fueron mucho más modestas de lo esperable y no se evitó que el volumen de gasto en I+D e innovación en Andalucía experimentase un grave declive durante los años correspondientes a la crisis financiera iniciada en 2008.

7- References

Asheim, B., Moodysson, J., & Tödtling, F. (2011). Constructing Regional Advantage: Towards State-of-the-Art Regional Innovation System Policies in Europe? *European Planning Studies*, 1133-1139. DOI: <https://doi.org/10.1080/09654313.2011.573127>

Barca, F. (2009). *An agenda for a reformed cohesion policy. A place-based approach to meeting European Union challenges and expectations*. Regional Policy European Commission. Recuperado de http://www.europarl.europa.eu/meetdocs/2009_2014/documents/regi/dv/barca_report_/barca_report_en.pdf

Boschma, R. (2005). Proximity and Innovation: a Critical Assessment. *Regional Studies*, vol. 39, 61-74. DOI: <https://doi.org/10.1080/0034340052000320887>

Boschma, R. (2009). *Evolutionary Economic Geography and its Implications for Regional Innovation Policy*. Paris: OECD. Recuperado de <http://econ.geo.uu.nl/boschma/OECD.pdf>

Brujin, P., & Lagendijk, A. (2005). Regional Innovation Systems in the Lisbon Strategy. *European Planning Studies*, 13, 8, 1153-1172. DOI: <https://doi.org/10.1080/09654310500336519>

Camagni, R., & Capello, R. (2012). Regional Innovation Patterns and the EU Regional Policy Reform: Towards Smart Innovation Policies. Paper presented at *the 52nd ERSA conference*. Bratislava, Slovakia. August 21-24: ERSA. Recuperado de <http://www-sre.wu.ac.at/ersa/ersaconfs/ersa12/e120821aFinal00190.pdf>

CDTI. (2013). Fondo FEDER Innterconecta [En línea]. Obtenido de www.cdti.es [ref. de 15 de maio de 2013]. Disponible en: <http://www.cdti.es/index.asp?MP=7&MS=577&MN=3>

Comisión Europea. (2006). *Marco Comunitario sobre ayudas estatales de investigación e desenvolvimiento e innovación*. Luxemburgo: DOUE C 323/1. Recuperado de <https://eur-lex.europa.eu/legal-content/ES/TXT/?uri=CELEX%3A52014XC0627%2801%29>

Comisión Europea. (2010). COM (2010) 553 final. Comunicación de la Comisión al Parlamento Europeo, al Consejo, al Comité Económico y Social Europeo y al Comité de las Regiones: Contribución de la Política Regional al crecimiento inteligente en el marco de Europa 2020. Bruselas, fecha de 6-10-2010. Recuperado de <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0553:FIN:ES:PDF>

Comisión Europea. (2011). *Regional Policy for Smart Growth in Europe 2020*. Brussels: Directorate-General for Regional Policy, EU Publications Office. Recuperado de https://ec.europa.eu/regional_policy/sources/information/pdf/brochures/rfec/2011_smart_growth_en.pdf

Cooke, P. (1998). Introduction: Origins of the concept. En H. Braczyk, P. Cooke, & M. Heidenreich (Eds.), *Regional Innovation Systems*, (2-25). London: UCL Press Limited

Cooke, P. (2001). Sistemas de innovación regional: conceptos, análisis y tipología. *Sistemas regionales de innovación*. Universidad del País Vasco, Olazaran, M. y Gómez, M. (eds.), 73-92. Recuperado de https://www.orkestra.deusto.es/images/investigacion/publicaciones/articulos-cientificos/revistas-especializadas/000078_M-Navarro.pdf

Cooke, P. (2009). Origins of Regional Innovation Systems Thinking and Recent Advances from Analysis of Green Innovation. *Ekonomiaz*, n° 70, 60-85

Cooke, P. (2012). Relatedness, Transversality and Public Policy in Innovative Regions. *European Planning Studies*, vol. 20:11, 1889-1907. DOI: <https://doi.org/10.1080/09654313.2012.723426>

Cooke, P. (2018). Transversality, resilience and innovation: a qualitative regional analysis. In Baycan & Pinto: *Resilience, Crisis & Innovation Dynamics*, Chapter 7, 130-149. DOI: <https://doi.org/10.4337/9781786432193.00014>

Hollanders, H., Es-Sadki, N., Kanerva, M. (2016). *Regional Innovation Scoreboard 2016*. Maastrich: InnoMetrics-Merit, European Commission. Recuperado de <https://publications.europa.eu/en/publication-detail/-/publication/693eaaba-de16-11e6-ad7c-01aa75ed71a1>

Isaksen, A. (2001). Building Regional Innovation Systems: Is Endogenous Industrial Development Possible in the Global Economy? *Canadian Journal of Regional Science*, 101-120. Recuperado de <http://www.cjrs-rcsr.org/archives/24-1/ISAKSEN.pdf>

Lundvall, B.-A. (1992). *National Systems of Innovation*. London: Pinter
Martin, R., & Trippel, M. (2013). System Failures, Knowledge Bases and Regional Innovation Policies. *CIRCLE Working Papers*, 13, 1-22. Recuperado de http://wp.circle.lu.se/upload/CIRCLE/workingpapers/201313_Martin_Trippel.pdf

McCann, P., & Ortega-Argilés, R. (2011). Smart specialisation, regional growth and applications to EU Cohesion Policy. *Documents de Treball de l'IEB*, n° 14, 1-32. DOI: <https://doi.org/10.1080/00343404.2013.799769>

Ministerio de Ciencia e Innovación. (2012). Orden ECC/1808/2012, de 18 de junio por la que se modifica la Orden CIN/1729/2011, por la que se establecen las bases reguladoras para la concesión de subvenciones destinadas a fomentar la cooperación estable público-privada en investigación y desarrollo (I+D), en áreas de importancia estratégica para el desarrollo de la

economía española (FEDER- INNTERCONECTA). Madrid, España: BOE núm. 194, de 14-08-2012. Recuperado de <https://www.boe.es/buscar/doc.php?id=BOE-A-2011-10854>

Ministerio de Economía y Competitividad. (2013). Resolución de 30 de enero de 2013, del Centro para el Desarrollo Tecnológico Industrial, por la que se aprueba la convocatoria del año 2013 para la Comunidad Autónoma de Andalucía del procedimiento de concesión de subvenciones destinadas a fomentar la cooperación estable público-privada en investigación y desarrollo (I+D), en áreas de importancia estratégica para el desarrollo de la economía española (FEDER-INNTERCONECTA). BOE núm. 46, de 22-02-2013. Recuperado de https://www.boe.es/diario_boe/txt.php?id=BOE-A-2013-2012

Ministerio de Economía y Hacienda (2007). *Programa Operativo de I+D+i por e para o beneficio das Empresas-Fondo Tecnológico*. Madrid: AGE. Recuperado de http://www.dgfc.sepg.hacienda.gob.es/sitios/DGFC/es-ES/ipr/fcp0713/p/pop/Documents/POFondoTecnologico_07_2011.pdf

Nauwelaers, C., & Wintjes, R. (2003). Towards a New Paradigma for Innovation Policy? En Asheim, B., Isaksen, A., Nauwelaers, C. & Tödtling, F. (2003), *Regional Innovation Policies for small-medium enterprises*, 193-220. Cheltenham, UK an Lyme, US: Edward Elgar

Navarro, M. (2009). Los sistemas regionales de innovación. Una revisión crítica. *Ekonomiaz*, Vol. 70, 25-59

OECD (2011). *Reviews of Regional Innovation-Regions and Innovation Policy*. Paris: OECD. Recuperado https://www.programmede.eu/fileadmin/PROG_MED/capitalisation/OECD_Regions_Collaborating_Across_Borders.pdf

Rodrik, D. (2007). How to save globalization from his cheerleaders? *KSG Working Paper N° RWP07-038*, 1-32. Disponible en SSRN: <https://ssrn.com/abstract=1019015> ou <http://dx.doi.org/10.2139/ssrn.1019015>

Sande, D. (2020). *O estrangulamento tecnolóxico de Galiza. Análise das políticas europeas para a innovación rexional durante a Gran Recesión*. Editorial Laidvento: Santiago de Compostela

Sande, D. (2022a). ¿Existe impacto de las Políticas Europeas de Innovación Regional en las empresas? Análisis del programa FEDER-Innterconecta del Fondo Tecnológico 2007-2013 en Galicia. *Cuadernos Europeos de Deusto*, n° 66

Sande, D. (2022b). Grandes Empresas Vs Pymes: Quién muestra mayor impacto de los Fondos Estructurales para innovación empresarial en regiones periféricas? Análisis de resultados del Fondo Tecnológico 2007-2013 en Galicia. *Revista Portuguesa de Estudos Regionais*, n° 61

Sande, D. & Vence, X. (2019). Avaliación do impacto do Programa Fondo Tecnológico 2007-2013 de Andalucía: resultados, concentración das axudas e fugas de recursos. *Revista Galega de Economía*, 28(3), 92-114

Sande, D. & Vence, X. (2021). Impact of Structural Funds for Innovation on the business innovation: analysis through the indicators of the companies participating in the ERDF-Innterconecta programme in Galicia. *Revista Galega de Economía*, 30(2), 1-16

Tödtling, F., & Tripl, M. (2005). One Size Fits All? Towards a Differentiated Regional Innovation Policy Approach. *Research Policy*, 34 (8), 1203-1219. DOI: <http://dx.doi.org/10.1016/j.respol.2005.01.018>

Vence, X. (2007). *Crecimiento y políticas de Innovación*. Madrid: Pirámide