

Comprehensive study of Technology Transfer Ecosystem

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Content

List of Abbreviations	3
1 Introduction	4
1.1 Work methodology	5
2 Background/Environment	6
2.1 RIS in Spain	8
2.2 Legislative Frameworks	12
3 Strategy for TT	16
3.1 Global strategy of HEIs in TT.....	19
3.2 Map of Stakeholders.....	21
4 TT Structures.....	31
4.1 TT System Scheme	34
4.2 TT Procedures	36
4.3 Strengths and Weaknesses of TT Units/Offices	37
4.4 TT Structure Best Practices	38
5 TT Instruments	40
5.1 Exchange of Research Staff with Companies	43
5.2 Internationalization of Knowledge Transfer	45
5.3 Tools Used to Publicize the Generated Knowledge	47
5.4 Barriers to the Commercialization of Knowledge Generated in HEIs.....	49
5.5 TT Instruments Best Practices.....	49
6 Economic Indicators and Funding.....	51
6.1 Distribution of the Budget Among the Involved Agents	53
7 Human Resources and Training.....	55
8 Relationships Between the Agents of the Ecosystem	57
9 Public Administration	59
10 Conclusions	60
11 Bibliographic References	61

List of Abbreviations

BCC: Barcelona Chamber of Commerce, Industry, Services and Navigation
BSO: Business Support Organisations
EEA: European Economic Area
EECTI: Spanish Science, Technology, and Innovation Strategy
EIS: European Innovation Scoreboard
ESIF: European Structural and Investment Funds
EU: European Union
GDP: Gross Domestic Product
HEIs: Higher Education Institutions
ICT: Information and Communication Technologies
IP: Intellectual Property
IPRs: Intellectual Property Rights
IT: Information Technologies
NDA: Non-disclosure Agreement
NGO: Non-Governmental Organizations+
OEPM: Oficina Española de Patentes y Marcas (Spanish Patent and Trademark Office)
OG: Official Gazette released by a patent office
OTC: Oficina de Transferencia de Conocimiento (Knowledge Transfer Office)
PROs: Public Research Organizations
PCT: Patent Cooperation Treaty
RedOTRI: Network of Spanish Technology Transfer Offices
RIS: Regional Innovation Scoreboard
RTD: Research and Technological Development
R&D: Research and development
SMEs: Small and medium-sized enterprises
STEM: Science, Technology, Engineering and Mathematics
TRL: technology readiness level
TT: Technology Transfer
TTO: Technology Transfer Office
TTP: Technology Transfer Professionals
VC: Venture Capital
WIPO: World Intellectual Property Organization

1 Introduction

There is consensus in describing the innovation and technology transfer ecosystem in Spain as a mature ecosystem (as will be seen in this study).

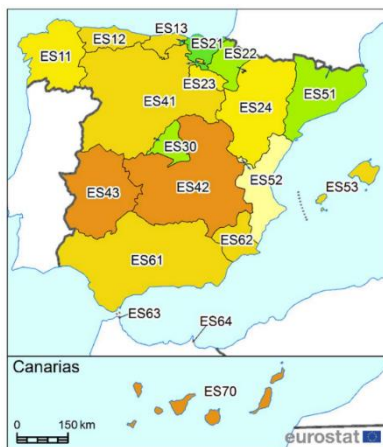
In general, there is sufficient legislation, dedicated public and private structures (for example OTC offices to be discussed below), as well as the general awareness that this is an area which needs to be improved to ensure the country’s competitiveness and the welfare of society.

However, although the different indicators show this maturity, Spanish TT system responds to the concept of a "[European paradox](#)". This term defines a common reality in the EU countries as the distance (sometimes huge) between scientific and academic achievements (such as the number of scientific publications and researchers) and the ability to transform these assets into innovative goods and services that industry adopts and impact on society.

In this study we will analyse the elements which make up the system of TT in Spain, the weaknesses and forces expressed by those concerned themselves, as well as some cases which are considered interesting for understanding this system.

This maturity is not homogeneous in the 17 autonomous communities which make up the Spanish territory, as well as in its two autonomous cities (Ceuta and Melilla).

As a sample, the [EU’s 2023 Regional Innovation Scoreboard](#) (which we will analyse in the following section) :



NUTS	Region	RII	Rank	Group	Change
ES	Spain	89.2	—	Moderate Innovator	9.7
ES11	Galicia	80.7	154	Moderate Innovator	8.4
ES12	Principado de Asturias	76.9	161	Moderate Innovator -	8.7
ES13	Cantabria	76.9	160	Moderate Innovator -	10.1
ES21	País Vasco	109.8	72	Strong Innovator	11.5
ES22	Comunidad Foral de Navarra	101.8	98	Strong Innovator -	14.1
ES23	La Rioja	83.1	148	Moderate Innovator	6.5
ES24	Aragón	83.6	147	Moderate Innovator	7.4
ES3	Comunidad de Madrid	106.6	80	Strong Innovator -	12.8
ES41	Castilla y León	78.9	157	Moderate Innovator -	10.9
ES42	Castilla-la Mancha	67.0	185	Emerging Innovator +	3.6
ES43	Extremadura	65.0	189	Emerging Innovator +	8.6
ES51	Cataluña	105.9	81	Strong Innovator -	11.5
ES52	Comunitat Valenciana	94.0	121	Moderate Innovator +	10.6
ES53	Illes Balears	71.1	171	Moderate Innovator -	9.2
ES61	Andalucía	71.1	172	Moderate Innovator -	4.5
ES62	Región de Murcia	76.7	162	Moderate Innovator -	7.1
ES63	Ciudad de Ceuta	35.3	231	Emerging Innovator -	2.2
ES64	Ciudad de Melilla	46.3	223	Emerging Innovator	2.8
ES7	Canarias	57.2	208	Emerging Innovator +	11.7

Figure 1 Innovation level of the different regions in Spain (EU RIS 2023)

As this report establish, “Regional performance differences are high with the best performing region, País Vasco (ES21), performing more than three times as well as the lowest performing region, Ciudad de Ceuta (ES63). Four regions are Strong Innovators, 10 regions are Moderate Innovators, and five regions are Emerging Innovators”.

Despite the existence of national policies for innovation, the business, industrial and social reality of each region as well as the policies of local communities cause this marked difference between some regions.

The present study will analyse the general elements existing in Spain which define the reality of TT.

1.1 Work methodology

The Barcelona Chamber of Commerce is a private corporation under public law in the business sector. For years, our corporation has shown a great interest in promoting and improving the technology transfer system (as evidenced by the different dissemination activities, studies of the TT system, meetings with stakeholders to determine proposals for improvements or the creation of the [KIMBcn Foundation](#) as an element to facilitate such TT).

To obtain a complete picture of the innovation ecosystem (not only from the business sector, but also from the academic sector) and to be able to translate the reality and opinion of the main stakeholders into this study, the following activities have been carried out:

- **Analysis of existing bibliography and references:** There are different public and private entities that have analysed the reality of TT in Spain (especially the network of universities or the different national and regional governments). Different aspects of these previous studies have been incorporated into this study to enrich the content and establish a logical structure.
- **Map of stakeholders:** Mapping the research and innovation ecosystem in Spain to identify key players.
- **Expert interviews:** More than 15 interviews were conducted with experts from different fields (local government, representatives of universities, technology centres, companies, start-ups, spin-offs and investors), to capture the different views of each.
- **Virtual survey with technology transfer offices in Spain:** A [virtual survey](#) has been carried out to collect information from technology transfer offices throughout Spain. Through this format 15 Spanish offices were contacted.
- **Review and update of the focus group on knowledge transfer in Catalonia carried out by the Cambra in 2022:** In 2022, the Barcelona Chamber held various meetings with representatives from the business, academic and scientific world to identify the state of knowledge transfer in Catalonia. During the present study, the results of this previous report have been reviewed and incorporated, and some stakeholders were contacted again to expand on its conclusions.
- **Content review and study with the KIMBcn Foundation:** In 2007, the Barcelona Chamber of Commerce and the Leitat Technology Centre founded Knowledge Innovation Market Barcelona (KIMbcn), a public-private foundation that was created to stimulate the knowledge economy in Spain and promote Open Innovation through:
 - The provision of specialized services related to the assessment of the technological level of enterprises.
 - The application or transfer of prospecting technology and its introduction into markets in the short, medium and long term.

- The application or transfer of technology linked to obtaining financing from enterprises in any strictly financial or participatory form provided for by law.
- Collaboration and development of joint projects with other actors (universities, research centers, technology parks, public administrations...).
- Dissemination of emerging scientific technologies, in connection with the most important national and foreign institutions for research and development.
- The organization of exhibitions, conferences, seminars and courses.
- The production, publishing, publication and sale of books, magazines, audiovisual material and multimedia.

The collaboration with this foundation, of which Cambra is a part, has allowed us to obtain a more precise view of the TT environment in Spain. KIMBcn has assisted in the validation of the methodology and revision of the conclusions.

All interviewees (both from the knowledge generation and business fields) have been collaborative when participating in this study. The transfer of technology is therefore an element that generates interest for everyone and of which they are all aware that great steps have been made, but that there are different points to improve.

2 Background/Environment

As mentioned in the introduction of this study and may be analysed in the following section through RIS data, there is agreement on describing that the innovation and technology transfer ecosystem in Spain can be considered mature.

The legal framework and existing TT structures are more than 25 years old, so we can consider it a developed ecosystem (although as we will see with aspects that need to be reviewed and improved).

Despite this maturity, the innovation system in Spain is below the European average according to various international indicators. Nonetheless, the development in the field of innovation and technology transfer has accelerated, achieving annual improvement rates above the European average.

The Spanish Strategy for Science, Technology, and Innovation 2021-2027 established the goal of positioning the Spanish economy with an R&D investment of 2.12% of GDP within the New Horizon 2027 framework, advancing towards convergence with the European Union.

In 2017, the first official figures evaluating the state of innovation placed the investment at 1.20% of GDP. By 2022, the figure had risen to 1.44%.

The low increase in percentage does not reflect the actual growth in R&D investment. The total investment went from **€14 billion in 2017** to **€19 billion in 2022**. During the period 2021-2023, Spain has been the European country with the **highest annual GDP growth at 4.1%**, compared to the European average of 1.9%. ([European Commission](#))

Although R&D investment in Spain showed a significant nominal increase in 2022, its relative impact on GDP has been limited due to the country's strong economic growth.

Spanish investment in Research and Development (R&D) **grew in 2022 for the eighth consecutive year, reaching €19.325 billion**, the highest figure in the historical series. The year-on-year growth rate rose to 12% (a total of €2.077 billion more than in 2021), the highest since 2007 (12.9%) and the sixth highest in the historical series (compared to 9.4% in 2021).

Business sector, which includes both public and private enterprises as well as private non-profit institutions (PNPIs), **reached a record investment of €10.969 billion**. This sector significantly **exceeds the pre-financial crisis peak** recorded in 2008 by €2.872 billion, marking a 35% increase up to the year 2022.

Public sector (which includes both administrations and universities) recorded an investment level of **€8.356 billion in 2022**. Although the investment volume observed in 2010 was recovered in 2021, public investment as a percentage of GDP has **not fully rebounded after 12 years**. In 2022, the public sector invested €1.3 billion more than in 2010 (+18%), but when measured as a percentage of GDP, it now **stands at 0.62% of GDP, compared to 0.67% in 2010**.

The positive trend in Spanish R&D investment has been driven by **both the public sector, which has grown for the sixth consecutive year**, and the **business sector, which has grown for the eighth consecutive year**. Notably, investment in R&D by the business sector increased by 12% in 2022, slightly surpassing the public sector, which grew by 11%. ([Informe COTEC](#))

To understand the 2022 data, it is important to consider the **'NextGeneration'** funds, which represented a **significant injection of money for investment in R&D&I**. Although the trend in 2024 remains positive, it has decelerated compared to 2022, as that was the period during which the country benefited the most from European funds.

Thus, although there is a notable improvement, the data trend indicates that even with the 2022 positive figures, **Spain will likely struggle to allocate 2.12% of its GDP to R&D & I in 2027**.

Patents portfolio

Data on patent applications from 2016 to 2023 reflects significant fluctuations in the total number of applications, with shifting preferences between different filing routes.

On a global scale, the total **number of patent applications grew by 68% between 2016 and its peak in 2021** (from 19.7 thousand to 32.9 thousand), but then sharply dropped to 15.6 thousand in 2023, reflecting a 53% decline from the peak. This pattern suggests an initial upward trend followed by a significant contraction in recent years.

The national filings show a relatively stable but low trend. From 2.2 thousand in 2016, they fell to just 0.6 thousand in 2020 (a 73% reduction). Since then, they have slightly recovered, reaching 0.7 thousand in 2023. Despite this recent stability, the national route still represents a small fraction of the total filings (4-5% annually).

The European route is by far the most dominant. It started with 17.4 thousand filings in 2016, peaked at 32.2 thousand in 2021 (an 85% increase), and then dropped to 14.8 thousand in 2023 (a 54% decline from the peak). The performance of the European route highlights its importance

as the preferred choice for patent protection, although recent data suggest a considerable contraction.

With much lower numbers than the other routes, PCT national phase filings show small fluctuations, starting at 114 filings in 2016, dropping to a low of 45 in 2021, and recovering to 63 in 2023. Though it represents a small portion of the total (less than 1%), the recent growth in this category may indicate a slight increase in interest in national protection after international PCT filings.

From 2016 to 2021, overall growth of 67% was primarily driven by the European route, while the other two routes showed declines or stability. From 2021 to 2023, a 53% contraction in total filings is evident, with all routes showing significant declines, except for the PCT national phase, which experienced moderate growth.

In Spain, the pharmaceutical sector tops the list of patent applications in Europe, despite a slight decrease of 2.1% compared to the previous year. Machinery, appliances and electrical energy, which includes clean energy technologies such as batteries, remains in second place with 159 applications (-2.5%). Biotechnology recorded an increase of 6.1%, displacing medical technology in fourth place with a fall of 14.3%.

Environmental sustainability effort is buoyed by Spain's very high resource productivity (136.9% of the EU average in 2024). However, there has been a significant decline in the generation of patents based on environmentally related technologies (-43.3%-points), leading to a below-EU-average performance (74.5%).

	2016	2017	2018	2019	2020	2021	2022	2023
TOTAL	19.661	31.359	27.370	22.646	28.146	32.946	25.127	15.554
Vía Nacional	2.194	1.944	1.698	1.206	588	671	666	691
Vía Europea	17.353	29.348	25.610	21.374	27.505	32.230	24.413	14.800
PCT Fase Nacional (Patent)	114	67	62	66	53	45	48	63

OEPM: Datawarehouse. Patents granted by the (OEPM) with effect in Spain.

2.1 RIS in Spain

The [regional innovation scoreboard \(RIS\)](#) is a regional extension of the European Innovation Scoreboard (EIS), assessing the innovation performance of European regions on a limited number of indicators.

This data is one of the most recognized references in the field of innovation when comparing the reality of innovation between EU and neighbouring countries. To do this, 32 indicators grouped into 12 categories are analysed and the annual trend is evaluated with respect to other regions to rank the level of innovation of different ecosystems.

The RIS 2024 provides a comparative assessment of the performance of innovation systems across 239 regions of 22 EU countries.

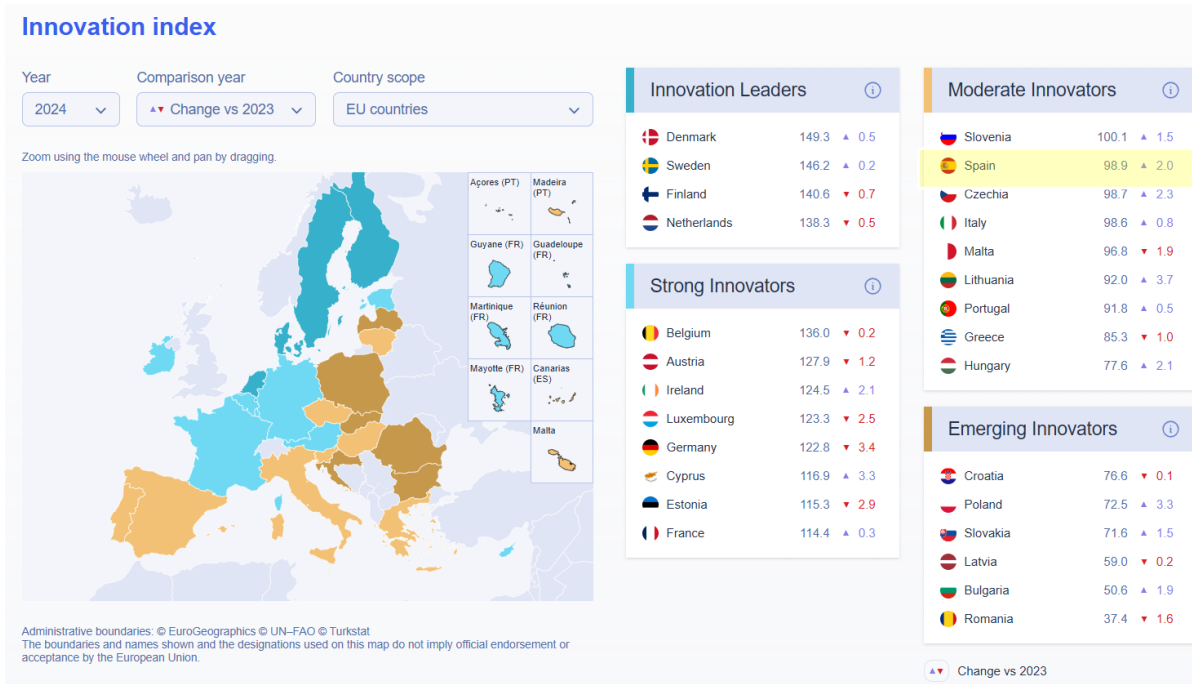


Figure 2 Innovation level of the different regions in Europe (EU RIS 2024)

In the case of [Spain](#), the innovation system is classified as "**Moderate Innovator**", ranking 14th out of 23 EU countries and 18th if we take into account the 38 countries in the study which considers some neighbouring countries.

The current score of 98.9 in the different indicators represents an improvement of 2 points compared to 2023 and 9.4 points compared to 2017 (year of the first study).

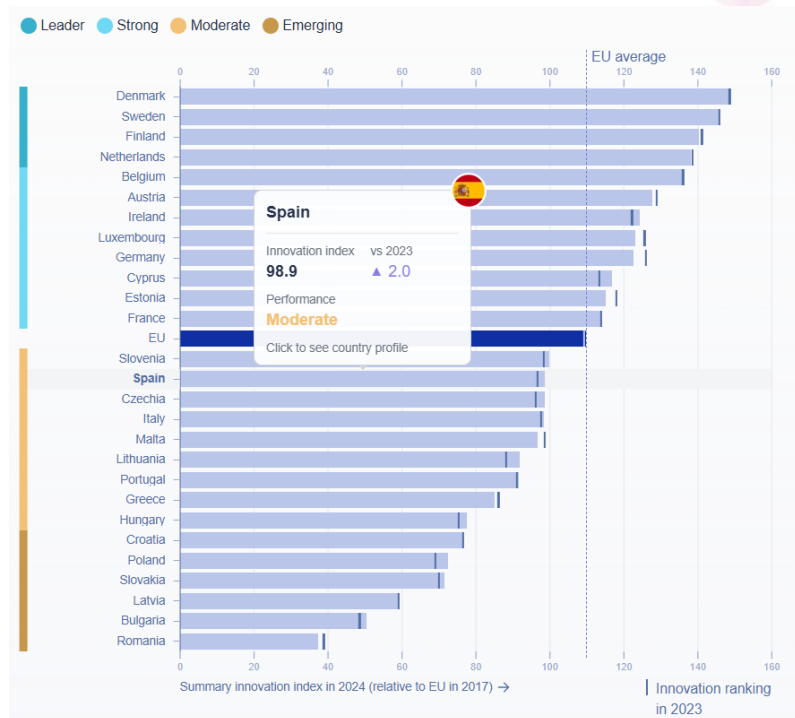


Figure 3 Innovation ranking of the different regions in Europe (EU RIS 2024)

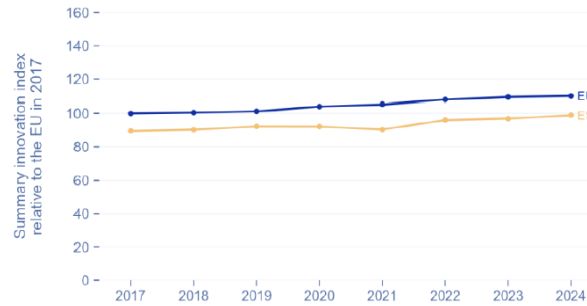


Figure 4 Comparison of the evolution of the innovation index between EU and Spain (Spain RIS 2023)

This value is **below the 110 points set by the EU average**, although with a higher growth than that of the EU average (0.6).

As mentioned in the introduction, the regional reality between the different communities that make up Spain is different. Although there are **4 autonomous communities in Spain classified as Strong Innovator** according to the 2023 index, the average with the rest of the territories establishes the set as Moderate Innovator.

Indicator	Performance relative to the EU in 2024	Performance change 2017-2024	Performance change 2023-2024
SUMMARY INNOVATION INDEX	89.9	9.4	2.0
Human resources	124.3	1.1	5.1
New doctorate graduates	100.0	-23.2	0.0
Population with tertiary education	148.4	21.0	10.8
Population involved in lifelong learning	125.4	15.3	6.1
Attractive research systems	90.2	11.9	0.2
International scientific co-publications	93.5	34.2	2.1
Scientific publications among the top 10% most cited	89.8	-5.2	-2.1
Foreign Doctorate students as a % of all doctorate students	88.3	29.3	4.3
Digitalisation	144.9	29.7	6.9
Broadband penetration	142.2	56.7	11.4
Individuals with above basic overall digital skills	148.7	2.6	2.6
Finance and support	103.9	28.8	2.0
R&D expenditure in the public sector	82.0	8.2	0.0
Venture capital expenditures	114.9	47.1	-0.5
Direct and indirect government support of business R&D	116.4	37.1	7.2
Firm investments	61.8	12.3	-2.7
R&D expenditure in the business sector	53.5	12.8	1.5
Non-R&D innovation expenditures	82.2	17.8	-2.5
Innovation expenditures per person employed	52.0	5.7	-7.7
Use of information technologies	89.3	1.9	3.5
Enterprises providing ICT training	90.3	-6.4	3.6
Employed ICT specialists	88.2	9.7	3.3

Indicator	Value	Category	Change
Innovators	53.6	Emerging Innovators	-1.5
SMEs introducing product innovations	58.0	Moderate Innovators	-3.7
SMEs introducing business process innovations	49.9	Moderate Innovators	-8.3
Linkages	92.8	Moderate Innovators	-4.4
Innovative SMEs collaborating with others	69.7	Moderate Innovators	31.0
Public-private co-publications	116.4	Strong Innovators	40.1
Job-to-job mobility of HRST	102.1	Strong Innovators	58.8
Intellectual assets	81.3	Moderate Innovators	-3.5
PCT patent applications	68.7	Moderate Innovators	-0.6
Trademark applications	110.3	Strong Innovators	1.9
Design applications	69.2	Moderate Innovators	-11.8
Employment impacts	61.3	Moderate Innovators	-2.6
Employment in knowledge-intensive activities	80.9	Moderate Innovators	6.0
Employment in innovative enterprises	44.6	Moderate Innovators	-10.4
Sales impacts	79.0	Moderate Innovators	6.9
Exports of medium and high technology products	66.5	Moderate Innovators	-5.5
Knowledge-intensive services exports	33.5	Moderate Innovators	8.5
Sales of new-to-market and new-to-firm innovations	170.5	Strong Innovators	47.0
Environmental sustainability	96.8	Moderate Innovators	-15.8
Resource productivity	136.9	Strong Innovators	3.0
Air emissions by fine particulates	86.3	Moderate Innovators	-7.4
Environment-related technologies	74.5	Moderate Innovators	-43.3

Figure 5 Value of innovation indicators for Spain in 2024 (Spain RIS 2024)

Analysing the different indicators relative to the rest of the EU countries, we can identify the following strengths and weaknesses of the innovation system in Spain relative to the values in previous years:

Relative strengths

- **Population with tertiary education:** Both this indicator and the rest related to HR (“new doctorate graduates”, “population involved in lifelong learning”) present results well above the EU average. Although, the number of new doctorate graduates in STEM has decreased.

- **Innovation leader in digitalisation:** The two related indicators with **digitalisation** (“broadband penetration” and “individuals with above basic overall digital skills”) have values well above the average in the US. Public policies and programs such as "[Digital Spain Agenda 2025](#)" have helped these factors.
- **Access to Venture Capital and Government support for investments:** Although the values have not changed much in recent years, the values related to **support for investments** (“venture capital expenditures” and “direct and indirect government support of business R&D”) are still above the EU average.
- **Access to Venture Capital and Government support for investments:** Although the values have not changed much in recent years, the values related to **support for investments** (“venture capital expenditures” and “direct and indirect government support of business R&D”) are still above the EU average.
- **Startups sales capability:** “Sales of new-to-market and new-to-firm innovations” has increased notably in recent years. This indicator of **sales** is generated by many types of companies, but especially **startups**.

Relative weaknesses

- **Firm investments:** While **firm investments in R&D** have moderately increased compared to 2023 values, the value is still low, especially in “R&D expenditure in the business sector” and “innovation expenditures per person employed”.
- **SMEs introducing business process innovations:** The **number of innovators** has increased particularly driven by the increasing share of “SMEs introducing product innovations”. However, innovators are only 53.6% of the EU average in 2024, due to the low value of SMEs introducing business process innovation.
- **Employment in innovative enterprises:** “Employment in innovative enterprises” has seen a notable decline and is now 44.6% of the EU average in 2024. This, added to the low value also for “employment in knowledge-intensive activities” gives a poor value for **employment in innovation in Spain**.
- **Knowledge-intensive services exports:** This indicator presents the lowest value of all those in the study. Despite the policies and assets generated, the system is not able to **export knowledge-intensive services**.
- **Decrease of the PHD personnel:** Since 2017, has decreased -23.2%. Given that, Spain is **22.6% lower than the European average**. This phenomenon is due the lack of incentives and motivation to run as a PHD employee.
- **General decrease of patents, licences and PCTs.**

These weaknesses and strengths are reflected in the general analysis of:

- **Framework:** Values related to framework (especially human resources and digitalisation capabilities) are considered as very positive.
- **Investments:** The financial support for research and development (R&D) in Spain has grown significantly since 2017. However, the indicators show a system that is growing in private investments through VC and in state support (especially through Next generation funds) but that, compared to other countries in the US, is not managing to increase investments in R+D in the business field significantly.
- **Innovation activities:** The three categories related to innovation activities (“innovators”, “linkages” and “intellectual assets”) present values under the EU average of 2024. Despite many of these indicators have been improved in the last year, maintaining consistency in intellectual assets such as patent and trademark applications has proven challenging. While “trademark applications” are above the EU average (110.3%), “design applications” have faced a decline (-11.8%-points) and “PCT patent applications” remained stable below the EU average (68.7% of the EU average).

These indicators once again show the **European paradox**, while academic and investment values are favorable, in general, knowledge transfer does not lead to an increase in business innovation activities.

- **Impact:** As we have mentioned, both indicators related with **employment** in innovation are under the EU average. This is one of the factors that presents big differences if we compare different parts of Spain (for instance, Catalonia, and Barcelona in particular, presents very good indicators in this field).

The impact of **sales**, even having a very positive value in “Sales of new-to-market and new-to-firm innovations”, the values in “exports of medium and high technology products” and “knowledge-intensive services exports” make the general value have an indicator below the EU (again the paradox).

2.2 Legislative Frameworks

The regulatory framework in Spain has a great impact on innovation and knowledge transfer policies in Spain. Its legal framework is updated around (EECTI 2021-2027) spanning a period of years to structure a **long-term decision-making**.

Currently, the **EECTI 2021-2027 (Spanish Strategy for Science, Technology and Innovation)** is in force with the goal of improving technology transfer methodologies, promoting public-private collaboration, attracting talent and modernizing the bureaucratic system related to patents and licenses. This aims to align with European countries classified as Strong Innovators and to move closer to the 2030 Agenda’s targets.

The implementation of the EECTI is divided into two phases: **PECTI (2021-2023)** and **PECTI (2024-2027)**.

The first phase, from 2021 to 2023, aimed at designing the strategies and developing the legal reforms to reach the established objectives, with the subsequent period from 2024 to 2027 focused on evaluating the impacts of these laws and determining whether any changes are needed in the implementation to meet the objectives of the EECTI by 2027.

EECTI innovation plans and strategies:

As innovation tools, the **EECTI (2021-2027)** deploys defined plans and strategies to establish action criteria in specific areas. Each plan and strategy include an **implementation roadmap**, a clear period of operation, and subsequently an evaluation of the effects achieved in that area.

The plans with impact on industry and innovation are the follows:

- [Estrategia España Nación emprendedora](#) : Promotes the **creation and growth of startups** and entrepreneurial initiatives by facilitating acces to resources, funding and an innovative environment.
- [Agenda digital 2026](#): Sets out guidelines for digital transformation aiming to **modernize technological infrastructure**.
- [Indústria conectada4.0](#): Drives de digitalization and integration of **advanced technologies in industry**.
- [Marco Estratégico en política de Pyme2030](#): Defines policies and support measures for (SMEs).
- [Estrategia Española de Economía Circular](#): Encourages de transition to an a circular economy.
- [Hoja de ruta para la gestión sostenible de las materias primas generales](#): Establishes guidelines for the efficient and **sustainable management of raw materials**.
- [Plan de atracción y retención de talento Científico e Innovador a España](#) : Designed to attract and retain highly qualified researchers.
- [Plan de Transferencia y Colaboración](#): Facilitates the tranfer knowledge and technologies between research institutions. Businesses and public sector.
- [Estrategía Nacional de Ciencia Abierta](#): Promotes the openness and free access to scientific research results, encouraging international collaboration and transparency.

From the need to enact legal changes to implement succesfully the objectives of those **EECTI** plans and strategies, **have been emerged the following estrategic plans and his own laws and legal reforms:**

PEICTI 2021-2023 (Plan Estatal de Investigación Científica, Técnica y de Innovación):

The present State Plan for Scientific, Technical, and Innovation Research 2021-2023, integrated into the Spanish Strategy for Science, Technology, and Innovation 2021-2027, is aligned with the

complex context we are experiencing, focusing its objectives on strengthening R&D&I in the most strategic sectors following the pandemic: health, ecological transition, and digitalization, in addition to advancing the development and enhancement of the scientific career.

This Plan integrates the actions outlined in the European recovery plan and has taken into account the recommendations of the Council of Europe regarding the Country Report 2018, 2019, and 2020 (National Reform Program and Stability Program of Spain), as well as their evaluation conducted by the Commission.

PEECTI 2021-2023 laws reforms 2021-2023:

At the national level, a key development is the amendment of the science Law 14/2011 through [Law 17/2022](#) as the main instrumental law to materialize all the EECTI 2021-2027 objectives. The approved legal reform focuses on three major areas:

- Improving **working conditions and professional development** of research personnel as well as the quality of their **infrastructure and equipment**.
- Efficiently strengthening knowledge transfer by developing stronger links between the public and private sectors with the aim of **increase business community's commitments to R&D&I** and making it **more competitive in the international field**. The reform allows the participation of public research entities in commercial companies to promote the **exchange of personnel and encourage qualified staff to participate in technology transfer**.
- Seeks to enhance the governance mechanisms of the system and **improve coordination** and collaboration between both public and private **stakeholders**. The new law introduces a measure that can facilitate the progress of awarding funding for R&D&I allowing public administration to use evaluation results previously by other public bodies when the grants serve the same purpose. By eliminating the need to repeat the process, **this measure will streamline the bureaucracy**

One of the most notable changes stemming from de Law 17/2022 has been the **actualization of Technological Transfer offices OTRI** (Oficina de Transmisión de Resultados de Investigación) changing his name to OTC (Oficina de Transmisión de Conocimiento.) [Real Decreto 984/2022 de 22 de noviembre](#).

The shift from OTRIs to OTCs **reflects a transition** from a mere focus on the transfer of research results to a comprehensive and **integral management** of technology, encompassing development, commercialization, and technological security.

The implementation of the legal change is occurring progressively. Leading universities in TT have already worked on modifying their functions whereas those not recognised by their technological research, still retain the competencies and methodologies of the former OTRIs.

Another reform within the framework of the EECTI 2021-2027, has been the repeal of the **Organic Law on Universities and the Implementation of the Organic Law on The University System (LOSU 2/2023)**. Thus, has brought significant changes to the governance and operation of Public Universities:

- **Knowledge and Technology Transfer:** The law designates transfer knowledge technology as a core function of universities.
- **Leadership by researchers:** University rectors and his personnel will be required to be research-active faculty members.
- **Creation of the Distinguished Professor Role:** A new role of “Distinguished Professor” is established to attract and retain the most renowned research faculty.
- **Promoting Internationalization:** The reform supports the internationalization of universities, and his technological production by facilitating agreements with foreign entities and promoting strategic alliances.

As a way to increase private research and the growth of emerging companies the Spanish government has launched the law, [28/2022 de 21 de diciembre de fomento del ecosistema de las empresas emergentes](#). The law also introduces measures to attract foreign investment and retain talent as well as facilitate international teleworking:

- **Tax incentives:**
 - Reduction in Corporate Tax Rate to 15% the first four years
 - Deferral of Tax Liability
 - Increased exemption to 50.000€ and new rules for stock valuation.
- **Deduction and benefits:**
 - Increases Investment deduction from 30% to 50% with an increase in the maximum deduction base.
 - Deduction for founding Partners regardless of the percentage of capital participation.
- **Regulation of Company Formation:**
 - Streamlined Process: Creation of companies in a single step with a tax identification number and electronic procedures.
 - Exemption from equity requirements for the first three years following incorporation
- **Promotion of innovation:**
 - Regulation to promote cooperation between universities and emerging companies.
- **Especial residence authorization for foreign researchers:**
 - Extension of residence permits from 2 to 3 years.

Intellectual property laws ([Ley de patentes 24/2015](#))

Although this law is not part of the EECTI 2021-2027 framework, it was one of the precedents for the modernization of innovation in Spain and the technology transfer between the public and private sectors.

In the specific field of knowledge transfer, and in particular HEIs and TCs, this is transferred in specific regulations. Although not all centres have specific regulations (as can be seen from the survey carried out), in many cases, HEIs establish procedures and regulations to deploy existing legislation.

In the same way, these activities are transferred locally to the different territories, through the legislation of the autonomous communities, although the powers are national.

As in other aspects of this study, the review of the legislation shows a high degree of maturity,

However, there is no consensus among the people interviewed that this framework provides sufficient guarantees for effective TT (approximately 40% of the responses indicate the opposite).

A recurring aspect is that these legislations are focused mainly from the academic field and, to a lesser extent, from the business field.

On the other hand, all the universities consulted have regular internal environments that they consider well defined and facilitate their operation.

As is the case with the specific transition from OTRI to OTC, various universities and technological centres are adopting the new guidelines unevenly, resulting in an asymmetric context where some regions exhibit innovation levels at or above the European average, while others remain significantly behind.

3 Strategy for TT

The Council of Ministers approved on December 2022 the **Transfer and Collaboration Plan**: science and innovation at the service of society, coordinated by the Ministry of Science and Innovation and which has a **budget of 1.2 billion euros in 2023**.

This plan specifically directed at Technology Transfer is part of the **Spanish Strategy for Science, Technology, and Innovation 2021-2027 (EECTI)**, which has already completed its implementation phase and is now undergoing a stage of review and adjustments.

The Technology Transfer Plan in Spain is designed to bridge the gap between research institutions and industries, facilitating the commercialization of innovations. Its primary goal is to enhance the competitiveness of the Spanish economy by encouraging the application of research results in businesses and the broader market.

The Plan is structured around **3 axes of action** and includes **15 measures**:

- **Knowledge transfer**
 1. Scientific and technological based entrepreneurship
 2. Industrial and intellectual property
 3. Open science
 4. Scientific advice to the public sector
- **Public-private collaboration for innovation**
 5. Public financing of collaborative projects
 6. New public-private alliances
 7. Public purchase of innovation
 8. Mobility between the public and private sectors
 9. Hiring of research personnel in companies
 10. Citizen science
- **Training and development of the ecosystem**
 11. Training and professionalization

12. Incentives for transfer and collaboration
13. State transfer and collaboration platform
14. Knowledge transfer offices
15. Networks and intermediate agents



*Figure 6 Technology Transfer Plan in Spain
(Spanish Ministry of Science, Innovation and Universities)*

Key elements of the plan include fostering **collaboration between universities, public research organizations, and private companies**. This is achieved by promoting the creation of knowledge transfer offices (**Oficinas de Transferencia de Conocimiento - OTCs**), which act as intermediaries to help researchers identify potential market applications for their inventions and innovations. Additionally, the plan supports the establishment of **spin-off companies** to commercialize technologies developed within academic and research settings.

The Spanish government, in coordination with regional authorities, **offers financial incentives, grants, and investment programs to stimulate technology transfer**. These programs are designed to reduce the risks associated with early-stage innovation, providing financial backing for feasibility studies, prototypes, and pilot projects. The plan also emphasizes the role of **venture capital and private investment** to scale up technological solutions.

Intellectual property (IP) management is another crucial aspect of the Technology Transfer Plan. Spain's framework seeks to protect and maximize the value of innovations through patents, trademarks, and other forms of IP, ensuring that researchers and institutions benefit from their work. The legal and regulatory framework for IP has been strengthened to facilitate smoother negotiations between research institutions and industry.

The plan also recognizes the importance of **fostering a culture of innovation and entrepreneurship in Spain**. To this end, it promotes educational initiatives and training programs aimed at researchers and entrepreneurs to equip them with the skills necessary to navigate the technology transfer process. Universities and research centres are encouraged to include technology transfer as a core part of their mission.

In terms of sector focus, the plan places a strong emphasis on **strategic industries such as biotechnology, pharmaceuticals, information technology, renewable energy, and advanced manufacturing**. These sectors have been identified as areas where Spain has the potential to become a global leader by leveraging its research strengths.

Overall, **Spain's Technology Transfer Plan** is a comprehensive strategy designed to enhance the country's innovation ecosystem, increase the economic impact of scientific research, and improve collaboration between the public and private sectors. By focusing on infrastructure development, financial support, intellectual property management, and skills training, the plan aims to position Spain as a competitive player in the global knowledge economy.

The successful implementation of this plan will depend on continued government support, active participation from the private sector, and the ability of research institutions to adapt to a more entrepreneurial mindset. **The goal is to create a dynamic innovation environment where scientific advances can be quickly transformed into commercial success.**

- **Main Implementations:**

Measure 1 of the plan includes public investment in science and technology-based ventures, through public venture capital funds of more than €4 billion over the coming years. **European PRTR (Recovery and Resilience Plan) funds will contribute to the implementation of the Plan's objectives.**

In the area of legal reforms, the **Law for the promotion of the start-up ecosystem**, approved in December 2022, stands out first of all. This law **simplifies procedures and introduces favourable conditions** for the creation of these new companies (**reduced corporate tax rate of 15%**, simplification of procedures, improved tax treatment of stock options, streamlined visa procedures for talent and digital nomads, etc.). It also provides for the creation of a Network of Entrepreneur Service Points, managed by the Ministry of Industry, Trade and Tourism, and the National Entrepreneurship Office.

Secondly, the **LCTI facilitates the participation of research personnel in spin-offs** (Article 17). It also enables public administrations to promote dependent or related commercial companies to foster transfer activity (article 35 bis 3) and investment and co-investment actions in seed capital and venture capital for investment in technology and financing of Spanish technological and innovative companies for their growth and transformation into relevant players in global markets.

Regarding financing mechanisms, emerging scientific and technological startups can benefit from both grants and financing through public venture capital funds. In terms of grants, the **Neotec program from CDTI** has been providing funding since 2002 to launch new business projects by small companies that require the use of technologies or knowledge developed from research activities, with the business strategy based on technology development. The program includes grants of up to 70% of the project budget, with a maximum amount of €325,000 per beneficiary, as well as specialized training. In the **2022 call**, this training will be **developed** through an agreement **with the Enterprise Innovation Institute of the University of Georgia (Atlanta, USA)**. In the 2021 and 2022 calls, Neotec had an annual budget of around €35 million, compared to €25 million in the 2019 and 2020 calls, representing a 40% increase. Additionally, in line with the LCTI, which promotes innovative entrepreneurship programs for women (article 4 ter 2c), in 2022 the Neotec Women program was launched to help close gender gaps.

A more recent trend is direct state investment in science and technology-based entities, through co-investment with previously approved private investors, with the aim of supporting the scaling up of these companies, which often face serious financing difficulties in the early stages.

The NEXT TECH Fund of the Official Credit Institute (ICO) and the Secretary of State for Digitalisation and Artificial Intelligence (SEDIA), also included in the PRTR, was set up in 2022 to **foster the development of high-impact innovative digital projects and investment in growth companies (scale-ups) by strengthening public financing instruments**, attracting international funds and boosting the venture capital sector. NEXT TECH aims to mobilise up to €4 billion in public-private partnerships with the Spanish venture capital sector by taking stakes and subscribing commitments in companies/funds specialising primarily in digital and artificial intelligence sectors.

Some autonomous communities have also recently adopted this type of public venture capital funding mechanisms, contributing to the objectives of the Plan. A notable example is the **Fons d'Inversió en Tecnologia Avançada (FITA)**, a new venture capital fund created by the Government of Catalonia at the end of 2021 to promote scientific entrepreneurship with an endowment of 60 million euros for the period 2022-2026, which will invest in research projects of start-ups in the initial stages of development.

The Plan will also support and raise the profile of international initiatives in which Spain participates, including two at the European level. The first is led by the European Innovation Council (EIC), with three funding instruments: i) EIC pathfinder, with 350 million euros, for multidisciplinary research teams with disruptive projects; ii) EIC transition, with 131 million euros, to convert research results into innovation opportunities (focused on the EIC pathfinder and ERC proof of concept projects); iii) EIC accelerator, with 1,160 million euros for start-ups and SMEs with innovations with great market potential. The second is the InvestEU Guarantee Agreement, signed by the European Commission and the EIB Group in March 2022, for the use of InvestEU financial products in Research, Innovation and Digitalisation, through which the EIB Group will deploy EUR 5.5 billion until 2027.

To facilitate access to the EIC Accelerator for innovative start-ups in Spain, in 2022 the CDTI launched the call for applications for SME Seal of Excellence grants, with a budget of EUR 30 million. In this way, Spanish SMEs that have achieved the European Innovation Council's seal of excellence will be able to access national funding to develop their R&D project presented in the European framework.

3.1 Global strategy of HEIs in TT

Technology Transfer (TT) is critically important for universities in Spain as it serves several key functions that contribute to the advancement of both academia and the broader economy.

1. **Enhancing Research Impact:** One of the primary roles of universities is to generate knowledge through research. TT enables universities to translate this research into real-world applications, thereby increasing the societal and economic impact of academic work. It helps universities move beyond theoretical research and contribute directly to technological innovation and economic development.

- 2. Securing Funding:** Engaging in technology transfer activities opens up new funding opportunities for universities. Through partnerships with industries, licensing agreements, and spin-off companies, universities can secure additional financial resources. This funding can be reinvested into research, infrastructure, and further innovation, helping to sustain long-term academic excellence.
- 3. Fostering Innovation and Entrepreneurship:** Universities that prioritize TT encourage a culture of innovation and entrepreneurship among students, faculty, and researchers. Many Spanish universities have created entrepreneurship programs, incubators, and innovation hubs that promote the development of spin-offs and startups. This not only helps commercialize new technologies but also trains the next generation of entrepreneurs and innovators.
- 4. Strengthening Industry Collaboration:** TT fosters stronger collaboration between universities and industries. These partnerships are crucial for aligning academic research with market needs, helping researchers identify practical applications for their work. Collaborative research projects and industry-funded initiatives can also provide valuable resources and real-world perspectives, enriching the academic environment.
- 5. Boosting University Prestige:** Successful technology transfer enhances the reputation of universities by demonstrating their ability to contribute meaningfully to the economy and society. Universities with strong TT programs are viewed as innovation leaders, which can attract high-quality researchers, faculty, and students. A robust TT system also helps universities in Spain rank higher in global innovation and academic rankings.
- 6. Intellectual Property (IP) and Commercialization:** Spanish universities benefit from TT through the management of intellectual property rights (IPR). By protecting and licensing patents and other forms of IP, universities can generate revenue from their innovations. Effective TT offices within universities play a vital role in negotiating IP agreements with companies and maximizing the value of research outputs.
- 7. Alignment with National Innovation Goals:** The Spanish government has made technology transfer a priority to boost the country's innovation ecosystem. Universities play a central role in achieving national objectives related to economic growth, competitiveness, and technological advancement. By engaging in TT, universities contribute to broader policy goals and benefit from government support, funding, and incentives.

The definition of this strategy is carried out by the university's rector's office, and from the corresponding vice-rector's office (research). On rare occasions, research groups, companies or external agents participate in this definition.

In summary, technology transfer is essential for universities in Spain, as it enhances their societal impact, provides additional financial resources, strengthens ties with industry, fosters innovation, and aligns with national goals. As a result, TT is becoming an integral part of the mission of Spanish universities.

60% of the HEIs that participate in the survey of the study considerate that TT is a priority activity for the university. 95% considered that their organizations have a clearly defined strategy to

support the TT. Finally, more than 65% considered that the governance team was involved in TT's strategy.

Thus, although the importance of TT is clearly confirmed, its weight in the strategy of universities and the support it receives (and therefore the resources allocated) do not always reflect that priority.

3.2 Map of Stakeholders

The number of stakeholders related to innovation in Spain is high. The main ones and the different groups that include them are described below.

Due to the national scope of the study, the state structure has been taken into consideration. It should be noted that the regional governments in turn have structures to support innovation and technological transfer (as is the case of the Generalitat in Catalonia).

- **Spanish Ministry of Science, Innovation and Universities**

The Ministry of Science and Innovation in Spain plays a crucial role in the transfer of technology and knowledge between the public and private sectors, with the aim of fostering innovation and economic development. Its mission is to ensure that scientific research results are applied in the market, turning them into products, services, or processes that enhance business competitiveness and societal well-being.

Key roles of the Ministry of Science in technology and knowledge transfer:

- **Promotion of R&D&I** (Research, Development, and Innovation): The Ministry designs policies and strategies to promote scientific research and technological development in universities, research centres, and businesses. This includes funding programs and direct support for innovative projects.
- **Encouragement of public-private collaboration:** It fosters collaboration between the academic sector and businesses through programs that incentivize joint projects, such as Collaborative R&D&I Projects and Technological Platforms, where companies and research organizations work together in strategic areas.
- **Funding and support for technology transfer:** Through entities like the CDTI (Centre for the Development of Industrial Technology), the Ministry funds technology transfer projects that allow companies to adopt innovations developed in research centers. It also supports the creation of startups and spin-offs based on academic research.
- **Protection and management of intellectual property:** The Ministry facilitates the protection of inventions and discoveries through patents and other intellectual property mechanisms, which are essential for ensuring innovations reach the market in a profitable and secure way.
- **Creation of innovation ecosystems:** It promotes the creation of science and technology parks, which act as hubs where businesses, universities, and research

centres are concentrated, making knowledge transfer easier. These parks foster interaction between key innovation players.

- **Internationalization programs:** The Ministry promotes the internationalization of Spanish science and technology by encouraging participation in European projects (such as Horizon Europe) and other global initiatives. This not only helps attract funding but also facilitates the sharing and transfer of technology on an international level.

In summary, the Ministry of Science and Innovation serves as a key facilitator in turning science into applied technology, encouraging collaboration between the scientific and business sectors, financially supporting innovation, and managing the knowledge generated in research institutions for transfer to the market.

<https://www.ciencia.gob.es/en/>

- **Centro para el Desarrollo Tecnológico y la Innovación (CDTI)**

The CDTI is a Business Public Entity under the Ministry of Science, Innovation and Universities that promotes innovation and technological development of Spanish companies.

<https://www.cdti.es>

- **Consejo Superior de Investigaciones Científicas (CSIC)**

The Higher Council for Scientific Research (CSIC) is the largest public institution in Spain dedicated to scientific and technical research and one of the most prominent in the European Research Area. It is attached to the Ministry of Science and Innovation through the General Secretariat of Research.

Currently, the CSIC has 121 research institutes distributed throughout the national territory.

<https://www.csic.es/es/el-csic>

- **Spanish University System (SUE) (public-private)**

The Spanish University System (SUE) has a total of **91 universities, 50 public and 41 private**.

Seven of these universities are non-face-to-face (virtual or online), 6 of which are private and 1 public.

In the **2023-2024 academic year**, 9,765 degrees have been established, 4,350 Bachelor's and double Bachelor's degrees (PCEO degree), 4,201 Master's and double Master's degrees (PCEO Master's) and 1,214 Doctorate degrees.



Figure 7 Territorial distribution of the 91 universities in Spain (Spanish Ministry of Science, Innovation and Universities)

Autonomous communities	Public universities	Private universities	Number of universities
Andalucia	10	1	11
Aragón	1	1	2
Canarias	2	4	6
Cantabria	1	1	2
Castilla y León	4	5	9
Castilla la Mancha	1	0	1
Cataluña	7	5	12
Madrid	6	15	21
Navarra	1	1	2
Comunidad Valenciana	5	4	9
Extremadura	1	0	1
Galicia	3	1	4
Islas Baleares	1	0	1
La Rioja	1	1	2
País Vasco	1	3	4
Asturias	1	0	1
Murcia	2	1	3
Total	48	43	91

Figure 8 Territorial distribution of the 91 universities in Spain (own construction based on ministry data)

In the 2023-2024 academic year, **1.111 university centres** (schools and faculties) were identified, and 2,774 departments.

The number of centres is distributed unevenly by autonomous communities. They own more own centres the public universities of Andalusia (135), C. de Madrid (101), Catalonia (83), Galicia (72) and Castilla y León (68).

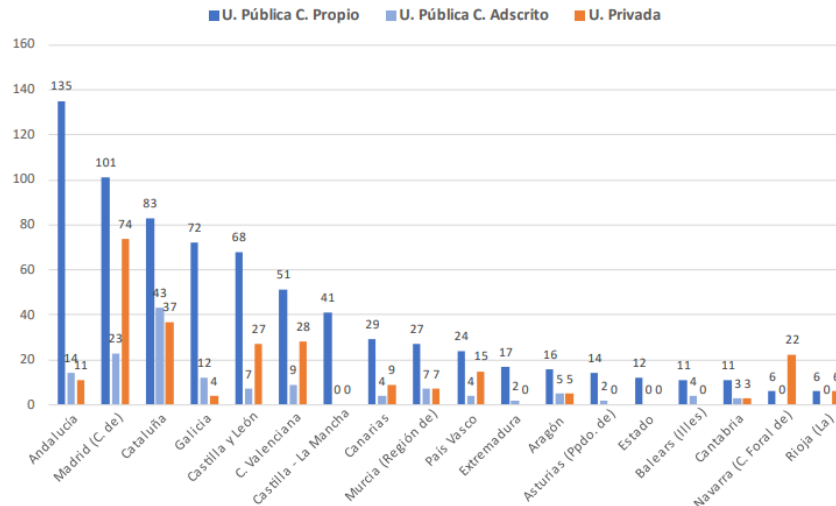


Figure 9 Number of university centers by autonomous community and type of university Academic year 2023-2024 (SIIU 2024)

55 of this universities are registered in the technology transfer office system (OTC).

The list of universities can be consulted at: <https://www.universidades.gob.es/listado-de-universidades/>.

Within these universities, the **research teaching staff** ("PDI" in Spanish) carry out the research projects, therefore being the most key actor in the system. Their motivation towards technological transfer is often decisive in making it happen.

- **The Spanish registry of Knowledge Transfer Offices (OTC)**

The OTC's (until 2022 called Research Results Transfer Offices (OTRI) were conceived within the **First Spanish National R&D Plan 1988-1991** as the mechanism that should serve as a catalyst for relations between the university and the company. The OTC can be defined as the knowledge transfer units of Spanish universities and public research organizations, whose mission is to **support and promote the production of knowledge** and its transfer to companies and other socioeconomic agents.

In 1996, at the initiative of the General Secretariat of the National Plan, the OTC Registry was created, regulated by the Ministerial Order of February 16, 1996 (BOE of February 23), which expands the concept of OTRI by opening registration in the same to other entities of the national innovation system, such as technology centres, business associations and different types of foundations with activity in R&D management and transfer (information in the OTRI-MICINN registry).

In universities and Public Research Organizations (OPI), the OTC is the interlocutor with companies and other socioeconomic agents, offering services such as:

- Facilitate collaboration between researchers and companies, identifying the most appropriate experts to meet their needs.
- Promote the catalogue of research results available to be transferred to society.

- Support the establishment of contracts and other forms of collaboration between the university or OPI and the company.
- Help find sources of public financing for collaborative activities between university or OPI groups and other entities.
- Manage patents and other forms of R&D protection.
- Assist in activities aimed at the creation of companies based on the exploitation of the knowledge generated at the university or OPI.

Currently there are 111 OTCs registered, belonging to 55 universities, 26 technology centers, 11 health entities, 7 regional R&D organizations, 5 state R&D organizations and 7 other types of entities.

Technology Transfer Offices (TTOs) in Spain do not usually have their own legal form, since in most cases they are integrated within universities, research centers, or broader public or private institutions. Generally, these offices do not operate as independent legal entities, but are part of the administrative structure of the institution that houses them.

<https://www.ciencia.gob.es/Innovar/OTC.html>

<https://aplicaciones.ciencia.gob.es/rot/>

- **Technology Centers (CT) and Support Centers for Technological Innovation (CAIT)**

In Spain there are **79 technological** centres and centres to support BioTech innovation registered in the registry of Spanish Ministry of Science, Innovation and Universities.

Autonomous Communities	Number of Technologies Center
ANDALUCIA	8
ARAGON	2
C.VALENCIANA	11
CANTABRIA	1
CASTILLA Y LEON	6
CASTILLA-LA MANCHA	1
CATALUÑA	5
EXTREMADURA	1
GALICIA	9
LA RIOJA	2
MADRID	2
MURCIA	8
NAVARRA	4
PAIS VASCO	16
PDO.ASTURIAS	3
Total	79

Figure 10 Territorial distribution of the 79 Technology Centres in Spain (own construction based on ministry data)

The list of these centres can be consulted at:

<https://aplicaciones.ciencia.gob.es/inforct/listadoltemInfoRct.mec>

Of the 79, 67 are technology centres (CT) and 12 innovation support centers (CAIT).

In addition to these technological centres, there are **21 more identified outside of this registry**, so the total would be 100.

<https://www.ciencia.gob.es/Estrategias-y-Planes/Sistema-de-Informacion-sobre-Ciencia--Tecnologia-e-Innovacion--SICTI-/Red-Espanola-de-Centros-de-I-D-I--RECIDI-.html>

- **Organismos Públicos de Investigación (OPI)**

Public Research Organizations (OPI) of the General Administration of the State are those created for the direct execution of scientific and technical research activities, activities for the provision of technological services and those other activities of a complementary nature, necessary for adequate progress. scientific and technological of society, which are attributed to them by law or by their rules of creation and operation. The coordination of the actions of the OPI is the responsibility of the Ministry of Science and Innovation.

There are **5 of these centres** and 8 more centres with link.

<https://www.ciencia.gob.es/Organismos-y-Centros/OPI.html>

<https://www.ciencia.gob.es/Estrategias-y-Planes/Sistema-de-Informacion-sobre-Ciencia--Tecnologia-e-Innovacion--SICTI-/Red-Espanola-de-Centros-de-I-D-I--RECIDI-.html>

- **Research Centers**

Public, private or mixed organizations dedicated to the generation of fundamental knowledge for the country through basic and/or applied scientific research projects in specific lines of research.

There are **113 of these centres registered** in Spain, not included in other categories and 638 in total (including, for example, universities, technology centres, clusters or science parks that also carry out other activities).

Autonomous Communities	Number of Research Center
ANDALUCIA	67
ARAGON	33
C.VALENCIANA	45
CANARIAS	27
CANTABRIA	16
CASTILLA Y LEON	30
CASTILLA-LA MANCHA	15
CATALUÑA	107
EXTREMADURA	15
GALICIA	43
IS. BALEARS	8
LA RIOJA	13
MADRID	108
MURCIA	18
NAVARRA	18
PAIS VASCO	54
PDO.ASTURIAS	21
Total	638

Figure 11 Territorial distribution of the 638 Research Centres in Spain (own construction based on ministry data)

<https://www.ciencia.gob.es/Estrategias-y-Planes/Sistema-de-Informacion-sobre-Ciencia--Tecnologia-e-Innovacion--SICTI-/Red-Espanola-de-Centros-de-I-D-I--RECIDI-.html>

- **Science and technology parks**

Science and technology parks are high-quality spaces and facilities where the flow of knowledge and technology between universities, research institutions, companies and markets is stimulated and managed.

They promote the creation and growth of innovative companies through incubation and spin-off mechanisms and provide other value-added services.

They generate knowledge, innovative companies and collaboration networks.

There are **51 of these science and technology parks** in Spain.

<https://www.ciencia.gob.es/Estrategias-y-Planes/Sistema-de-Informacion-sobre-Ciencia--Tecnologia-e-Innovacion--SICTI-/Red-Espanola-de-Centros-de-I-D-I--RECIDI-.html>

- **Technology platforms**

Collaborative networks that bring together industry, research centres, universities, and government agencies. They aim to foster innovation, streamline the commercialization of new technologies, and bridge the gap between scientific research and industrial application. These platforms facilitate cooperation, align research efforts with market needs, and accelerate the development and adoption of new technologies, ultimately driving economic growth and technological advancement.

Here are some examples of technology platforms for technology transfer in Spain:

- **PLATECMA (Spanish Technology Platform for Advanced Materials and Nanomaterials):** Promotes research and development in advanced materials and nanomaterials for industrial applications. <https://www.platecma.com/> .
- **BIOPLAT (Spanish Technology Platform for Biomass):** Supports the use of biomass as a renewable energy source, facilitating technology transfer and knowledge in the sector. <https://bioplat.org/> .
- **PLANETIC (Spanish Technology Platform for Electronic, Information, and Communication Technologies):** Fosters innovation and development in ICT, connecting researchers and businesses. <https://www.planetic.es/> .
- **PTECO2 (Spanish Technology Platform for CO2):** Focuses on technologies for carbon dioxide capture, utilization, and storage, offering innovative solutions to mitigate climate change. <https://pteco2.es/>

- **Food for Life-Spain:** Promotes research and development in the agro-food sector, linking industry with research centres and universities. <https://foodforlife-spain.es/>

These platforms play a crucial role in transferring knowledge from research to industry, enhancing competitiveness and technological development in Spain.

- **Innovative business groups – Clusters**

A cluster is a type of concentration of companies in a specific geographical area or the concentration of different organizations related to a specific subject and that are present in a State or region. The reason for these clusters is that they manage to increase the productivity of companies.

There are **107 of these clusters** in Spain.

<https://www.ciencia.gob.es/Estrategias-y-Planes/Sistema-de-Informacion-sobre-Ciencia--Tecnologia-e-Innovacion--SICTI-/Red-Espanola-de-Centros-de-I-D-I--RECIDI-.html>

- **Business associations**

In Spain, there are several ****employers' associations**** (known as "patronales") at the national, regional, and sectoral levels that represent the interests of companies in different industries and regions. Some of the most important national associations include:

- CEOE (Spanish Confederation of Business Organizations). The largest and most representative organization in Spain. It brings together companies from all economic sectors and plays a major role in collective bargaining and economic policy in the country.
- CEPYME (Spanish Confederation of Small and Medium-Sized Enterprises). Focused on representing small and medium-sized businesses. It often works in coordination with CEOE.

In addition to these large organizations, there are many other sector-specific employers, associations that represent the interests of specific industries. Some examples include:

- ANFAC (Spanish Association of Automobile and Truck Manufacturers), in the automotive sector.
- FIAB (Spanish Federation of Food and Beverage Industries).

In summary, there is no fixed number of employers' associations, as there are many organizations depending on the industry and region.

- **Chambers of Commerce**

In Spain, there are 85 official Chambers of Commerce spread across the country. These chambers are public law corporations, and their main function is to represent and defend the

interests of businesses, as well as provide services such as business support, internationalization, training, and advisory services.

Additionally, there is a Spanish Chamber of Commerce (previously known as the Superior Council of Chambers), which acts as the coordinating body for all regional Chambers of Commerce.

Each autonomous community typically has one or more Chambers of Commerce that cover different provinces or geographic areas.

These institutions serve as a key point of reference for businesses at the local level, supporting international trade, commerce, and business development.

<https://sede.camara.es/sede/organismos>

- **Red Española de Centros de I+D+I (RECIDI)**

Group of Public Research Organizations, Universities, Health Institutes, Centers of Excellence, Technology Centers and Support Centers for Technological Innovation, Unique Scientific and Technical Infrastructures, Innovative Business Groups, Technological Platforms, Scientific and/or Technological Parks, European Strategy Forum on Research Infrastructures, Research Centers.

So, this network (managed by the Spanish Ministry of Science, Innovation and Universitie) brings together all those interested in the generation of knowledge in Spain, as well as in the transfer of knowledge:

Entity type	Number of centers
Public Research Organizations (OPI)	5 (plus 8 more centres with link).
Universities	91 (50 public and 41 private).
Health Institutes	42 (35 accredited by the Ministry).
Centers of Excellence SOMMA	46 Centers of Excellence
Technology Centers and Support Centers for Technological Innovation	100 Tecnology Centers (79 registered in the national registry).
Unique Scientific and Technical Infrastructures (ICTS)	29
Innovative Business Groups	125 (107 innovative business groups – cluster and 18 other innovation associations)
Technological Platforms	52
Scientific and/or Technological Parks	51
Research Centers	113
Total	654

Figure 12 Types of centres in the network of R&D centres
(own construction based on ministry data)

<https://www.ciencia.gob.es/Estrategias-y-Planes/Sistema-de-Informacion-sobre-Ciencia--Tecnologia-e-Innovacion--SICTI-/Red-Espanola-de-Centros-de-I-D-I--RECIDI-.html>

- **Red PIDI**

The PIDI Network (Network of Information Points on Research, Development, and Innovation Activities) is an information network in Spain that provides specialized and free advice on the funding and financial support available for research, development, and innovation (R&D&I) projects. It is managed by the Centre for the Development of Industrial Technology (CDTI), which operates under the Spanish Ministry of Science and Innovation.

<https://www.redpidi.es/Publica/home/index.html>

- **Red de Fundaciones Universidad-Empresa (RED FUE)**

Association declared of public utility that promotes cooperation between universities and companies, multiplying and optimizing the work carried out by each of its members.

<https://redfue.es/>

- **Federación Española de Centros Tecnológicos (FEDIT)**

Since 1996, FEDIT has worked to promote and promote Innovation, Technological Development and private Research to increase the competitiveness of companies through the strengthening of Technological Centers.

<https://fedit.com/>

- **Asociación de Parques Científicos y Tecnológicos de España (APTE)**

The Association of Scientific and Technological Parks of Spain (APTE) is a non-profit association whose main objective is to collaborate, through the promotion and dissemination of scientific and technological parks, to the renewal and diversification of productive activity, to technological progress. and economic development.

<https://www.apte.org/>

- **Network of science parks in Catalonia (XPCAT)**

The Xarxa de Parcs Científics i Tecnològics de Catalunya (XPCAT) brings together large countries of production, transfer, dissemination and use of connection and acts as a point of contact between the research and innovation communities.

<http://www.xpcat.net/>

- **Catalan Foundation for Research and Innovation (XPCAT)**

The Catalan Foundation for Research and Innovation (FCRI), a private entity founded in 1986, disseminates research and innovation among society to promote scientific culture, scientific-technical vocations, public-private relations and entrepreneurship in this area.

<https://fundaciorecerca.cat/es/>

4 TT Structures

In Spain, technology transfer (TT) structures include:

- **Technology Transfer Offices (OTC):** Facilitate the commercialization of research from universities and research centres.
- **Research and Development Centers:** Focus on applied research and industry collaboration.
- **Technology Parks and Science Parks:** Provide infrastructure and support for tech startups and companies.
- **Innovation Hubs and Clusters:** Promote collaboration and networking among businesses, researchers, and institutions.
- **Public Research Organizations:** Conduct advanced research and partner with industry for technology transfer.

These structures support the transition of scientific discoveries into marketable technologies and products.

The structure of Technology Transfer Offices (OTC)

With the approval of Royal Decree 984/2022, those entities changed their name, Oficinas de Transmisión de Resultados e Investigación to Oficina de Transmisión del Conocimiento. Such change, added more functions and capacity of action.

OTC's play a crucial role in facilitating technology transfer. Their key functions include:

- **Commercialization:** Managing the commercialization of research outputs from universities and research centres, including licensing patents and developing spin-offs.
- **Intellectual Property Management:** Protecting and managing intellectual property rights, including patenting and negotiating IP agreements.
- **Industry Collaboration:** Connecting researchers with industry partners to foster collaboration, joint ventures, and applied research projects.
- **Advisory Services:** Providing guidance to researchers on commercial potential, market trends, and business development.
- **Funding and Grants:** Assisting in securing funding and grants for technology development and commercialization.

To carry out these functions, they offer different services to teachers, researchers and research groups.

- **Intellectual Property Management:** Advising on patenting, copyrights, trademarks, and managing IP portfolios.
 - o Determine whether to protect the IP rights in the innovation.
 - o Negotiate licence agreements for the transfer of innovation IP rights.
 - o Perform administrative functions in support of IP protection and technology transfer.

- **Commercialization Support:** Assisting with licensing agreements, forming spin-offs, and negotiating commercialization deals.
 - o Advise teachers and researchers to identify commercially valuable results.
 - o Evaluate the commercial potential of published innovations.
 - o Commercialize innovations.
- **Market Analysis:** Providing insights into market potential and helping to identify commercial opportunities.
- **Funding Assistance:** Helping secure grants, venture capital, and other funding sources for technology development.
- **Industry Partnerships:** Facilitating collaborations between researchers and industry partners. Help find industrial partners.
- **Technology Evaluation:** Assessing the commercial viability and technical feasibility of innovations.
- **Business Development:** Offering support for business planning, startup development, and scaling ventures.
 - o Advise on the creation and management of spinoff.

In Spain, there is **no single model to structure these TT offices**.

Most universities have a **single office that offers all services** to the different research groups, but there are universities that, due to their size, have different offices dedicated to specific research groups or areas of knowledge and that also have a structure to coordinate its activity. In some (few) cases, there are different TTO specialized in different services.

As an example, **Universidad de Santiago de Compostela** has two different TTO specialized:

- AVTE: Patents, licenses, support for spin-off establishment, and management of the portfolio of participated companies.
- APEC: Collaborative research and research contracts.

On the other hand, **Universitat Politècnica de València** has a single office "UPV innovation" that offers all the services. It is a kind of federation of specialised offices within the university along with private consultants and is governed by a Board of Directors.

Due to the framework provided by the OTRI network (that offers knowledge and resources), these offices are generally **internally structured**, but in the case of **intellectual property**, they often rely on external agents to be able to offer services.

REDOtri:

RedOtri is a network in Spain formed by the Research Results Transfer Offices (OTRI) (now changing to OTC's), which aim to connect universities and research centres with the market and business sector. Their main function is to coordinate the activity of all the offices, although they work independently to meet the needs of their region. They are also responsible for implementing the changes in technology transfer that EECTI 2023-2027 establishes.

It also facilitates the signing of contracts and licences between academic institutions and companies, allowing technologies to be used in commercial products or services. In addition, RedOtri encourages the creation of spin-offs and start-ups based on research, helping researchers to turn their ideas into viable companies.

Another important aspect of RedOtri is its support in the search for funding, both public and private, for innovation projects, enabling many of these research projects to be carried out and scaled up in the market.

Technological Parks and Research Centers:

In Spain, the management and function of technology parks, science parks and other research centres is coordinated through the **Association of Science and Technology Parks of Spain**, independently of the universities.

The activity of these entities accelerates the processes of technology transfer between the various agents in the system and enables the creation and rapid growth of new research centres and new technology-based companies, key elements in achieving the desired technological convergence of our national innovation system with Europe.

Although in constant collaboration with Spanish universities, they have their own programmes and initiatives:

- **APTE Innovation Spaces:** This is an initiative promoted by the Association of Science and Technology Parks (APTE) aimed at making visible and promoting the capabilities and opportunities offered by the innovation spaces located in the association's member parks.
- **Aptenisa:** A business ideation and acceleration programme that will lead to the detection of 100 business ideas and the acceleration of 30 start-ups.
- **Apte Investment Network:** This is an initiative promoted by the Association of Science and Technology Parks with the aim of supporting the growth and facilitating access to funding for the startups that have emerged during the APTENISA ideation and acceleration programme, as well as the rest of the startups located in the Spanish science and technology parks.

Communication between OTCs and other agents

As reported by different directors of the OTC offices through the interviews and surveys carried out, **communication** (internal / external) **is one of the main challenges in the system.**

The OTC are responsible for this aspect of communication:

- In some cases, there is complexity in connecting OTC services with researchers and research groups.
- It is necessary to optimize internal communication, to coordinate all TT structures or units, as well as all agents.
- Different interviewees recognize that aspects related to marketing are one of the weaknesses. TT units they should allocate more efforts to promotion and marketing activities.

Externally, **companies do not always understand the transfer structure** of universities (again due to the lack of marketing according to those interviewed), so they can directly access research groups or researchers, without the support of these offices.

On the other hand, the network structure offered by the **centralized registration of OTC** by the Spanish Ministry of Science, Innovation and Universities facilitates the connection between them and the generation of synergies.

Main aspects to improve

The four main aspects to improve identified are:

1. Economic resources available for OTC.
2. Marketing orientation of the services and personnel that are part of the OTC.
3. Training of the personnel involved.
4. Contact with the rest of the ecosystem (industrial companies or target audience).

4.1 TT System Scheme

In the "Map of Stakeholders" section we can find the different elements that make up the technology transfer system in Spain.

As a summary, the following diagram shows the relationship between the different agents.

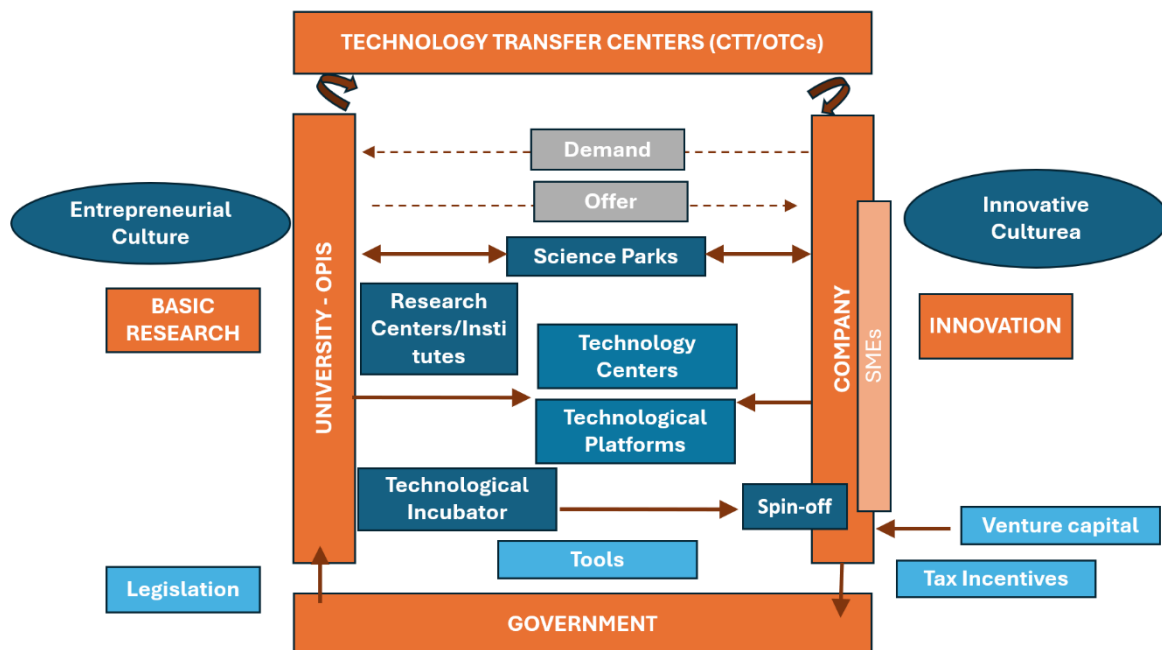


Figure 13 Scheme of TT-related agents in Spain (Cotec 2003 "Nuevos Mecanismos de Transferencia de Tecnología en Encuentros Empresariales COTEC")

The functions of each of these agents in the TT system are:

Generation of knowledge and technology: Represent the "offer" of the technology transfer system, the knowledge and technologies to be transferred

- **University:** Universities play a key role in technology transfer, **fostering innovation**, research collaboration, and commercialization of scientific discoveries. They bridge academia and industry, driving economic growth through patents, spin-offs, and partnerships. Also generating **talent** that can be incorporated into the business field. Within universities, **professors, researchers and research groups** represent the assets that generate the knowledge and technology to be transferred,
- **Public Research Organizations (OPI):** Public Research Organizations drive technology transfer by conducting **advanced scientific research**, fostering innovation, and collaborating with industries to commercialize discoveries, promoting economic development and technological advancements.
- **Research centres:** Facilitate technology transfer by conducting **cutting-edge research**, fostering innovation, and collaborating with industries, enabling the commercialization of scientific advancements and contributing to economic growth.
- **Technology centers:** Facilitate technology transfer by **connecting research with industry needs**. They support innovation, develop applied research, and **help companies adopt new technologies**, enhancing competitiveness and fostering collaboration between academic institutions, businesses, and government agencies for economic growth.

Entities or structures for the connection between HEIs and companies: main structures for the connection between knowledge agents and the business environment.

- **OTC (Technology Transfer Centers):** HEI technology transfer offices that facilitate TT between the university and companies, with the support of the government registration system. Their functions are detailed in the previous sections of this study.
- **Technology platforms:** Bring together industry, research centers, universities, and government agencies. They aim to foster innovation, streamline the commercialization of new technologies, and bridge the gap between scientific research and industrial application. These platforms **facilitate cooperation**, align research efforts with market needs, and accelerate the development and adoption of new technologies, ultimately driving economic growth and technological advancement.
- **Scientific parks:** Innovation hubs that support technology transfer by **providing infrastructure, resources, and collaboration opportunities for research institutions** and businesses. They foster the commercialization of research, facilitate partnerships, and drive technological and economic development.

Business creation: One of the ways to carry out technology transfer is the creation of companies specifically dedicated to commercializing the technology created.

- **Tech incubators:** Support technology transfer by **nurturing startups**, providing resources, mentorship, and networking opportunities. They bridge innovation and

commercialization, fostering collaboration between researchers, entrepreneurs, and industries.

- **Spin-offs:** Spin-offs are **companies created from academic or research institutions** to commercialize innovations, turning research into viable businesses. **Drive** technology transfer by turning academic research into marketable products and services. They foster innovation, promote entrepreneurship, and strengthen collaboration between universities and industries for economic growth.

Technology adoption: Represent the "demand" of the technology transfer system:

- **Companies:** Companies play a crucial role in technology transfer by **adopting and commercializing innovations**. They collaborate with research institutions, invest in R&D, and apply new technologies to enhance products and processes, driving economic growth and technological advancement.
- **SME: 94% of Spanish companies are SMEs**, with an average of 1.7 employees, placing Spain alongside Italy and Portugal at the top of the EU in terms of proportion of SMEs. It is therefore important to take into account the specific needs of these companies in the field of technology transfer.

The role of government

- **Government:** In Spain, the government facilitates technology transfer by **funding** research, supporting innovation **policies**, and fostering **collaboration** between academia and industry. It provides grants, tax incentives, and creates regulatory frameworks to streamline the commercialization of technologies, thus enhancing economic growth and technological advancement.

4.2 TT Procedures

TT procedures are organized steps and actions that facilitate the movement of knowledge, innovations, and technologies from research institutions or universities to the productive or commercial sector. These procedures ensure that scientific inventions are transformed into useful products, services, or processes in the market.

Main processes in TT that require specific procedures are:

- **Technology identification:** Evaluating research and scientific results with commercial potential.
- **Intellectual property protection:** Registering patents, trademarks, or copyrights to protect innovations.
- **Commercial feasibility assessment:** Analyzing the market and possible commercial application of the technology.

- **Licensing and agreements:** Negotiating usage licenses or collaboration agreements between the technology-owning entity and companies or startups.
- **Prototype development:** Creating proof-of-concept or prototypes to validate the technology's functionality in real-world conditions.
- **Spin-offs or startups:** Establishing new companies to develop and commercialize the technology when viable.
- **Commercialization:** Bringing the technology to market through sales, commercial partnerships, or mass production.

These procedures are essential to ensure that scientific innovations reach the public and are applied in industry.

Some actors such as **LERU (League of European Research Universities)** (<https://web.ub.edu/es/web/leru>), highlight the need to define clear and transparent rules on the ownership of industrial and intellectual property rights and, in general, on the different internal procedures related to the TT.

The HEIs are responsible for the internal definition of procedures for the TT, with the support and access to knowledge provided by the OTRI network.

Most of the universities consulted have **some specific procedures for each type of TT**, or a general procedure for all cases, while only rarely is a specific procedure established for each case.

On the other hand, the heads of other offices consulted recognize that not in all cases there is a clear definition of the costs defined for each of the services.

4.3 Strengths and Weaknesses of TT Units/Offices

Based on interviews with different managers of OTRI offices, the following advantages and weaknesses are identified.

Strengths	Weaknesses
High maturity of the offices, experience and focus on specific functions (e.g. European programs, protection of results of investigation...)	Lack of business intelligence practice. Lack of contact of the researcher with the outside, no they know externally the work being carried out, in sometimes excessively theoretical works
Highly experienced staff. Highly qualified and specialized, versatile personnel, dynamic, flexible and motivated	Lack of access to customer relationship information. Productive fabric incapable of absorbing the technological offer. Lack of knowledge of the transfer function technology still for companies.
Spin-off support	Marketing orientation
Contacts with the industry. Good interaction between the different agents of the system (companies, universities and public administrations)	Lack of incentives for professional careers of KT managers. Little awareness or motivation of researchers to transfer.

Scouting & Analysis. Excellent level of researchers and experience.	Need for resources (including administrative staff). Scarce RR. HH., job insecurity and little stability
High scientific and technological production capacity.	Excessive fragmentation of the transfer function.

There is quite a consensus in pointing out that it is necessary for the structures (and the OTC) to have more support through the relevance of their functions.

Those mechanisms, are established to assess the generation of technological transfer of teaching and research staff, given that currently this aspect is not sufficiently important. In this way, in many cases the staff of the knowledge centers do not have sufficient motivation to carry out transfer and the offices carry out more management functions than technology commercialization.

4.4 TT Structure Best Practices

Below are some detected examples of good practices:

- **The Innova Program from UPC (Universidad Politècnica de Catalunya)**

In 1998, the UPC (Universidad Politècnica de Catalunya) launched a pioneering initiative in Catalonia and Spain focused on promoting the culture of innovation and entrepreneurial spirit, and promoting the creation of new companies based on knowledge and technology (<https://rdi.upc.edu/ca>).

The activity of this innovation and entrepreneurship dissemination program has two fields of action.

One is the support for the valorization of research, the generation of patents from the technologies generated at the University and the promotion of the creation of companies based on knowledge.

And the other major line of action of the Innova Program is the support of the entrepreneurial spirit and the culture of innovation among the university community, that is, the transmission of the values of innovating and entrepreneurship among researchers and teaching staff, students, administration staff and services, and graduates.

In 25 years, under the umbrella of the Innova Program, more than 400 technology companies have been established—of which a hundred are spin-offs dedicated to deep tech (disruptive technologies)—which in total have generated 5,000 highly qualified jobs. . Likewise, more than 500 patents have been generated and more than 300 technologies have been licensed. A nucleus that has contributed to forming the innovative ecosystem of Catalonia.

By sectors, companies dedicated to information and communications technologies (43.88%) and health (17.35%) predominate, followed by companies that work in the industrial field and robotics (14.29%).), and energy and materials (14.29%). To a lesser extent, the companies

created are dedicated to mobility and sustainability (6.12%), the space and aeronautics field (2.04%) and the agrotech/food tech sector (2.04%).

With this, the UPC has generated 40% of the spin-offs that arise in the entire Catalan university system in the last 25 years.

- **The SPIN Program from UPV (Universitat Politècnica de València)**

The UPV (Universitat Politècnica de València) understands spin-offs as the most complete and effective technology transfer mechanism. In the same, both research results and the talent and capacity of its creators are made available to the company. Likewise, it contributes to the creation of an innovative and knowledge-based economic fabric. To these companies, some owned by the UPV and others not, the UPV offers them the Spin-off UPV brand, which allows them to be recognized and differentiated (<https://innovacion.upv.es/es/spinupv-2024/>).

Spin UPV promotes and develops companies, in spin-off format, generated from UPV's knowledge and scientific-technological results.

SPIN UPV Program aims to boost the creation of spin-off companies by scouting, team forming, PoC funding and access to investors

Match up Program to match UPV researchers with business innovation challenges.

The program contributes to renewing the economic fabric of the Valencian Community. For this, SPIN UPV offers an itinerary of 8 counselling and training sessions that will accompany during 2024 the research teams that wish to transfer their scientific and technological results to a real company with value for the market and society.

The Polytechnic University of Valencia understands spin-offs as the most complete and effective technology transfer mechanism. In this process, both research results and the talent and capacity of the creative teams are made available to the company.

Likewise, it contributes to the creation of an innovative and knowledge-based economic fabric. To these companies, some owned by the UPV and others not, the UPV offers them the "Spin-off UPV" mark, which allows them to be recognized and differentiated.

- **New strategic plan for research at UOC (Universitat Oberta de Catalunya)**

As a way to align the work of researchers with the industry, the new strategic plan for research at UOC (Universitat Oberta de Catalunya) will be mission oriented.

Although the plan is currently being developed, its innovative approach, as well as its orientation to the needs of the company, already makes it worthy of recognition and interest among the Spanish academic community.

The university has carried out a study on the research and innovation policies carried out by the EU and has carried out a bottom-up process to review its research plan

As part of this new plan, the university will no longer have research groups but will instead have units that must respond to one or several missions.

These "missions" will define general objectives for the entire university and align with the EU objectives.

With this, the university expects:

- Be able to orientate (explain that they are strong) in a specific number of challenges of society and industry.
- Align the language of your research (and researchers) with social and business reality.
- Facilitate access to financing that the EU has related to these challenges.

As examples of these missions:

- E-learning
- New rurality – Catalonia / empty Spain
- Sustainability

In this new concept, all TT will be focused on these specific missions (and not on specific technologies or general areas of knowledge), in a similar way to the open innovation carried out by companies.

5 TT Instruments

There are different instruments to carry out technological transfer from the field of knowledge generation (HEIs).

These instruments are listed below, with an assessment of their degree of use in the different centres interviewed.

- **Research contracts**

In several universities these contracts are managed directly by the researchers, in others they are managed by the transfer units (OTC).

The role of Technology Transfer Offices (TTOs) in universities is to manage and facilitate research contracts between the university and external entities, like companies or governments.

According to surveys carried out through RedOTRI, the largest source of income for among all the transfer mechanisms used by universities Spanish companies are R&D on request.

The LOSU (universities law) gives OTCs an important role in this area, so that OTCs fulfils different functions:

- **Intellectual Property Management**: TTOs help protect and manage intellectual property rights (patents, copyrights) from research projects.
- **Contract Negotiation**: They negotiate and draft research contracts, ensuring the university's interests in terms of ownership, confidentiality, and publication rights.

- **Collaboration Facilitation:** TTOs foster partnerships between academia and industry, promoting research commercialization and joint projects.
 - **Legal Compliance:** They ensure contracts follow legal and ethical standards.
 - **Innovation Support:** TTOs encourage the creation of startups and commercialization of research results.
 - **Administrative Oversight:** They manage research funding and track project timelines and goals.
- **Cooperative research contracts (with public funding)**

Cooperative Research Contracts (with public funding) are agreements between universities or research institutions and companies to collaborate on joint research projects. These projects receive partial or full funding from public sources, such as government grants or programs.

There are also certain cases in which regional governments have financed specific programs at universities to promote university-business cooperative research

Key points:

- **Public-private collaboration:** Both parties work together to solve complex problems or develop new technologies.
- **Public funding:** Research is partially funded by public grants or programs (e.g., EU Horizon Europe).
- **Shared ownership:** Results, like patents, are shared between partners based on contributions.
- **Public benefit:** Projects aim to provide broader social or economic benefits due to public funding.

In this case, the TTOs play a role in disseminating this aid and, as in the case of research contracts, manage some of these contracts.

- **Licenses and patents**

The TTOs manage licenses and patents by facilitating the protection and commercialization of university research.

Key functions:

- **Patent Filing:** TTOs help researchers secure patents, handling the application process and legal requirements.
- **Licensing:** They negotiate licensing agreements with external companies, allowing businesses to use university-developed technologies.
- **Commercialization:** TTOs identify commercial opportunities and market intellectual property to potential partners or startups.

The [Spanish Patent Law \(Law 24/2015\)](#) regulates the protection of inventions through patents. It grants the patent holder exclusive rights to exploit the invention for **20 years** from the application date. This includes manufacturing, selling, and using the product or licensing its use to others.

Key aspects of the law include:

- **Exclusive rights:** Only the patent holder can commercialize the invention or authorize others through licensing agreements.
- **Licensing:** There are voluntary licenses (negotiated between the holder and third parties) and compulsory licenses, which the government may impose if the invention is not being exploited or in cases of public interest.
- **Employee inventions:** If an employee creates an invention as part of their job, the employer generally owns the patent. However, the employee may be entitled to additional compensation if the invention generates significant profits for the company.
- **Transfer of rights:** The patent holder can sell or transfer patent rights to another party, who then benefits from any revenue generated.

TTOs typically handle these tasks internally but may collaborate with external patent attorneys or partners for legal and business support.

There are few universities that have a patent fund or with its own programs to encourage industrial protection and intellectual or commercialize it.

- **Creation of Spin-off**

TTOs support the creation of spin-offs (technology-based companies, “EBTS” in spanish) by helping researchers turn university innovations into new companies.

Key functions:

- **Business Development:** TTOs assist researchers in developing business plans and identifying market opportunities.
- **Funding Support:** They connect spin-offs with venture capital, grants, or incubator programs.
- **Legal Structure:** TTOs help set up legal frameworks for the new company, ensuring intellectual property rights.

TTOs often run incubators, mentorship programs and provide access to seed funding to support spin-off creation and growth.

Most OTC directors surveyed indicated this type of functions as the most prominent in the promotion of TT in universities.

Some examples of the number of spinoffs created in the last 3 years by universities are the Universidad de Alicante with 10, Universidad de Santiago de Compostela with 6 or UOC (Universitat Oberta de Catalunya) with 3.

- **Públic Purchase of Innovation**

Pre-commercial Public Procurement (PPP) and Public Procurement of Innovation (PPI) are mechanisms that stimulate business R&D&I activities. They have a high potential impact on the innovation ecosystem as they allow technology to be developed and validated, with early adopters within the Administration **who could later tender for contracts** requiring technological solutions such as those developed in PPP and PPI. These actions, mainly carried

out by the **CDTI and the General Secretariat for Innovation, act as catalysts for business R&D&I.**

5.1 Exchange of Research Staff with Companies

Researcher Exchange between companies and public research centres refers to programs that facilitate the temporary transfer of researchers between the two sectors. This collaboration allows the sharing of knowledge, skills, and technologies to foster innovation and strengthen ties between industry and academia.

The Spanish Science, Technology, and Innovation Law promotes researcher mobility between public research institutions and the private sector.

Key points:

- Knowledge transfer: Researchers gain exposure to new environments, enhancing skills and innovation.
- Collaboration: Strengthens partnerships between companies and public research institutions.
- Joint projects: Often used to work on joint R&D projects or technology development.

Some instruments used:

- Secondments: Temporary assignments where researchers work in a different organization while maintaining their primary affiliation.
- Fellowship Programs: Grants or scholarships that support researchers working in industry-academia collaborations.
- Public-Private Partnership (PPP) Programs: Initiatives that encourage joint projects and researcher mobility between companies and research institutions.
- Training and Exchange Programs: Formal programs focused on skill development through industry-academia cooperation.

University programs that promote exchange.

- Through contracts.
- Business Chairs.
- Creation of Mixed Centers.
- Calls for research stays (e.g. Marie Curie Program).
- Public calls to hire Doctors.
- Direct collaboration agreements of the university with certain centres.
- Visits to companies, presence in forums, technological platforms...

The **LCTI (Science, Technology, and Innovation Law)** introduces various reforms to improve the mobility of research personnel between the public and private sectors. The main measures include:

1. **Scientific-Technical Contracts**: A new type of contract is established to facilitate the hiring of staff from the private sector, without the need for prior authorization if external

funding is available. This allows universities and research centers to hire technical, research, or management personnel, even without a Ph.D.

2. **Distinguished Researcher Contract:** This contract allows hiring recognized experts to lead research teams or knowledge transfer centers, fostering the influx of talent from the private sector into the public sector.
3. **Mobility Between Sectors:** The law facilitates the mobility of researchers between the public and private sectors by providing greater flexibility in hiring and recognizing these experiences in selection and promotion processes.
4. **Review of the Associate Professor Role:** This proposal aims to adapt the associate professor role to include professionals from the private sector with relevant experience in specific areas, strengthening the link between academia and industry.
5. **Mentorship and Training Programs:** Initiatives such as **REBECA** from FECYT are supported, promoting mobility between sectors and attracting talent, helping researchers identify transferable skills to other sectors.

An example of these programs is [The Marie Skłodowska Curie \(MSCA\) Personnel Exchanges call](#), the results of which were published by the [European Commission on June 2, 2023](#), makes Spain the first European country in number of coordinated projects and returns received.

The MSCA Staff Exchange call seeks, through the financing of consortium projects, to strengthen international and intersectoral collaboration through the exchange of personnel through the development of a joint R&D&I project.

However, some Spanish universities find limitations related to mobility:

- Legal (possible illegal transfer of workers, situation and rights employment of the people who could participate in said experience, regulatory restrictions when hiring personnel at the service of the public administration).
- Problems in making the teaching load compatible with the training program mobility.
- Lack of real interest on the part of the company or the researcher so that the exchange occurs.

But in many highly technical sectors (such as space) where hiring is expensive, this type of program (especially the Marie Coriue program) is very convenient and a system to promote.

Programa Torres Quevedo:

The Torres Quevedo programme, launched in 2001, grants three-year aid to companies, state-level technology centres, state-level technological innovation support centres, business associations and science and technology parks for the employment of PhDs to carry out industrial research projects, experimental development projects or preliminary feasibility studies, in order to promote the professional career of research personnel, as well as to stimulate demand in the private sector for personnel sufficiently prepared to undertake R&D plans and projects, and to help the consolidation of recently created technology companies.

It will also promote a new model of support for the recruitment of research personnel by companies that have previously obtained public funding for R&D projects, either through CDTI, AEI or ISCIII calls for proposals.

The Plan also aims to promote industrial doctorates in order to encourage the employment of research personnel in companies from the beginning of their professional careers. It is planned to increase funding for the AEI's Industrial Doctorates programme. The objective of the aid is to train PhDs in companies by co-financing the employment contracts of research personnel in training who take part in an R&D&I project to be developed in the company, in which their doctoral thesis will be framed.

5.2 Internationalization of Knowledge Transfer

Technology transfer (TT) by Spanish universities internationally is achieved through several channels:

- **Researchers:** They leverage their contacts and participation in international projects (e.g., Framework Programs) to secure R&D projects with companies or entities. Opportunities also arise through Spanish companies abroad with which universities frequently collaborate.
- **Direct Contact:** TT units connect with foreign entities via TT networks like Enterprise Europe Network ([EEN](#)), showcasing technological offers and demands through international TT and innovation events and fairs.
- **Researcher-driven:** Universities note that a significant portion of TT comes from researchers who bring projects through their industry contacts and market knowledge.
- **Multinational Companies:** They identify top researchers for specific projects, regardless of their location, or collaborate to find partners for European projects.

However, university technology is considered limited due to several factors:

- **Lack of Coordinated Strategy:** There is no unified national strategy to promote Spanish university technology globally, leading to fragmented and less effective efforts.
- **Limited Resources:** Universities often face financial and resource constraints, which hinder investment in marketing, international networking, and participation in global conferences and trade shows.
- **Language and Cultural Barriers:** Language barriers and cultural differences can restrict Spanish universities' ability to compete in international markets and collaborate with foreign partners.
- **Limited International Connections:** Universities may have a limited network of international contacts and partnerships, reducing opportunities for technology transfer and global collaboration.
- **Low Visibility:** Spanish university technology often lacks visibility compared to that of countries with a stronger international presence.
- **Regulatory and Bureaucratic Challenges:** Regulatory processes and bureaucracy can be obstacles to internationalization, complicating compliance with international standards and requirements.

- **Focus on Local Research:** Many universities may prioritize local research and development over seeking international applications and collaborations for their technologies.

To improve internationalization, Spanish universities need to develop coordinated strategies, invest in resources, overcome language and cultural barriers, and expand their international networks.

These are examples of programs involved on **Plan Estatal de Investigación Científica, Técnica y de Innovación 2021-2023**

EUROPA INVESTIGACIÓN (State Research Agency): These grants aim to promote and improve Spain's participation in European science and technology initiatives, specifically increasing the number of Spanish coordinators in Horizon Europe projects. In particular, funding is provided for the preparation of research and innovation proposals in transnational collaboration, led by Spanish research groups, as well as individual proposals directed to the European Research Council (ERC).

EUROPA EXCELENCIA (State Research Agency): The ERC and its various funding schemes are one of the most recent successes of EU scientific policy. These grants are an international benchmark for excellence and play a decisive role in attracting global talent. To strengthen Spanish participation in ERC calls, the PEICTI (State Plan for Scientific, Technical and Innovation Research) included, during 2013-2016, funding to support proposals that were highly rated by the ERC but did not receive funding due to budget limitations. The PEICTI 2017-2020 continued these actions with one or two-year grants. The PEICTI 2021-2023 maintains these actions with the possibility of expanding them to other similar Horizon Europe programs to improve proposal quality, increase success rates, and enhance Spain's presence in European excellence programs.

GESTIÓN DE PROYECTOS EUROPEOS (State Research Agency): These grants, which support and strengthen the project management capabilities of research centers, continue the "Europa Redes y Gestores" and "Centros Tecnológicos" calls from the PEICTI between 2013 and 2020. They are intended for public and private research centers and contribute to strengthening structures and knowledge needed to promote, prepare, support, and manage international projects, improving their chances of participation in Horizon Europe projects. Calls will assess the incremental participation of entities in the Framework Program in terms of project coordination and funds returned, as well as their ability to attract other Spanish entities.

SELLO DE EXCELENCIA ISCIII-HEALTH15 (Carlos III Health Institute): These grants implement the recent Royal Decree-Law 23/2020, Article 3, which modifies the LCTI (Spanish Science, Technology, and Innovation Act) to allow direct grants for national funding or co-funding of scientific, technical, and innovation research projects resulting from public R&D+I calls under the EU Framework Program, as well as those from international treaties or agreements. An instrument will be created to take advantage of this modification to finance excellent single-beneficiary proposals from the National Health System (SNS) and the Spanish Science, Technology, and Innovation System (SECTI) that, despite receiving favorable evaluations, cannot access EU Framework Program funding.

EUROSTARS - INTERCOMPANY INTERNATIONAL (Center for the Development of Industrial Technology): These grants finance applied research or experimental development activities presented to the international EUROSTARS program, which have been favorably evaluated, above the threshold score, and have public and/or private funding from other countries in the consortium. The goal is to promote R&D+I activities led by SMEs, which, by representing a substantial technological improvement or innovation for the market, contribute to enhancing the position and international competitiveness of SMEs.

On the other hand, in the field of research centres, there is a highly internationalized offer. As an example, in Catalonia, several research centres are highly internationalized, actively participating in global collaborations and projects.

- **Institut de Recerca Biomèdica (IRB Barcelona):** Focuses on biomedical research, including cancer, neurodegenerative diseases, and cellular biology, with extensive international collaborations and partnerships.
- **Institut Català de Nanociència i Nanotecnologia (ICN2):** Specializes in nanoscience and nanotechnology, engaging in significant international research collaborations and projects.
- **Centro de Regulación Genómica (CRG):** Known for its work in genomics and functional genomics, the CRG collaborates globally with leading research institutions and participates in international consortia.
- **Institut de Química Teòrica i Computacional (IQTC):** Focuses on theoretical and computational chemistry, with a strong international network and collaborations in chemical research.
- **Barcelona Supercomputing Center (BSC):** Operates one of Europe's most advanced supercomputing facilities and is involved in numerous international research projects, including collaborations with major global tech companies and research institutions.

These centers are prominent for their active involvement in international research networks and their contributions to global scientific advancements.

5.3 Tools Used to Publicize the Generated Knowledge

Spanish universities use several tools to showcase their generated knowledge:

- **Technology Transfer Offices (TTOs):** TTO's have services aimed at the commercialization of technologies.
- **Websites,** which may be those of the university or even those of the university each research group, TT unit...
- **Research offer catalogues.**
- **Research and Innovation Networks:** Platforms like Enterprise Europe Network (EEN) help universities connect with international partners and showcase their technologies.
- **Conferences and Trade Shows:** Universities participate in global events to present their research and innovations.

- **Publications and Databases:** Universities publish research findings in academic journals and maintain databases to share their knowledge with the global research community.
- **Collaborative Projects:** Participation in international research projects and consortia highlights their expertise and facilitates knowledge exchange.
- **Presence in the media** (Press, Radio, Social Networks...).

Between 2018 and 2021, the Spanish Foundation for Science and Technology (FECYT), under the Ministry of Science and Innovation, **has funded 70 citizen science initiatives** with a contribution of around 1.3 million euros in its regular calls. In July 2022, the Ministry of Universities announced an additional contribution of 400,000 euros to the call for grants for the promotion of scientific, technological and innovation culture of the FECYT, to strengthen citizen science actions. Within the framework of this Plan, it is planned to continue and reinforce this type of call for proposals.

Creation of a multidisciplinary and multilevel collaborative environment: The creation of a forum for discussion, debate and consultation is envisaged with the aim of making recommendations to adequately guide the call for grants for the generation and consolidation of innovation ecosystems in the SECTI.

Support for the promotion of open science from the Spanish Science and Technology Foundation, FECYT: Facilitate free access to publications, data, codes, methodologies and results generated by research, develop open infrastructures and platforms, and encourage the open participation of civil society in scientific processes (Law on Science, Technology and Innovation, LCTI, and the LOSU project).

Innova-ITC:

One of the priority reforms proposed by the OECD Roadmap is to facilitate and coordinate the functioning of the various intermediate agents, a recommendation already included in the LCTI (Art. 29 1d) by establishing that ‘digital platforms and tools will be used to enable the articulation of challenges, citizen participation, competitions and, in general, better coordination between supply and demand of knowledge’. In line with these objectives, the Ministry of Science and Innovation is going to develop the State Platform for Transfer and Collaboration: INNOVA-ITC (with an estimated public budget of 1 million euros for 2023), as a showcase for technological solutions for companies, with the following lines of action:

- **1. Visibilise** research results, prototypes, innovative products and services selected for potential and availability for transfer.
- **2. To centrally offer information** and tools to establish links between universities, other higher education centres or research centres and national and international companies.
- **3. To promote cooperation** between the intermediate agents of the ecosystem and the exchange of good practices, as well as with the rest of the agents of the Spanish science, technology and innovation system.

5.4 Barriers to the Commercialization of Knowledge Generated in HEIs

Marketing is one of the main aspects to improve in the technology transfer system. Some of the barriers detected by university representatives regarding commercialization are:

- **Curricular Patents:** There is an increase in "curricular patents," where the focus is on academic value rather than commercial exploitation, making it difficult for these patents to reach the market. However, this trend is gradually changing.
- **Lack of Awareness:** Researchers often lack awareness about the importance of intellectual and industrial property rights. They view these protections as legal or bureaucratic burdens rather than as means to safeguard their work or generate funding.
- **R&D Contracts with Companies:** Generally, researchers do not negotiate R&D contracts effectively, and companies often aim to claim sole ownership of research results. Many researchers and companies are unaware that the results should belong to the university.
- **Lack of Patent Culture:** Spanish companies often lack a favourable culture towards acquiring patents or licenses, which complicates the commercialization process.

5.5 TT Instruments Best Practices

Below are some detected examples of good practices:

- **Cervera Technology Transfer R&D Projects for Technology Centers**

The purpose of this [program](#) is to strengthen the technological centres that develop applied research in Spain, as well as their driving role in the entire Spanish System of Science, Technology and Innovation.

In particular, the aim is to strengthen the capabilities of these centers in strategic technologies (Cervera priority technologies) through networking, as well as to promote their ability to collaborate with different agents, especially companies, in these technologies.

The program offers financing to innovation projects that collaborate with technology centres. The creation of financing mechanisms that require collaboration with technology centres or universities facilitates the transfer of technology with the industry. At the same time, it focuses these centres on the technologies on which research should focus.

The objective of the program is strengthening the innovation capabilities of SMEs and mid-cap companies, through the contracting of R&D activities to knowledge-generating centres or the execution of R&D projects in collaboration with these entities, in some of the priority technologies "Cervera."

Priority technologies "Cervera":

- Advanced materials
- Circular economy
- Energy transition
- Smart manufacturing
- Health technologies
- Safe and healthy food chain
- Deep learning and Artificial Intelligence
- Advanced mobile networks
- Smart transportation
- Information protection
- Quantum computing

Help Tool Features

- Financing of the activities necessary to achieve the objectives established in the strategic R&D&I programs presented by the beneficiaries.
- Subsidies up to 100% of the strategic program presented by the group.
- The carrying out of economic activities will not be subject to aid.
- Obtaining the aid will entail the accreditation of the beneficiary as a "Cervera Center of Excellence".

The budget for the 2023 (program specific for technology centers) call was €40M.

- **AMIRA Therapeutics**

AMIRA Therapeutics is a Spinoff created by Leitat Technological Center, Amira is working hard to bring new targeted therapies to children with soft tissue sarcoma and brain cancer and, potentially, to others who may benefit from their revolutionary therapies.

Collaboration between the knowledge field and the industrial field must be agile.

In order to focus the commercialization of the patented solution, as well as to guarantee the necessary flexibility for this, the Leitat technological centre has created different successful spinoffs like AMIRA Therapeutics (<https://amiratx.com/>) or Gene Vector (<https://genevectorbcn.com/es/inicio/>) by themselves or in collaboration with relevant partners.

Amira Therapeutics is a company inspired by the urgent needs of children with cancer, focused on developing new medicines for people of all ages with life-threatening diseases.

Amira is a preclinical biotech born in Barcelona (Spain) and collaborate with the best paediatric hospitals to solve urgent needs in paediatric oncology.

Amira is a name inspired by the children, our princes and princesses (Amira in various cultures), and how cancer becomes a life-altering moment in our lives. Amira exists to radically change the outlook for families who receive the devastating news of a cancer diagnosis or other life-threatening disease.

AMI463 has received Orphan Drug Designation (ODD) from the European Medicines Agency (EMA) and from the US Food and Drug Administration (FDA) for the treatment of soft tissue

sarcomas (STS). Additionally, AMI463 has obtained the Rare Paediatric Disease Designation (RPDD) from the FDA for the treatment of paediatric rhabdomyosarcoma, the most common STS in the paediatric population.

Soft tissue sarcomas represent a rare and heterogeneous group of tumours, arising in embryologically derived mesenchymal connective tissues. Advanced STS is associated with a poor prognosis, and treatment options are limited to chemotherapy.

6 Economic Indicators and Funding

In Spain, Technology Transfer (TT) initiatives benefit from a variety of financing instruments aimed at fostering innovation, research, and development. These instruments are essential for supporting the commercialization of scientific research and technology into market-ready products.

Below are some of the key financing instruments available around TT in Spain:

- **National Public Funding**

- **CDTI (Centro para el Desarrollo Tecnológico Industrial):** CDTI is one of the main bodies that supports R&D and technology transfer in Spain. It offers grants, loans, and equity funding to companies developing technology-based projects. Key programs include:
 - **Innodemanda:** Focuses on funding technology projects with high innovation content.
 - **NEOTEC:** Equity-free funding for startups developing innovative technologies.
 - **Eureka and Eurostars:** International collaborative R&D projects in partnership with European countries.
- **AEI (Agencia Estatal de Innovación):** Provides grants to promote innovation in businesses, especially in areas like technology transfer, industrial property, and research partnerships.
- **RETOS-COLABORA:** Part of Spain's national R&D plan, this program finances collaboration between companies and research organizations to develop applied research and TT projects.
- **Plan Estatal de I+D+i (National Plan for Scientific and Technical Research and Innovation):** The main national strategy for promoting research and innovation, with several funding programs targeting TT in key industrial sectors.

- **Regional Public Funding:** Many Spanish regions have their own agencies and programs to promote technology transfer, often with a focus on regional economic development.

Examples include:

- **ACCIO (Catalonia):** Offers grants and loans for innovation and technology transfer projects.

- [IVACE \(Valencian Community\)](#): Provides support for R&D projects and TT, with a focus on SMEs.
- [IDEPA \(Asturias\)](#): Supports innovation through grants for research, technological innovation, and transfer initiatives.
- **European Union Funding:**
 - [Horizon Europe](#): The EU's main R&D funding program. It includes instruments for technology transfer and innovation such as:
 - [European Innovation Council \(EIC\)](#): Offers grants and equity financing to startups and companies involved in high-risk, high-impact technological innovations.
 - [European Research Council \(ERC\)](#): Funding for advanced research projects, with pathways for TT.
 - [Marie Skłodowska-Curie Actions \(MSCA\)](#): Support for training and mobility of researchers, often linked to TT initiatives.
 - [European Regional Development Fund \(ERDF\)](#): Co-finances regional development projects, including innovation and TT activities, aimed at promoting research and innovation across less-developed regions in Spain.
 - [Eurostars Program](#): A joint program between EUREKA and the European Commission to support R&D-performing SMEs in TT initiatives in cross-border projects.
- **Private Financing Instruments:**
 - [Venture Capital and Private Equity](#): Many Spanish and international venture capital firms invest in technology-based startups and SMEs, often with a focus on innovation and technology transfer. [Kibo Ventures](#), [Seaya Ventures](#), and [Caixa Capital Risc](#) are notable examples of venture capital firms active in tech innovation in Spain.
 - [Business Angels and Corporate Venture Capital](#): High-net-worth individuals and corporations often provide funding for early-stage companies involved in technology transfer. These investors not only offer financial support but also strategic advice and industry connections.
- **University and Research Institute Funding:** Many universities and research institutes in Spain have internal programs or spin-off funds aimed at facilitating technology transfer from academic research to commercial applications. Some of the instruments include:
 - [Technology transfer offices \(OTRI – Oficinas de Transferencia de Resultados de Investigación\)](#): These offices help researchers find financing for their projects, including public grants, partnerships, and private investment.
 - [Public-Private Partnerships](#): Spanish universities often form alliances with companies to co-finance TT projects and innovations.

- **Loans and Guarantees:**

- **ENISA (Empresa Nacional de Innovación):** Provides loans to innovative startups and SMEs in various stages of development. ENISA loans are often linked to innovation and technology projects.
- **ICO (Instituto de Crédito Oficial):** Offers credit lines and guarantees for innovative companies and technology-based SMEs, helping them to secure financing for their projects.

- **Tax Incentives and Credits:**

- **Patent Box Regime:** Allows companies to benefit from reduced tax rates on income derived from the commercialization of patents and other intellectual property, encouraging technology transfer.
- **R&D Tax Deductions:** Companies that invest in R&D activities, including technology transfer, can benefit from significant tax credits or reductions in their corporate income tax.

- **Crowdfunding and Alternative Financing:** Platforms such as [Crowdcube](#), [FundedByMe](#), and [CapitalCell](#) offer opportunities for innovative companies engaged in technology transfer to raise capital from the general public. This is becoming a popular way for startups to fund early-stage innovation.

- **Incubators, Accelerators, and Innovation Hubs:** Many incubators and accelerators provide not only mentoring and office space but also access to funding for TT initiatives.

Notable examples include:

- [Wayra](#) (Telefónica's accelerator)
- [Barcelona Tech City](#)
- [Madrid Food Innovation Hub](#)

These financing instruments form an ecosystem designed to foster innovation, encourage collaboration between research institutions and industry, and support the commercialization of technological advances in Spain.

6.1 Distribution of the Budget Among the Involved Agents

In Spain, the distribution of income from patents between universities and researchers varies depending on each institution's internal policies, though it typically follows general principles set by law. [The Law of Science, Technology, and Innovation \(2011\)](#) provides a framework for the

commercialization of research results and ensures researchers' right to a share of the profits, but it leaves the exact distribution to the universities.

Typical income distribution:

1. **Universities or institutions:** Usually receive 50% to 70% of the income from patent exploitation. This portion is often used to cover patent management costs (e.g., registration, maintenance) and to fund research activities or the Technology Transfer Office (TTO).
2. **Researchers or inventors:** Typically receive 30% to 50% of the income. This share is divided among the inventors based on their contributions to the patent.

Universities and research centers often have their own **internal regulations and agreements** that detail how patents are managed and exploited.. These policies are approved by the governing bodies of the university. Before the revenue is distributed, costs associated with patenting (such as legal fees or renewal charges) are deducted, and only the net income is shared.

Some Examples:

- **Technical University of Madrid (UPM):** 50% of the income goes to the university, and 50% to the inventors.
- **University of Salamanca:**
 - o For the first €100,000 (i.e., from €0 to €100,000.00): 80% to the inventors, 20% to the university.
 - o For the next €150,000 (i.e., from €100,000.01 to €250,000.00): 65% to the inventors, 35% to the university.
 - o For the next €250,000 (i.e., from €250,000.01 to €500,000.00): 50% to the inventors, 50% to the university.
 - o For amounts exceeding €500,000.01: 40% to the inventors, 60% to the university.
- **Universitat Politècnica de Catalunya:** Regardless of the income derived from the assignment or exploitation:
 - o 25% to the university.
 - o 25% to the department/institute to which the professors or researchers belong.
 - o 50% to the inventor(s).

In **public research centers** (such as [CSIC](#) or the [Carlos III Health Institute](#)), the policies are usually similar. Although it may vary, researchers generally receive between **30% and 50%** of the revenue generated from the patent.

In cases where a patent is commercialized through spin-offs or licensing agreements, the distribution may vary based on the specific contracts or ownership stakes in the spin-off company.

In general, the approach aims to balance rewards for researchers' contributions with the university's need to reinvest in innovation and technology transfer.

7 Human Resources and Training

Human resources and training in Technology Transfer (TT) play a crucial role in fostering innovation in Spain. These resources aim to equip researchers, professionals, and companies with the necessary skills and knowledge to facilitate the successful commercialization of technology and research outcomes.

One of the most requested aspects from the OTC is **to have sufficient resources**.

The universities consulted consider that their TT technicians, in general, have a good training and have a great specialization in certain subjects. Although there is also coincidence in indicating that the aspects related to marketing must be reinforced.

Below are key aspects of human resources development and training in TT in Spain:

- **University Programs and Academic Training**

- **Master's and PhD Programs in Innovation and Technology Transfer:** Several Spanish universities offer postgraduate programs focusing on the management of innovation and technology transfer. For instance, **Universidad Autónoma de Madrid**, **Universidad Politécnica de Valencia**, and **Universitat de Barcelona** have programs that cover topics like intellectual property management, commercialization strategies, and research funding.

- **Specific TT Training Programs:** Specialized training programs aimed at improving technology transfer skills are available across Spain. These programs focus on providing both technical and managerial skills needed for successful TT, often through collaborations with research institutions, companies, and public bodies. Some examples:

- **Fundación COTEC:** COTEC is a non-profit foundation that promotes innovation in Spain. It organizes workshops, seminars, and training programs on technology transfer, especially targeted at researchers and companies. COTEC also conducts studies and publishes reports to improve TT processes.
- **IE Business School – Innovation and Entrepreneurship:** IE offers executive programs and short courses focusing on entrepreneurship, innovation, and technology commercialization. The training often integrates real-world case studies, exposing professionals to best practices in TT.
- **Science and Technology Parks:** Many science and technology parks in Spain offer training programs to help entrepreneurs, startups, and researchers develop TT skills. These parks often collaborate with universities and public agencies to organize events, seminars, and workshops on innovation, technology commercialization, and intellectual property.

On the other hand, there is also consensus in indicating that **researchers and students** need more training on TT. OTC in Spain provide training and support for both researchers and students on how to transfer their research results to the market.

In general, business professionals have training in innovation, but not specifically technology transfer between the public research and the private market and the commercialization of what has been researched.

- **Programa de Dinamización y Formación:**

The Ministry of Science and Innovation has launched in June 2022 the **Programme of dynamisation and training on knowledge** exchange and transfer processes (DINA-ITC), with a **budget of 800,000 euros**. It is aimed at managers in the public sector, universities, PRIs, technology institutes, science and technology parks, technology platforms, technicians and managers of knowledge exchange and transfer (KTIs), institutes, companies, teaching staff and senior and junior research staff, as well as professionals in the private sector. The programme aims to **promote a cultural change in the scientific system and its relationship with innovation**, contributing to its dynamisation and increasing the involvement of research and teaching staff in the processes of exchange and transfer of knowledge with social agents. DINA-ITC also aims to support institutions in the implementation of active strategies for the promotion of JTI processes, as well as to improve the management of the different means to carry it out. Funded by the PRTR, the DINA-ITC programme is led by INGENIO, a joint centre of the Spanish National Research Council (CSIC) and the Universitat Politècnica de València (UPV).

In addition, the Menéndez Pelayo International University (UIMP) will participate in the organisation of the courses and meetings planned and with the collaboration of a team of teachers and professionals with knowledge and experience in TTI processes, as well as the entities APTE, FEDIT, Red OTRI CRUE and Redtransfer. The DINAITC programme will also promote and **facilitate the obtaining of international certifications for transfer professionals**, such as the Registered Technology Transfer Professional (RTTP) of the Alliance of Technology Transfer Professionals (ATTP). In support of professionalisation, legislative reforms are underway to improve the careers of R&D and innovation management and technical staff. The LCTI envisages that technical staff of Public Research Organisations can have professional mobility, temporary training stays and collaboration in companies. It also introduces the contract for scientific-technical activities which, in addition to the indefinite contracting of research personnel, allows the integration of transfer management personnel within research groups, charged to the financing of the research groups and without being subject to the limits of public employment offers, replacement rates or wage bill, nor to prior authorisation when financed by external funds .

Cabe también destacar el papel de la formación profesional en los procesos de transferencia del conocimiento y la innovación, que se seguirá potenciando con el desarrollo de la Ley Orgánica 3/2022, de 31 de marzo, de ordenación e integración de la Formación Profesional, que dedica el título VIII a la innovación, investigación aplicada y emprendimiento, así como a través de otras iniciativas recientes como la Red estatal de centros de excelencia de formación profesional, iniciada en julio de 2022 con un presupuesto de 50 millones de euros.

8 Relationships Between the Agents of the Ecosystem

In Spain, different agents of the innovation ecosystem such as Technology Transfer Offices (TTOs), Higher Education Institutions (HEIs), and companies are connected through various platforms, forums, meetings, and programs that promote collaboration, knowledge exchange, and technology transfer. Below are some of the main ways these agents interact:

- **Industry-Academia Forums and Conferences:**

Innovation forums, technology transfer conferences, and research-industry meetings bring together universities, TTOs, and companies to foster collaboration.

Examples:

- [Transfiere Forum](#): A major innovation and technology transfer forum in Spain that connects research and industry stakeholders.
- [University-Industry Collaborations](#): Sector-specific conferences where researchers present their findings to businesses seeking innovative solutions.

These events provide networking opportunities and help identify potential collaborations or research commercialization avenues.

- **Open Innovation Programs:**

Open innovation programs are platforms where universities and companies collaborate to solve real-world challenges using academic research and technology. Companies openly share their innovation needs, and researchers or startups propose solutions.

Common structures include:

- [Hackathons or innovation challenges](#): Universities and companies collaborate on challenges, with students, researchers, or external innovators offering solutions.
- [Corporate innovation programs](#): Large companies, such as [Telefónica](#) with its [Open Future](#) program, often partner with universities to source innovations through calls for projects.

- **Public-Private Collaboration Projects:**

Universities, companies, and TTOs often collaborate through public-private partnership (PPP) programs. These projects are usually co-funded by government bodies like the [CDTI](#) (Center for Technological and Industrial Development) and aim to encourage joint R&D projects. For example:

- [Horizon Europe and other EU programs](#): Promote university-industry partnerships for large-scale research projects.
- [Strategic Collaboration Agreements](#): Some universities and companies enter long-term agreements for joint research and development in fields like biotech, engineering, or artificial intelligence.

- **Innovation and Technology Transfer Consortia:**

Consortia bring together multiple universities, research centers, and companies to address technological challenges. These consortia pool resources and expertise from different sectors to advance research and bring innovations to market faster. An example is [CIEN Projects](#), large multi-sector innovation projects supported by Spanish government programs.

- **Technology Transfer Meetings:**

TTOs organize or participate in technology transfer days or brokerage events, where universities showcase patent portfolios, research outcomes, or innovation projects to industry representatives. These meetings are designed to create licensing opportunities or research partnerships between academia and companies.

- **Science and Technology Parks:**

Science and technology parks play a key role in creating physical spaces for interaction between universities, companies, and research institutes. Parks like [Parque Científico de Barcelona](#), [Parc Mediterrani de la Tecnologia \(PMT\)](#) or [Parque Tecnológico de Andalucía](#) provide incubators, accelerators, and office spaces where startups and university spin-offs can grow alongside larger firms and research centers. This proximity promotes informal collaborations, networking, and joint R&D projects.

- **Innovation Clusters:**

Innovation clusters are another way these agents collaborate. Clusters such as [BIOCAT](#) (biotechnology and health sciences cluster in Catalonia) promote cooperation between companies, research institutions, and universities by organizing regular meetings, workshops, and innovation roundtables.

- **University Spin-offs and Start-up Incubation Programs:**

Universities and TTOs often assist researchers in forming spin-offs to commercialize academic research. These companies, in turn, often collaborate with industry partners or attract investment. Many universities provide incubation programs, such as the [Universidad Complutense de Madrid Complutense Emprende](#), which helps entrepreneurs develop business ideas.

- **Training Programs and Knowledge Exchange:**

Companies and universities collaborate on training programs, workshops, or executive education courses, aimed at enhancing industry skills or applying academic research in real-world contexts. This promotes direct interaction between academic experts and business professionals.

Conclusion:

The relationship between TTOs, HEIs, and companies in Spain is fostered through a wide range of activities, including forums, open innovation programs, consortia, and public-private collaborations. These interactions encourage knowledge exchange, technology transfer, and the commercialization of research, ultimately strengthening the innovation ecosystem.

9 Public Administration

In the Spanish context of R&D&I, there is a horizontal hierarchy of public entities, where some are responsible for designing action plans and others for implementing them.

The main agents responsible for the design and distribution of funding and policies are as follows:

- **CDTI (Centre for the Development of Industrial Technology):** Provides funding for business research, development, and innovation (R&D&I) projects. Its funds come from both national and European sources, and are distributed in the form of grants, loans, and equity participation. It is one of the primary channels for financing technology transfer projects.
- **State Research Agency (AEI):** Funds basic and applied research projects, often in collaboration with companies, universities, and research centers. Funds are allocated through competitive calls for scientific and technological research projects.
- **Ministries:** The Ministry of Science and Innovation and the Ministry of Industry, Commerce, and Tourism manage national programs to promote technology transfer to productive sectors.

The objectives designed by these public entities are translated into the following action plans:

- **Cervera Technology Transfer Program:** Promoted by CDTI, this program is aimed at financing innovation and technology transfer projects in collaboration between companies and technological centers. Priority areas include advanced manufacturing, biotechnology, and circular economy.
- **Horizon Europe:** Although it is a European Union program, it provides significant funds through competitive calls for innovation and technology transfer projects in international consortia. Spain is a major beneficiary of this program.
- **State Plan for Scientific and Technical Research and Innovation:** This is the primary framework for the distribution of national funds to R&D&I projects, with various programs designed to foster the transfer of knowledge and technology between academia and industry.

The implementation of the action plan guidelines is carried out through RECID (Spanish Network of R&D&I Centres), which is deployed across Spanish territory.

The RECID is conformed by:

- Public Research Organizations (OPs) under the General State Administration (AGE).
- Health Research Institutes.
- Technology Centers.
- Clusters and Platforms that facilitate collaborative innovation.
- European Strategy Forum on Research Infrastructures.
- Regional Research Centers, specific to Autonomous Communities.
- Universities, playing a central role in both research and technology transfer.
- SOMMa Centers of Excellence, focusing on high-level scientific output.
- Unique Scientific and Technical Infrastructures (ICTS), critical for cutting-edge research.
- Science and Technology Parks, fostering collaboration between academia and industry.
- Research Centers not classified under other categories.

In addition to RECIDI, the REDOTRI network is vital, comprising university-based offices and some technology parks that manage technology transfer and implement new guidelines in this field.

These institutions are the main actors responsible for executing the strategies and plans outlined in the Spanish Strategy for Science, Technology, and Innovation (EECTI) 2021-2027.

One of the key goals for 2027 is improving the dissemination and promotion of innovation activities. Therefore, each agent within the network has independently designed its approach to achieve this objective.

10 Conclusions

The analysis of the information collected through the different previous studies, the interviews with main actors in the knowledge transfer system in Spain (both in the academic and business sides) and surveys carried out, lead us to the conclusions listened below.

Regarding the existing TT structures, in general, there is agreement on the needs of:

- **Improve TT structures** so that they are solid, stable and with sufficient financial and people resources.
- Optimize internal communication, to **coordinate all TT structures** or units as well as agents.
- **Improve marketing strategies**: TT units must allocate more efforts to promotion and marketing activities. (In each level: PHD's, private researchers, students, teachers, small local businesses...).
- Increase the weight of the TT function in the real strategy of the university.
- Expand the instruments to support TT and develop stable and solid programs.
- Modify the regulations at the national level and the way of evaluating teaching and research staff

Regarding the TT system in Spain:

- **The policies for the supply of scientific knowledge are a success**, derived from a successful and effective strategy, with a long-term horizon. On the other hand, equally, effective strategy must be designed to boost business demand for knowledge and technology.
- **Supply and demand for knowledge are not separate elements of a linear process.** It is necessary to jointly involve companies and research/technological centers in the concurrent production of knowledge focused on industrialization and commercialization.
 - HEIs need to take more into account the possibilities and needs of the existing business fabric.
 - It is necessary to evaluate patents and spin-offs with criteria for effective application in the market when financing projects with public resources.
- The **effective transmission of knowledge to companies** requires an effective knowledge of the particularities of the different sectors, the size of the company and its technological needs.
 - It is necessary to adapt the different instruments to support innovation to the actual size of Spanish company, which is smaller than in other countries, especially in what has to do with access to financing and the regulatory framework of the public administration.
- There is a **great distance between the business fabric and academia** and the world of research. Public research must also be measured with market-oriented indicators. There are many indicators of the research operation process, but there are **few efficient indicators of the impact of research on the economy and society**.
- Transfer offices are under-resourced. On the other hand, technological centers have a reduced size.

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