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BOOST
Smart Innovation Ecosystems

SPAIN - national & regional innovation framework & CATALUNYA Regional analysis of the innovation status

Clúster Digital

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SPAIN - national & regional innovation framework

Territorially, Spain is one of the most decentralised countries in the world. It is organised into 8131 municipalities, 50 provinces, and 17 Autonomous Communities, plus the autonomous cities of Ceuta and Melilla.



Figure no. 1. Spanish Autonomous Communities

The Autonomous Communities are territorial entities that have political and financial autonomy. This implies the attribution of competence to legislate and execute in those areas in which their Statutes of Autonomy recognise it. Their main institutions of self-government are two: the Legislative Assembly and the Governing Council. In most of the Communities, this institutional framework is complemented by their own institutions (similar to those of the Central State).

In general, the Autonomous Communities have the following competences:

- Exclusive legislative and executive powers: for social services, agriculture and livestock, inland fishing, industry, trade, tourism, youth, and sports.
- Competences for the development and implementation of basic State legislation: in environmental aspects, economic policy, consumer protection, education, health care, and public health.
- Competences for the implementation of legislation adopted exclusively by the State. This is the case for employment and vocational training.

The Autonomous Communities have financial autonomy, although their revenues depend partly on the State and partly on their own resources, their own taxes or part of those obtained from State taxes in the Autonomous Community. This system is based on a “system of participation” in State revenues collected from the main taxes.

Spain has a population of 47,6 million inhabitants (2022), of which 15,95% live in rural areas.

• Research, development & innovation GOVERNANCE

The Spanish national innovation framework is characterized as a "system of systems". The development of the competences of the Autonomous Communities in the field of scientific and technical research and innovation through their Statutes of Autonomy and the approval of their normative frameworks has resulted in autonomous systems of R&D&i with their own entity, that coexist with the system promoted by the General Administration of the State.

In this framework, the Spanish **Strategy for Science, Technology and Innovation** (EECTI) was born "*top-down*" through the governance established in Law 14/2011, of 1 June, on Science, Technology and Innovation (LCTI) but also "*bottom-up*" through the constitution of interest groups that respond to a quadruple helix model (Companies, Research and Public Administration, Civil Society and Innovation Users).

The EECTI 2021-2027, promoted by the Ministry of Science and Innovation, is the multiannual reference framework for achieving a set of general objectives, shared by all the Public Administrations with responsibilities in promoting scientific, technical and innovation research, and, together with the State Plans for Scientific, Technical Research and Innovation, is configured as the **State Smart *Specialisation Strategy S3***. This provides an instrument that will serve as a reference for drawing up the scientific and technical research plans of the different Public Administrations, and for their articulation with the research policies of the European Union and International Organisations.

Thus, the Strategy is an umbrella for both the State R&D&I Plans and the regional plans of the Autonomous Regions, meaning that it is necessary to develop the EECTI's governance and monitoring and evaluation system to facilitate sectoral and territorial coordination with the different ministries and the Autonomous Regions, respectively. Nevertheless, the EECTI Monitoring Committee must have the following composition:

Three representatives of the MCIN (Ministry of Science and Innovation) and one representative of MUNI (Ministry of Universities), excluding the chair and vice-chair.
Six representatives from the rest of the ministerial departments representing the six strategic lines of national R&D&I. To be determined by the Council of Ministers.
Four representatives of the Autonomous Regions. To be determined in the CPCTI (Council for Science, Technology and Innovation Policy)
Six scientists, technologists or innovators of recognised prestige representing the six strategic lines of national R&D&I. To be appointed by the General Secretariat for Research at the proposal of the CACTI (Science, Technology and Innovation Advisory Council)
Two representatives of society, two trade union representatives and two representatives of the business sphere, reflecting the demands of citizens, consumers and non-profit organisations. To be appointed by the General Secretariat for Research at the proposal of the CACTI.
A representative of the State Investigation Agency (AEI).
A representative of the Centre for the Development of Industrial Technology (CDTI).
A representative of the Instituto de Salud Carlos III (ISCIII).
A representative of the Spanish Foundation for Science and Technology (FECYT).

The EECTI is being implemented in two phases:

- In the first phase (2021-2023) efforts are being focused on guaranteeing the strengths of the system, reinforcing current programming, infrastructures and human resources.
- The second phase (2024-2027) will place R&D&I among the fundamental pillars of Spain and consolidate its value as a tool for the development of a knowledge-based economy.

The Strategy's main objectives are to strengthen public-private collaboration, promote knowledge transfer, improve the situation of research personnel and institutions, enhance Spain's capacity to attract, recover and retain talent and guarantee the application of the principle of real equality between women and men in R&D and innovation

In addition, at the national level, there are **sectoral strategies**, where R&D&I plays a fundamental role, such as the Spanish Strategy for R&D&I in Artificial Intelligence; the National Connected Industry Strategy; Defence Technology and Innovation Strategy; Digitisation Strategy for the Agri-Food and Forestry Sector and the Rural Environment; or strategic framework in SME policy, among others, which establish priorities to be developed in initiatives and activities defined and financed through the State Plans for Scientific and Technical Research and Innovation (PEICTI).

Finally, it has also been adopted the Pact for Science and Innovation, which is a document signed by organisations representing science, academia, business, and labour. This document includes a series of specific commitments regarding the sustainable increase of resources, the improvement of the conditions of scientific and technical personnel and the reinforcement of the autonomy and coordination of R&D&I funding entities.

• Research, development & innovation SYSTEM

In Spain there are various institutions and public bodies responsible for supporting and promoting Spanish companies. These institutions belong to both the central State Administration and the Autonomous Communities

At the national level, business policies and strategies are planned and developed through the General Secretariat for Industry and Small and Medium-Sized Enterprises of the Ministry of Industry, Trade and Tourism, whose management body is the Directorate-General for Industry and Small and Medium-Sized Enterprises.

This body has adopted the **SME Strategic Framework**, which is an instrument at the service of SMEs that defines the political framework of action for Spanish public administrations in the field of small and medium-sized enterprises in the long term, comprising a set of recommendations organised into seven levers or areas of action that are considered strategic in any policy that has SMEs at its centre:

- entrepreneurship,
- business management and talent,
- regulatory framework,

- financing,
- innovation and digitalisation,
- sustainability and
- internationalisation.

All of this, in coordination with the different plans and strategies, whether sectoral or of a more cross-cutting nature, of both the General State Administration and the Autonomous Communities and Local Bodies.

In addition, there are advisory bodies, such as the State Council for SMEs (attached to the Ministry of Industry, Trade and Tourism, through the General Secretariat for Industry and Small and Medium-Sized Enterprises), whose function is to advise on issues that have an impact on SMEs, promoting their creation, growth, and development of competitive advantages.

At the Spanish level, we can find the Centre for the Development of Industrial Technology (CDTI), which is a Public Business Entity, answering to the Ministry of Science and Innovation, which fosters **the technological development and innovation of Spanish companies**. It is the entity that channels the funding and support applications for national and international R&D&i projects of Spanish companies.

The CDTI thus seeks to contribute to improving the technological level of the Spanish companies by means of implementing the following activities:

- Financial and economic-technical assessment of R&D projects implemented by companies.
- Managing and fostering Spanish participation in international technological cooperation programmes.
- Fostering international business technology transfer and support services for technological innovation.
- Supporting the setting up and consolidating technological companies.

Finally, other actors that play a crucial role at supporting SMEs and fostering their innovation strategies are the Chambers of Commerce. Concretely, the Spanish Chamber of Commerce -which is a public law corporation, with consultative and collaborative functions, whose purpose is to represent, promote and defend the general interests of Spanish companies- promoted the programme “Apoyo al emprendedor España” (Support for Entrepreneurship Spain) that, among others, aims at providing financial support for boosting innovation.

Supporting innovation through clusters in Spain

Clusters in Spain play a fundamental role in the development of business innovation, especially among SMEs. Aware of it, the Ministry of Industry, Trade and Tourism promoted in 2006 the “Agrupación Empresarial Innovadora” (Innovative Business Association- AEI), which is, on one hand, a distinctive to clusters that have a high innovative potential, and, on the other hand, grants SMEs members of theses clusters access to direct funding. Thus, the final objective of the AEI programme is to improve the competitiveness of SMEs through calls for proposals to support their innovative and business competitiveness strategies.

The Ministry of Industry has awarded the status of AEI to 99 Innovative clusters all over Spain, with Catalonia being the most represented with 24 clusters AEI:

CCAA	AEI	Entities	SMEs	Research centres	Employees
Andalucía	6	994	860	47	325.508
Aragón	12	797	578	51	334.274
Asturias, Principado de	6	436	361	29	156.243
Balears, Illes	1	60	45	2	445.414
Canarias	1	105	98	2	4.263
Cantabria	1	17	11	2	5.898
Castilla y León	6	426	326	61	205.008
Cataluña	24	3.050	2.516	224	967.326
Comunitat Valenciana	8	733	640	37	128.844
Galicia	6	615	492	29	240.941
Madrid, Comunidad de	9	887	679	69	482.231
Murcia, Región de	1	46	46	3	1.847
Navarra, Comunidad Foral de	6	467	387	39	96.838
País Vasco	8	1.219	1.018	68	332.343
Rioja, La	4	324	287	10	27.587
TOTAL	**99**	**10.176**	**8.344**	**673**	**3.754.565**

Table no. 1. Innovative cluster by Autonomous Communities (iPyme).

Those 99 clusters employ two million people and include 10.174 companies, 80% of which are SMEs.

The sectors represented by the AEIs are:

Sector	AEI	Sector	AEI
Aeronautics	3	Materials	8
Agri-food	12	Media	2
Automotive	7	Environment and Energy	14
Biotechnology and health	7	Naval	2
Sports	1	Textile and footwear	4
Railway	1	ICT	15
Habitat	6	Tourism	4
Childhood and toys	2	Machinery and Industrial Technology	8
Logistics	3		

Table no. 2. Clusters AEI by sector (iPyme)

• POLICY & STRATEGIES boosting research, development & innovation

AT THE NATIONAL LEVEL, the Spanish **Strategy for Science, Technology and Innovation** (EECTI) was born "top-down" through the governance established in Law 14/2011, of 1 June, on Science, Technology and Innovation (LCTI) but also "bottom-up" through the constitution of interest groups that respond to a quadruple helix model (Companies, Research and Public Administration, Civil Society and Innovation Users).

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The Strategy's main objectives are to strengthen public-private collaboration, promote knowledge transfer, improve the situation of research personnel and institutions, enhance Spain's capacity to attract, recover and retain talent and guarantee the application of the principle of real equality between women and men in R&D and innovation.

In addition, at the national level, there are **sectoral strategies**, where R&D&I plays a fundamental role, such as the Spanish Strategy for R&D&I in Artificial Intelligence; the National Connected Industry Strategy; Defence Technology and Innovation Strategy; Digitisation Strategy for the Agri-Food and Forestry Sector and the Rural Environment; or strategic framework in SME policy, among others, which establish priorities to be developed in initiatives and activities defined and financed through the State Plans for Scientific and Technical Research and Innovation (PEICTI).

Finally, it has also been adopted the **Pact for Science and Innovation,** which is a document signed by organisations representing science, academia, business, and labour. This document includes a series of specific commitments regarding the sustainable increase of resources, the improvement of the conditions of scientific and technical personnel and the reinforcement of the autonomy and coordination of R&D&I funding entities.

AT THE REGIONAL LEVEL, Catalonia bases its strategic programming on European strategies, i.e., it takes as a reference the 2030 Agenda, the European Pact, the Digital Strategy and the Industrial Strategy. Thus, in Catalonia we find the following Strategies and Agendas:

- Smart Catalonia strategy. Smart Catalonia is the strategy of the Government of Catalonia that, in line with the Europe 2020 strategy of the European Commission, extends the Smart City concept on a national level to undertake a programme that integrates and coordinates local and multi-region initiatives in support of businesses and ongoing Smart initiatives throughout the territory.

  Smart Catalonia aims to make Catalonia an international "Smart Country" of reference, using digital information and technology to bring innovation to public services, drive economic growth and promote a smarter, more sustainable and more inclusive society.

- Research and innovation strategy for smart specialization in Catalonia (RIS3CAT). Further information can be found below.

- Eco-design Strategy for a circular and eco-innovative economy. The Catalan Ecodesign Strategy is one of the main instruments of the Generalitat de Catalunya that, within the framework of other European and Catalan strategies, aims to promote the transition towards a circular economy. This strategy is formed by 43 actions.

- Rural agenda of Catalonia. The Rural Agenda is a key element for planning Catalonia's territorial balance and cohesion policies. The Rural Agenda of Catalonia has been drafted following the frame of the European Parliament's initiative to elaborate a European Rural Agenda that promotes socio-economic development, economic growth and diversification, social welfare, protection of nature and cooperation and interconnection with urban areas.

- Agenda of towns and cities of Catalonia 2050.Catalonia's urban agenda provides support to regions and municipalities with vulnerabilities towards climate crises. The agenda is based on the idea that the future of cities depends on economic, social, and environmental resilience. The plan includes a multilevel roadmap, with actions designed for different administrations and the economic and social stakeholders, in order to deal with the ecological transition and digitalization and generate opportunities across the country with the horizon of 2050.

Local authorities also have their own local development strategies. Barcelona includes the integrated Urban Development Strategy and Barcelona Metropolitan Strategic Plan.

The **RIS3CAT 2030**, approved by the government agreement on the 29 th of November 2022, is the document that contains the Catalan strategy for smart specialization, which focuses on shared agendas, research and innovation as the main drivers to guide Catalonia towards a greener, digital, resilient and fairer socio-economic model.

RIS3CAT 2030 prioritises **transformative and responsible research and innovation**, the development of enabling technologies, the **creation of new digital and technology-based industry** and the transformation of goods and services delivery systems through **shared agendas**. Social innovation in the broadest sense has, therefore, a key role.

In this framework, RIS3CAT 2030 promotes:

- A sustainable, fair, equitable and healthy food system.
- An emission-neutral and environmentally friendly energy and resource system
- A sustainable mobility and logistics system
- A universal, sustainable and resilient health and social care system
- A reflective, proactive, inclusive and responsive education and knowledge generation system
- A sustainable and competitive industrial system
- A cultural system that integrates people, territory and history

Focusing on the technologies, these have been redefined considering the cross-cutting enabling technologies of the Horizon Europe programme and the technological trends and developments of the last few years:

- Artificial intelligence]
- Cybersecurity, connectivity and blockchain
- Microelectronics and nanoelectronics, photonics and quantum technologies
- Advanced and sustainable materials
- Biotechnology
- Advanced digital manufacturing

The RIS3CAT 2030 also promotes instruments to support research and innovation and improve scientific and technological infrastructures that strengthen the business ecosystem and competitiveness, accelerate digital and green transitions in all areas of society and contribute to reducing social inequalities.

Governance system

The RIS3CAT 2030 governance system is coordinated by the Secretariat for Economic Affairs and European Funds of the Catalan Government's Department of Economy and Finance. The governance is organised through intermediaries:

- The Interdepartmental Commission for Economic Recovery and Governance of the NextGeneration EU Funds.
- The Directorate General for European Funds
- The Opportunity Discovery Mechanism

The Secretariat for Economic Affairs and European Funds, which plays a central role in all governance bodies, ensures the necessary coordination to prioritise the financing of strategic initiatives and actions, maximise the attraction of European funds in Catalonia and increase the participation of the actors of the Catalan research and innovation system in European and international networks and initiatives.

Interdepartmental Commission for Economic Recovery and Governance of the Next Generation EU Funds:

Created by government agreement on 13 July 2021, its main function is to plan, prioritise and monitor projects financed with Next Generation EU funds. The presidency of the Commission is held by the President of the Generalitat de Catalunya and the vice-presidency by the Minister of Economy and Finance.

Directorate General for European Funds:

The Directorate General for European Funds, attached to the Secretariat for Economic Affairs and European Funds, programmes, coordinates, and approves the actions of the Government of Catalonia financed with the FEDER Operational Programme for Catalonia 2021-2027 and promotes and coordinates the actions financed with the Recovery and Resilience Mechanism.

The Opportunity Discovery Mechanism:

The Opportunity Discovery Mechanism (MDO) is a response to the requirement, established by Regulation (EU) 2021/1060, that all RIS3s have a "business opportunity discovery process" that promotes cooperation between the parties involved in the strategy.

The MDO promotes that the relevant actors of the system (administrations, universities, research and technology centres, companies and civil society entities and associations) are actively involved in shared agendas and in the processes of opportunity detection, definition of priorities, implementation of initiatives and projects and monitoring.

- PROGRMMES boosting research, development & innovation (including regioal level)

Support Program Science and Innovation Missions -CDTI

As it has been mentioned, CDTI is the main responsible for the State Program to Catalyse Innovation and Business Leadership, which includes the State Public-Private Collaboration Subprogram.

This subprogram includes, among other actions, Science and Innovation Missions, which are pre-competitive research projects led by companies that pursue relevant research that proposes solutions to cross-cutting and strategic challenges of Spanish society, improve the knowledge and technology base on which Spanish companies rely to compete, while stimulating public-private cooperation.

The Science and Innovation Missions program is fully aligned with the Spain 2050 initiative, which lays the foundations and proposals for a Long-Term National Strategy, anticipating the main challenges and problems that Spain must face in the next 30 years. The missions selected in this call address relevant aspects of two of the nine challenges set out in Spain 2050: the first “To be more productive in order to grow better” and the fourth “To become a carbon neutral, sustainable and climate change resilient society”.

Likewise, the call for Science and Innovation Missions 2022 is included among the actions foreseen in the National Plan for Recovery, Transformation and Resilience, which outlines the roadmap for the modernization of the Spanish economy, the recovery of economic growth and job creation, for the solid, inclusive and resilient economic reconstruction after the COVID crises, and to respond to the challenges of the next decade.

Support Program Agrupación Empresarial Innovadora (AEI)

At the national level, the support program for Innovative Business Groups (AEI) is aimed at improving the competitiveness of small and medium-sized enterprises by supporting, with publics funds, the companies’ innovation strategies and business competitiveness. As it was previously mentioned, there are 99 clusters in Spain with this distinctive.

Since the program’s release, an annual (ordinary) call for proposals has been launched. However, since the Government adopted the Transformation and Resilience Plan to channel the funds earmarked by Europe to repair the damage caused by the COVID-19 crisis, two annual calls have been issued: the ordinary and the extraordinary one

The ordinary call has a budget of 8M€, while the extraordinary call in 2021 had a budget of 23M€, in 2022 a budget of 50M€ and in 2023 will have a budget of 53M€. In 2021, under the extraordinary call, 221 projects were founded, while in 2022 319 projects were founded.
In 2021 extraordinary call, the sectors more benefited were from the ICT sector (26 projects) and environment and energy (27 projects), while in 2022 the sectors more benefited were from ICT (56 projects) and Agrifood (45 projects).

Support Program Catalonia Clusters

At the Catalan level, ACCIÓ launched in 2013 the programme "Catalonia Clusters" to achieve excellence of Catalan clusters. This programme was born with three main objectives:

· To boost the competitiveness of the Catalan economy through clusters.
· To systematise the actions of the Generalitat in the field of cluster policy.
· To contribute to the rationalisation of the existing map of clusters in Catalonia.

It is a voluntary programme open to all clusters that have a scope of action at least throughout Catalonia and that meet certain criteria. The participation in the programme basically allows access to certain specialised services offered by ACCIÓ, such as:

· Strategic orientation.
· Advice on governance.
· Networking.
· Specialised training.
· Promotion of inter-cluster dynamics.
· International benchmarking.
· Advice on European programmes for clusters.
· Access to specialised infrastructures, such as the Catalonia Clusters Space.

Currently, ACCIÓ has accredited 26 clusters that bring together more than 2,600 companies and associated agents, with a turnover of more than 70,000 million euros.
Every year, ACCIÓ evaluates its cluster policy. For 2021 it has been stated that every cluster has an average of 112 associates, of which 69% are SMEs. The average income is 378.260€ per cluster and the priority and strategic activities are focused on collaborative innovation, internationalization and new services.

Under this programme, ACCIÓ launches every year one call focused on boosting innovation for SMEs, named IRC-Grants for Competitive Reinforcement Initiatives.

2014-2020

	Name of the program	Measure/ Call	Target beneficiaries	(N) National/ (R)Regional/ (E) European	(I) Individual application or (C)Collaborative
1	**Support Program Science and Innovation Missions- CDTI**	Missions	Enterprises (Grouping constituted by between 3 and 8 partners, of which at least one must be an SME and led by a Large Company) & SMEs (Grouping constituted by between 3 and 6 partners, all of them SMEs, and led by a medium-sized company)	N	C
2	**CERVERA-CDTI**	Cervera	Research Centres and SMES	N	I
3	**CIEN program-CDTI**	CIEN-National Business Research Consortia	Large companies and SMES (required to subcontract Research centre)	N	C
4	**AEI**	AEI	SMEs	N	C
5	**Catalonia Clusters**	IRC- Grantsfor Competitive Reinforcement Initiatives	SMEs	R	C
6	**N/A**	ACCIÓ coupons for innovation	SMEs	R	I

Forthcoming 2021-2027

	Name of the program	Measure/ Call	Target beneficiaries	(N) National/ (R)Regional/ (E) European	(I) Individual application or (C)Collaborative
1	**Support Program Science and Innovation Missions- CDTI**	Missions	Enterprises & SMEs	N	C
2	**CERVERA-CDTI**	Cervera	Research Centres and SMES	N	I
3	**CIEN program-CDTI**	CIEN-National Business Research Consortia	Large companies and SMES (required to subcontract Research centre)	N	C
4	**State Program to Promote Scientific-Technical Research and its Transfer**	Technology and Innovation Platforms	Universities, public research centres and companies, Associations.	N	C
5	**AEI**	AEI	SMEs	N	C
6	**Catalonia Clusters**	IRC- Grantsfor Competitive Reinforcement Initiatives	SMEs	R	C
7	**N/A**	ACCIÓ coupons for innovation	SMEs	R	I
8	**Digital innovation hub support program (PADIH)**	February 2023	SMEs	N	I

CATALUNYA Regional analysis of the innovation status



• Introductory data about the region

With an estimated population of 7.7 million inhabitants (2021), Catalonia is the second most populated Autonomous Community in Spain. Catalonia is organised in 947 municipalities and "veguerias", 41 counties (comarcas) and 4 provinces: Barcelona, Girona, Lleida and Tarragona.



Fig. no. 2. Catalan counties

Despite the 947 municipalities, Catalonia has a small rural population because the majority of citizens (around 95%) are concentrated in around 300 municipalities with more than 2,000 inhabitants and are, therefore, considered to be urban.

Politically, as established by the *Estatut de Autonomia*, Catalonia is organised in the Generalitat de Catalunya, which is formed by the Parliament, the Presidency, the Executive Council, and the institutions created by the Parliament. And, as it has been mentioned, Catalonia has a wide range of exclusive legislative powers, shared legislative powers (with the central state) and executive powers of the state legislation, which are included in the Estatut de Autonomia, and that enables Catalonia, among others, to create their own innovation Policy and Business Development and support system.

• Macroeconomic indicators and business environment

Catalonia has an unemployment rate of 9.3% of the active population, which is lower than the national rate (12,67%):

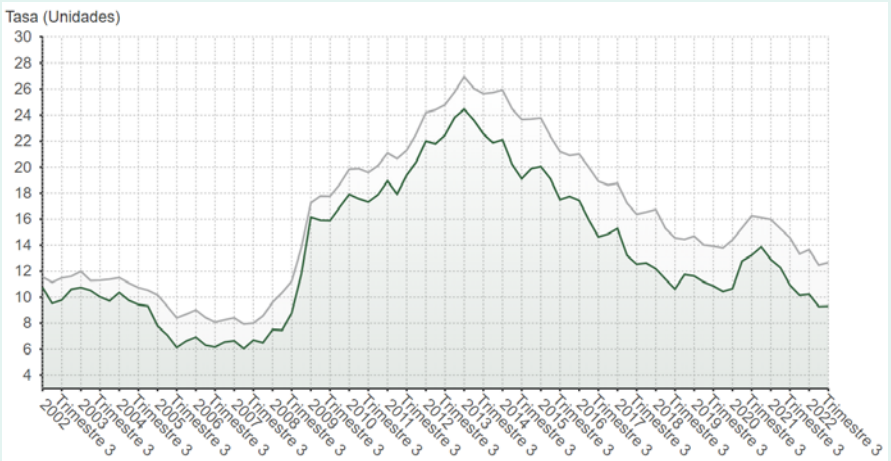


Fig. no. 3. Unemployment comparison Spain and Catalonia

Among the cities with the lowest unemployment rate in Catalonia, Sant Cugat del Valles stands out with an unemployment rate of 4.6%, followed by Castelldefels (6,53%), Sant Feliu de Llobregat (6,96%) and Barcelona (7,01%). All of them are from the Province of Barcelona.

Catalan GDP is 229,418 M€, which places it as the second largest economy in Spain by GDP volume out of the 19 Autonomous Communities, after Madrid (234,639 M€).

In Catalonia, the largest economy is the county of Barcelonès with 85.1558 M€, followed by el Vallès Occidental with 27.778,5 M€.

The 229.418 M€ in Catalonia represents an increase of 5.8% compared to 212.438 million in the previous year:

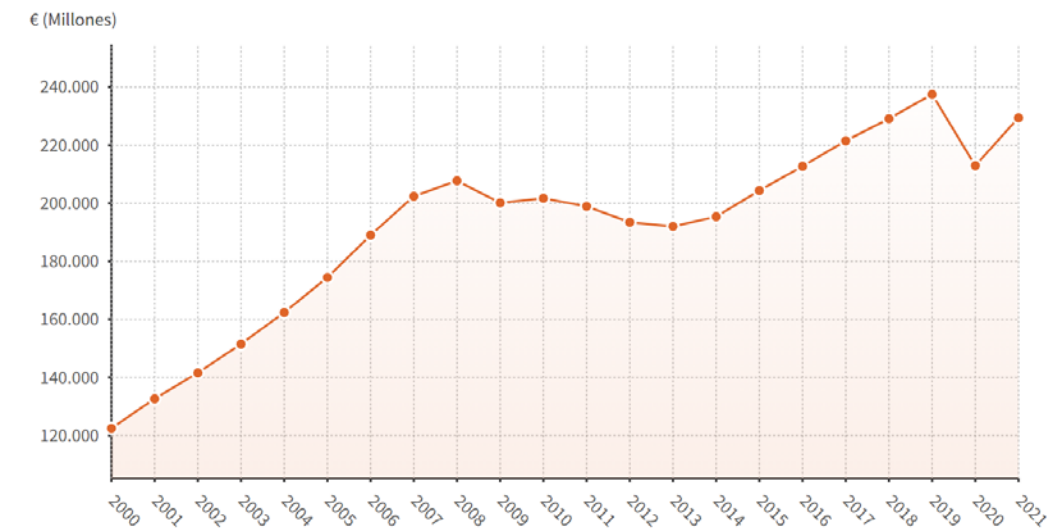


Fig. no. 4. Catalan GDP evolution (INE)

In terms of GDP per capita, which is a good indicator of quality of life, in Catalonia in 2021, it was €29,942, compared to €25,500 GDP per capita in Spain. If we order the Autonomous Communities according to their GDP per capita, Catalonia is in a very good position in terms of the standard of living of its inhabitants, as it is ranked 4th in terms of GDP per capita out of the 19 Autonomous Communities.

In Catalonia, despite the fact that the Barcelonès county is the one that generates the highest GDP, the county with the highest GDP per capita is Ribera d'Ebre with an average of 51.100 euros per person.

According to the latest available data (last update was in February 2022) in Catalonia there are a total of 630.474 companies that have their registered office there (18.5% of the total number of companies in Spain). The business structure shows the predominance of companies without employees. The distribution is as follows:

- 57.7% of companies have no employees.
- 42.3% of companies have employees.
  - 37.9% have between 1 and 9 employees.
  - 3.6% have between 10 and 49 employees.
  - 0.8% have more than 49 employees.

The following table shows the number of companies established in Catalonia per sector and number of employees (2021):

	Industry	Construction	Services	Total
Companies established in Catalonia	**35.720**	**75.565**	**519.207**	**630.474**
Without employees	11.654	45.324	303.297	360.275
1-9 employees	17.094	27.075	193.822	237.991
10-49 employees	5.096	2.813	16.280	24.189
50-249 employees	1.348	293	4.128	5.769
250 or more employees	510	60	1680	2.250

Table no. 3. companies established in Catalonia per sector and number of employees (Idescat)

According to the Department of Economy and Finance, the financial crisis had serious consequences for business demographics, causing the net disappearance of 43,059 businesses between 2009 and 2014, of which 17,286 were without employees and 25,773 with employees. During the subsequent recovery period, between 2014 and 2019, there is a net increase of 54,310 companies. The recovery of pre-crisis companies, however, has been largely thanks to companies without employees, which have increased by 42,642 units. In relative terms, the ones that grew the most were the medium and large ones, followed by small and non-salaried companies.

As of 2019, the statistical concept of company is modified, which is why there is a break in the time series. During 2019, the number of companies continued to expand, especially medium and large companies.

The outbreak of COVID-19 has had negative implications for the business dynamics of the Catalan economy, with the net disappearance of 6,909 companies (compared to January 1, 2020), of which 6,418 were without employees. In relative terms, small and medium-sized companies are the ones with the greatest reduction.

Innovative Companies in Catalonia:

According to the barometer of innovation and digital and green transformation in Catalonia for the year 2021, created by ACCIÓ, half of all Catalan companies (50.7%) with more than nine employees have carried out some innovative activity during 2021; 24.4% of innovative companies had acquired or developed R&D in 2021; and 23.2% of innovative companies collaborated in 2021 with technology centres, research centres and/or universities.

Innovation is concentrated to a greater extent in start-ups and more mature companies:

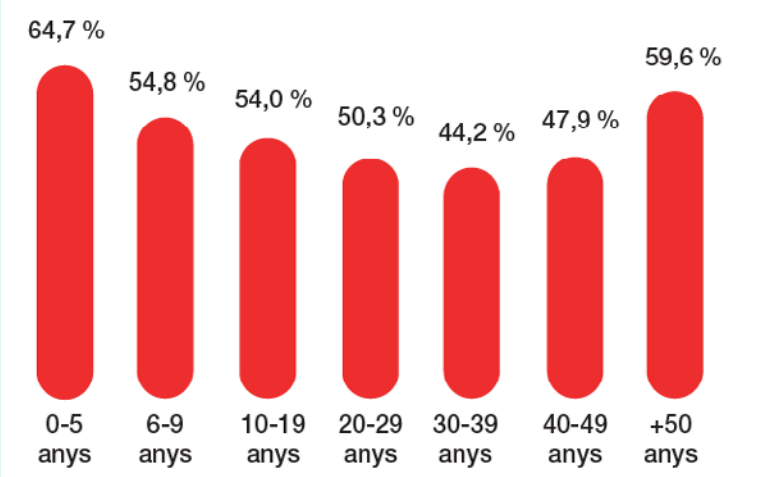


Fig. no. 5. Innovative enterprises by age groups 2021. (Acció)

During 2021, Catalan companies innovated mainly in product (57,8%) and information and communication systems (42,8%).

Barcelona is considered the most innovative city. In fact, The Catalan government promotes initiatives to continue positioning the city of Barcelona as a true hub for urban innovation, research and modernization through the creation of self-sufficient and sustainable management solutions to improve public policies, services and goods with a social impact.

- Business support framewor

In Spain there are various institutions and public bodies responsible for supporting and promoting Spanish companies. These institutions belong to both the central State Administration and the Autonomous Communities.

In Catalonia, **ACCIÓ** is the public agency for the competitiveness of Catalan enterprise, attached to the Ministry of Business and Labour of the Generalitat of Catalonia. It aims to promote the competitiveness and growth of the Catalan business fabric by promoting innovation, internationalization and by attracting investment.

ACCIÓ assists enterprise in the process of competitive differentiation and in the continuous search for new business opportunities. The agency also advises companies in their search for funding, helps them grow through training programmes and guides them on issues concerning clusters, among other programmes and support services. It is also responsible for attracting foreign investment to Catalonia through Catalonia Trade & Investment.

In addition, the most representative business organizations in Catalonia are FOMENT, PIMEC and FEPIME.

Foment del Treball Nacional (Foment) is the confederation that represents employers and the powerful Catalan industry since 1771. As an independent, private and non-profit organization, protected by the constitutional and legal right of association of employers, it is governed with democratic criteria by freely elected representatives.

PIMEC, founded in 1975, is the most representative employers' confederation that represents and defends the interests of micro, small and medium-sized enterprises (SMEs) and the self-employed in Catalonia. PIMEC is one of the most representative social agents in Catalonia, participating in more than 430 working groups and commissions with public administrations and other social agents, as well as regularly expressing its opinion on legislative initiatives and public policies and making proposals to defend and represent the interests of SMEs and the self-employed. This work is carried out in Catalonia at all levels (local, regional and autonomous), as well as in Spain and Europe.

Federació d'Empresaris de la Petita i Mitjana Empresa de Catalunya - FEPIME Catalunya is the employers' association representing micro, small and medium-sized companies in Catalonia. Founded in 2000, Fepime represents, directly and indirectly, around 400 territorial and sectorial organizations. Currently, FEPIME and Foment have initiated an integration process.

At the local level, other organization supporting business development is "Barcelona Activa", which is the agency for local development of Barcelona. Among the services that Barcelona Activa offers to companies, it is worth mentioning management and business strategy, digitalization, and business innovation

Supporting innovation through clusters in Catalonia

Catalonia stands out for having a very successful cluster policy, which has been in operation for 30 years. Thus, clusters play a crucial role in supporting the Catalan business fabric. In Catalonia there are 74.438 associations, according to data from the Department of Justice in 2020. At the whole Catalan level, it is difficult to quantify the exact number of clusters. Nevertheless, following a regional report based on Barcelona and its metropolitan area, there are 32 clusters with presence in this area that represent 54% of the total. Thus, Catalonia has over 59 clusters, 26 of which have the distinctive of "Catalonia Clusters" (programme promoted by ACCIÓ).

Barcelona is one of the most powerful provinces in terms of clusters. In fact, there are 32 clusters, and 1.480 companies out of the 2.740 companies that belong to a cluster in Catalonia, are in Barcelona and its metropolitan area. Of which 1.021 are in Barcelona city (representing 68% of the Metropolitan Area and 37% of the total of Catalonia). Currently, the clusters employ more than 150.000 people in Barcelona and its Metropolitan Area and account for more than 50.000 million euros in turnover.

Industry in Catalonia

There are over 1.400 industrial parks in Catalonia, in which 44.000 companies are represented. This number represents 24% of the total for Spain, positioning Catalunya with the highest number of industrial parks in Spain.

The industry in Barcelona-Catalonia is highly diversified, with the main branches being **chemicals and plastics, food and beverage, motor vehicles,** and **life sciences.**

The **chemicals and plastics** are the No.1 sector in Catalonia's economy, representing 16.9% of its industrial GVA. It is, in fact, the largest chemical hub in Southern Europe, enjoying the presence of multinational companies such as BASF, Dow, Kao, Covestro, Puig, and Repsol.

Food and beverages represent the second largest industrial sector in Catalonia. Most leading food companies in the world, such as Nestlé, Danone, Unilever, Kellogg's, Haribo and Griffith Foods, have set up productive centres, R&D departments and logistics activities in Catalonia.

The **motor vehicles** sector is also strong: 17% of the vehicles in Spain are produced in Catalonia, making it a leading automotive powerhouse in Southern Europe. The region hosts SEAT's (Volkswagen Group) automotive OEM development centre and most of the engineering units of the parts suppliers Tier 1 and 2.

Life sciences is experiencing exponencial growing in Barcelona-Catalonia. The region has a world-class network of medical institutions, hospitals, research centres, biotech startups and pharma companies. Moreover, 40% of the top global companies in life sciences are present in Catalonia, such as Teladoc Health, AstraZeneca, Sanofi, Novartis or Roche.

Startups, accelerators, incubators, hubs:

Barcelona is the 5 th best ecosystem of the EU to create a start-up, following Paris, Berlin, Stockholm, and Amsterdam and it is the 4 th ecosystem of the EU with the highest number of scaleups. Below there are some statistics from the recent report on Barcelona & Catalonia Startup hub, created by ACCIÓ:

- In 2022 there were 2.020 startups, which supposes an increase of 86% between 2016 and 2022; and an increase of 6,3% compared to 2021.

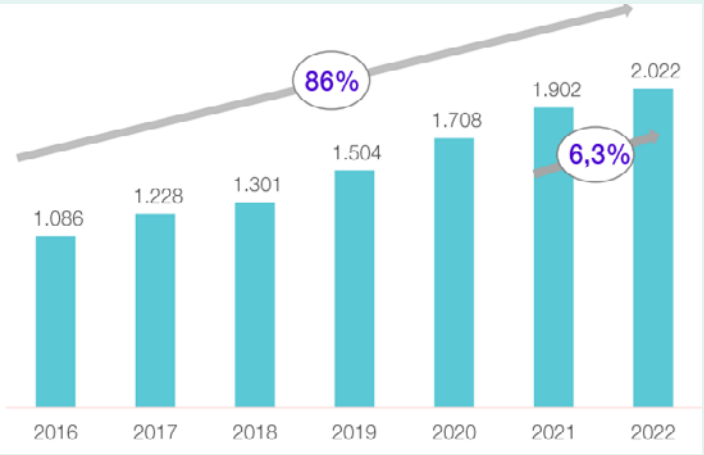


Fig. no. 6. Startups evolution in Catalonia (Barcelona & Catalonia Startup Hub 2022)

- 87,7% of the startups are in Barcelona and its metropolitan area.
- 76% of the startups work with technologies linked to industry 4.0, being Artificial intelligence and big data the main technologies.
- 79% of startups invest in R+D.
- 49% of startups have some kind of patents or protection systems.
- Ecommerce & MarketPacle and SaaS are the predominant business models.

The following graph shows the distribution of startups by sectors (top 10 %):

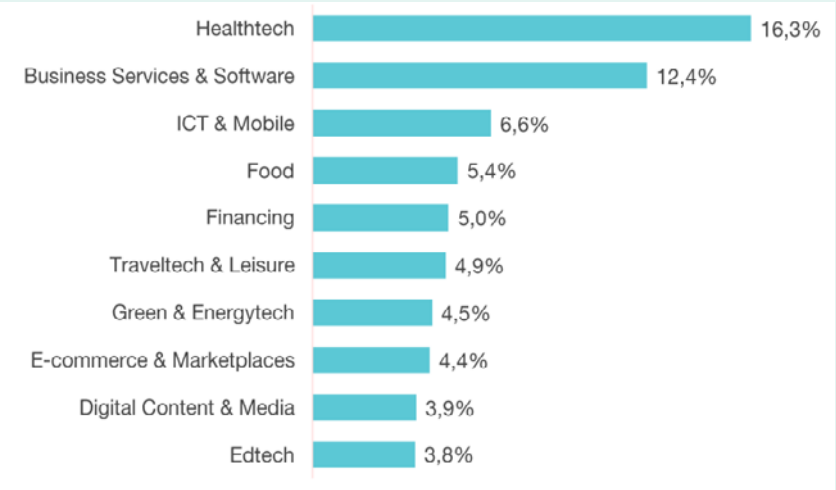


Fig. no. 7. sectoral distribution of startups. (Barcelona & Catalonia Starpup Hub, 2021, ACCIÓ)

- Private funding

The volume of private equity investment in Spain reached 7.494 billion euros in 2021, according to the first estimates obtained by the Spanish Association of Capital, Growth and Investment (*Asociación Española de Capital, Crecimiento e Inversión*, ASCRI) through the European EDC platform. A total of 841 investment transactions were closed and did not suffer as a result of the pandemic. In fact, it was a historic year for venture capital and the second best year on record in the middle market, only behind 2019.

Venture capital broke its ceiling in 2021, with 1.942 billion euros marking its highest amount to date and with 691 deals also beating previous figures. International venture capital played a major role in this milestone, with a total of 1.575 billion euros disbursed in 173 investments, 248% more than in 2020.

According to the report "Capital Stock in Spain and its Autonomous Communities", elaborated by BBVA and IVIE, private investment plays an important role in the post-pandemic economic recovery. Indeed, the performance of private investment represented 91% of the total investment (2021). While during the first pandemic year private investment fell by more than -10%, in 2021 it grew by 4.1%.

The following types of private financing are highlighted in Spain:

- Friends, Family & Fools (FFF).
- Business Angels. There are 35 Business Angels networks distributed among 9 autonomous communities. Their investment, according to AEBAN (Association of Business Angels networks) are between 50,000€ and 500,000€.

According to AEBAN report on Business Angels, during 2021 a significant proportion of business angels invested through venture capital funds (36%) and crowd equity platforms (36%), in addition to making direct investments in startups.

Technology and software (39%), health and medical equipment (33%) and biotechnology (29%) are the sectors that have attracted the most investors' interest in 2021.

- Venture Capital: In the past years, the Venture Capital ecosystem has experienced a period of clear growth. The covid-19 pandemic has slowed down the rate of growth, but there are still large expectations for the coming years. 2019 was a record year since 151 were carried out investments, all between €1M and €10M, a growth of 55.7% compared to 2018.

All the national investments came from 79 Spanish investment funds, of which some of which also base their operations on international investments: from 'Axon Partners Group', €150M, to 'BeWater Funds', €7M. These funds have a net worth to invest of €50M.

- Crowdfunding: According to the report prepared by Universo Crowdfunding, in collaboration with the Complutense University of Madrid, in Spain, in 2015 the volume of transactions represented only 29.8 million euros, but as of that date it has experienced a strong growth, going to 73.2 million in 2016 and 101.7 million in 2017 (35.33% more than in 2016). This figure represents a very significant amount, but also, all the indicators suggest that this growth will continue unstoppable for the next few years.

- Investment funds: The average profitability of investment funds in Spain in the last 15 years (1.9%) was lower than the investment in 15-year Spanish state bonds (3.4%) and investment in the IBEX 35 (2.7%). 93 of the 614 funds with 15 years of history had a return higher than that of government bonds at 15 years and 146 to the IBEX 35. 52 funds had negative returns.

- BME Growth: The companies listed on BME Growth have overcome the pandemic, as shown by their financial data at the end of 2021. These companies are consolidating their position as a key player in the Spanish economy and are achieving a very positive evolution in turnover, EBITDA and number of employees.

In part, this positive trend is due to the fact that companies from the most innovative sectors are mainly part of this BME market. In fact, if we compare the increase with respect to 2020 only of the group of companies in expansion, which excludes the real estate sector, this amounts to 46.1% in turnover, 32.5% in EBITDA and 37.1% in headcount.

According to the financial information published, the total of BME Growth companies at the end of 2021 has increased its turnover by 28.9% to 3,636 million euros, consolidating a compound growth of 26.6% over the last 5 years.

- Bank funds: Spain's high levels of private debt, in particular bank debt, together with increased public debt levels, is making it extremely difficult for Spanish banks to tap wholesale funding markets, currently their main source of funding. Such difficulties have essentially led banks, and to an even greater degree cajas, to rely on shorter dated, secured debt instruments. However, in the actual context of greater risk aversion for peripheral Eurozone countries, only the Spanish Treasury is successfully able to raise money in the primary market. Temporary ECB liquidity support measures have provided some necessary breathing space for the Spanish financial system. But, Spanish credit institutions must recover the confidence of the markets and come back to traditional funding channels in order to reduce their heavy dependence on Eurosystem liquidity

- Foreign direct investments

Catalonia is a leading European ICT hub that attracts foreign investment in technology. Barcelona is considered the world's fourth most technology-oriented city, and most prepared for the technology of the future. It is the fifth European city in attracting technology investments and it is recognized by the Financial Times for having Europe's best foreign investment attraction strategy.

Regarding investment for startups, in 2022, the investment attracted (1.653M€) was 4.3% higher than in 2021 (1.585M€). The investment raised for startups in Catalonia in the last 5 years is 296% higher than that raised in the previous five years:

	2013	2014	2015	2016	2017	TOTAL (2013-2017)
Inversió en startups (M€)	133	269	279	308	282	1.271

	2018	2019	2020	2021	2022	TOTAL (2018-2022)
Inversió en startups (M€)	456	902	448	1.585	1.653	5.043

296%

Fig. no. 8. Evolution of Startup investment (Dealroom 2023).

Barcelona ranks 6th in the ranking of EU cities by volume of venture capital investment raised.

In 2021, Catalonia Trade & Investment attracted €612M, the highest figure on record, and it is the region that received the most R&D investment projects in all Europe, making it a key innovation hub in the continent. In total, 82 foreign investment projects were executed in Barcelona-Catalonia in 2021, creating 3,211 jobs and maintaining an additional 2,471 jobs.

Regarding investment in Innovation, in the last 3 years, 22.3% of companies invested in innovation. Catalonia ranks third in this ranking, only surpassed by the Basque Country, with 24.3% of innovative companies, and the Valencian Country, with 22.7%. It is ahead of communities such as Madrid (21.2%) and Navarra (19.9%).

In 2021, the interest of international funds in the Spanish market was strongly linked to the excellent figures achieved in both the private equity and venture capital segments. In total, over 81% of the amount invested in Spanish companies came from abroad. In fact, this capital offset the reduced amount invested by national fund managers, which, spread over 501 transactions, stood at 1.285 billion euros compared to 1.474 billion euros the previous year

In its analysis of investments in 2021, ASCRI looks at both the source and destination of capital. This has allowed it to detect a greater maturity in the venture capital, by counting up to 1.505 billion euros invested in 182 transactions in what it calls late stage venture capital; i.e. in companies with a certain presence.

- Education environment

In Catalonia, for the period 2020-2021, there were 2,3% of university students enrolled (270.000) and 18.024 students enrolled for a doctorate.

Spain has more STEM students than the EU average, and Asturias and the Basque Country lead in percentage of graduates in these careers. No current and concrete data on STEM students are easily available in Catalonia. Nevertheless, it is estimated that the percentage of new students from 2015/16 to 2019/20 was almost 24%. In 2019, the "STEMCat Plan" was approved to promote scientific, technological, engineering and mathematical vocations, but an in depth analysis needs to be done.

- Research & Innovation

In all research and development (R&D) activities in Catalonia, 59.5% of the personnel employed are men. A weight that increases up to 2 points more if we refer to researchers, according to the latest data collected by Idescat, corresponding in 2018.

As for university staff, although women are still below 50% in the positions of permanent and non-permanent PDI (teaching and research staff) -with percentages of 42% and 46% respectively-, again the weight of the female collective is very significantly reduced in the highest category, that of university professor, representing only 22.8% of the total, according to data corresponding in 2019 collected by the Uneix system indicators.

Regarding Catalonia's university system, it includes 12 universities (7 public, 5 private and 1 virtual), five international schools and five campuses of excellence. According to The Times, it is the third best university system in Europe. Barcelona is also the seat of IESE, ESADE and EADA, business schools, considered among the most prestigious in the world.

Barcelona and Catalonia also stand out for their open and multicultural nature and their ability to attract international talent. The Catalan capital is considered the fourth most attractive city in the world to work in and has a wealth of skilled labour in science and technology.

- Public authorities - innovation and digitalization

Catalonia also encourages innovation in public administration. In fact, the Generalitat has developed several tools, such as ApLAB, which is a meeting point, both physical and virtual, to promote innovative projects that improve public services, especially digital ones; or Innoteca, which gathers innovative experiences carried out in the administration of the Generalitat de Catalunya and its public sector.

The digitization of the public sector in Catalonia revolves around 4 areas: people, processes, data and technologies. Also, it is important to highlight that the Catalan RIS3CAT strategy fosters, mainly innovative public procurement and co-creation processes. However, in the public administration other tools are being used: testing, open innovation, ideas competition, agile processing, among others.

The most characteristic services are e-administration and e-government, training, and rapid response to citizens.

At the national level, there exists the Quality and Innovation in Public Management Awards. In Catalonia, there exists the Alfons Ortuño Awards of innovation and good practices in Catalan public administrations. Catalonia has other awards such as: eGovernment Awards, Discapnet best practices model, and "Laus de Bronze" awards.

- Conclusions - SWOT Analysis

a) STRENGTHS - "Sweet spots"

- The Catalan research system, which has a high capacity to produce, attract and retain talent, is an internationally recognized model of success.
- With 1.5% of the EU-27 population, Catalonia generates 2.9% of publications, 2.2% of the funds of the 7th Research Framework Program, and attracts 3.29% of the projects of the European Research Council projects (third EU country in terms of projects per million inhabitants). With 0.1% of the world's population, Catalonia produces 1% of all scientific publications.
- There is an important base of centres for the generation and application of knowledge (12 universities and 3 of Europe's top 25 business schools), which gives rise to a significant critical mass of graduates highly valued in the world of work and science. There are also hospitals and research centres that have great international prestige from a scientific and knowledge transfer point of view.
- In Catalonia, over the last twenty years, stable public policies have been agreed in order to have stable public policies, with a political commitment to R&D. This is the case, for example, the National Pact for Research and Innovation (2008), the innovation (2008), the science law and the strategic plan for research, innovation and and the Strategic Plan for Agrifood Research, Innovation and Transfer of Catalonia.
- The ICREA program has the capacity to attract and retain talent: 294 researchers of international prestige (40% of whom come from EU institutions and 20% from the United States), 70 of whom are involved in European Research Council (ERC) projects.
- Catalonia has scientific and technological infrastructures of international recognized prestige (the National Center for Genomic Analysis, the Alba synchrotron and the Barcelona Supercomputing Center).
- The R&D&I system is competitive enough to face new challenges and play a role in the major scientific and technological projects of the future:
    1. Catalan research centres and groups participate in the two Flagship research projects selected by the EU.
    2. The success in the calls for proposals of the European Research Council's "Proof of Concept" initiative is an example of the incentives to increase the commitment to knowledge transfer from research centres and universities to the productive sector.
- Incentives are provided for the concentration and consolidation of research agents to increase critical mass and competitiveness (SUMA, a program of the Generalitat of Catalonia for the integration of CERCA centres).

- The network of technology centres, which is highly developed, is progressively improving the positioning in European and international platforms and projects.

- There are multiple collaboration initiatives between the agents of the research and innovation system. The 15 Connect-EU Groups stand out, made up of public and private agents that collaborate to agree on strategic R&D agendas in specific technological areas and with applications to industry.

- Catalonia, especially Barcelona, is internationally recognized for its emerging creative class and for design. The creative elements are a great asset of the Catalan innovation system.

b). Weaknesses

- The research and innovation effort is still below the eurozone average.Cooperation and strategic alliances between companies and between them and the knowledge-producing system are limited.

- Catalonia does not have sufficient decision-making capacity in key areas for research and innovation. There is little coordination between the R&D&I policies and instruments of Catalonia and the Spanish state (lack of a complicit state).

- Patent production is significantly lower than the European average.

- There is a lack of a culture of cooperation between SMEs and the rest of the agents of the research and innovation system. SMEs often have a low capacity for absorbing knowledge and do not have qualified personnel to develop R&D or to take advantage of external R&D

- There is little relationship between universities and business, and the mobility of researchers between the public and private sectors is low.

- The potential of public procurement and investment as a strategic driver of innovation is underdeveloped

- There is little investment capital willing to take risks in knowledge-intensive business projects, especially in the early stages of expansion.

c). Opportunities

- R&D&I processes are increasingly global and open. The Catalan R&D system is well positioned: it is a pole of attraction for researchers with international prestige and is fully interconnected in European networks and platforms.

d). Threats:

- The economic crisis and the containment of public spending threaten the economic sustainability of the R&D system, which is mainly financed with public funds.

- Within the framework of smart specialization strategies, countries and regions are looking for ways to improve their positioning in the scientific and technological niches that have the greatest potential for the future. There is a risk of not standing out in anything due to a lack of capacity to focus and bet on the scientific and technological areas in which Catalonia has a competitive advantage.