Orkestra
BASQUE INSTITUTE
OF COMPETITIVENESS
DEUSTO FOUNDATION

2026 BASQUE COUNTRY COMPETITIVENESS REPORT

FROM KNOWLEDGE TO THE MARKET: TECHNOLOGY TRANSFER TO TRANSFORM INDUSTRY



Deusto

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2026 Basque Country Competitiveness Report

From knowledge to the market: technology transfer to transform industry

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2026 Basque Country Competitiveness Report

Access online report

The Basque Country Competitiveness Report 2026 is available in PDF in three languages (Spanish, Basque and English) at Orkestra´s website:

https://www.orkestra.deusto.es/en

Access Regional Competitiveness Observatory

Real-time updates of many of the indicators presented in this Competitiveness Report are available at:

https://www.orkestra.deusto.es/competitiveness-observatory/en

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Foreword

Each edition of the Competitiveness Report explores a key challenge for our future. In 2023, we analysed the transition towards sustainable competitiveness; in 2024, inclusion as a driver of competitiveness and well-being; and in 2025, international connectivity as a catalyst for our industry. The 2026 Report continues this journey and focuses on an issue that cuts across all these challenges: technology and knowledge transfer as a fundamental lever for transforming our industrial fabric and safeguarding the well-being of society.

Global competitive pressures and threats have only intensified over the past year. The choice of this theme reflects the times we are living in. Geopolitical tensions, the reshaping of global value chains, technological competition, and the energy and digital transitions are forcing our companies to adapt rapidly. Competitiveness is not inherited: it is built day by day. And in an economy such as the Basque economy, with a strong industrial base and close links with the outside world, it will depend increasingly on our ability to incorporate knowledge, develop new solutions and bring them to market as quickly as possible. We cannot take it for granted that the strengths that have brought us this far will be sufficient to meet the challenges of the future.

Given the scale of the challenges, we must act with agility, ambition and a sense of urgency on the factors that are under our direct control.

The Basque Country is in a favourable position. We have a science, technology and innovation system developed over decades, internationally recognised capabilities and a culture of collaboration that is rare to find. The analysis confirms this strength: innovative Basque companies cooperate more than the European average, and this collaboration is associated with better innovation outcomes. However, it also highlights a significant limitation: knowledge does not reach the entire business sector with the same intensity, particularly smaller firms, and many new technology start-ups face difficulties in growing. The challenge is not merely to generate more knowledge, but to ensure that more companies can capitalise on it.

For this reason, talking about technology and knowledge transfer means talking about something far broader than simply moving a result from the laboratory to the market. Innovation does not follow a single, linear path; it arises from the interaction between companies that identify needs, universities and research centres that open up possibilities, technology centres that develop and validate solutions, people who contribute skills, investments that facilitate growth, and institutions that create the conditions for progress. Rather than a one-way transfer, we should be talking about

collaboration and co-creation, shared learning and the ability to apply what has been learnt.

To this end, the Report begins by contextualising the Basque system within the international landscape and presenting success stories from other regions. It then characterises the Basque technology and knowledge transfer ecosystem through an exhaustive analysis of R&D&I, public investment, patents and scientific output. It then delves into market outcomes, analysing the creation of spin-offs and new technology-based firms, as well as the impact of knowledge transfer on the business fabric, to assess how and to what extent knowledge actually reaches the market.

As in previous years, this analysis is complemented by a holistic assessment based on 80 comparative indicators of the Basque Country's economic and business performance and well-being, which paint a positive overall picture. The Report concludes with recommendations for five strategic priorities aimed at preserving the system's strengths and addressing the obstacles that limit its scope.

The publication of this Report also coincides with a very special milestone: the 20th anniversary of Orkestra. Since its creation in 2006, within the University of Deusto, the Institute has championed a demanding principle: research must help us not only to understand reality, but also to transform it. This conviction has guided our way of working: combining an international perspective with a deep commitment to the Basque Country, and bridging the gap between the academic world and decision-makers in businesses, institutions and society as a whole.

Over the course of these two decades, we have helped to consolidate a vision that views competitiveness not as an end in itself, but as a means of generating opportunities, social cohesion and well-being. More than 700 research projects, numerous publications and a significant presence in international networks are a testament to a sustained collective effort.

This anniversary invites us to look to the future, to anticipate changes more swiftly and to strengthen our collaboration with local stakeholders even further. We find ourselves at a juncture of reflection, seeking to define and drive forward a research agenda that meets this ambition. It is particularly significant that this year's Report is dedicated to knowledge transfer: for Orkestra, too, the challenge lies in ensuring that research does not end with a diagnosis or a publication, but rather translates into better decisions, policies and projects capable of transforming reality.

I would like to conclude by thanking everyone for their commitment and diligence in making this Report possible and, particularly on this twentieth anniversary, for the trust placed in us by the institutions and organisations that have supported Orkestra, as well as the collaboration of so many local stakeholders. The best way for us to celebrate this is to renew our commitment to the future: to continue putting knowledge at the service of a more competitive Basque Country, with more opportunities and greater well-being for everyone.

Iván Martén Uliarte
President of Orkestra – Basque Institute for Competitiveness
Deusto Foundation

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The report was produced by a group of people coordinated by Susana Franco, Aitor Sedano and James Wilson. We would like to thank the entire Orkestra team who have contributed in various ways throughout the process. We are grateful for the contribution from Tecnalia, which collaborated on the drafting of one of the report's boxes. We would also like to thank the members of the Board of Directors, the Advisory Board, Orkestra's sponsoring organisations and other institutions with whom we have been reviewing previous drafts.

The calculation of the indicators on which this report is based has been made possible thanks to the data supplied by Eustat, through ad hoc and pro bono analyses of its databases carried out at Orkestra's request. Our sincere thanks go to Eustat for all the assistance provided. We would also like to thank Sabi-Informa (SABI) for its collaboration in supplying data for other analyses in the report.

Furthermore, we would like to thank all the organisations that have participated and contributed to the generation of knowledge as part of the various projects carried out by Orkestra over recent years.

Orkestra accepts responsibility for any errors or omissions in the content of this report.

Executive summary

The Basque Country's competitiveness model has demonstrated a remarkable capacity to generate high levels of material well-being and social cohesion, underpinned by a diversified industrial base and high labour productivity. However, the current environment —characterised by geopolitical volatility, the reconfiguration of international value chains, accelerated decarbonisation, digital disruption and demographic changes— poses significant challenges to the sustainability of this model.

Perceived competitive threats from other parts of the world have intensified, and it is essential to act swiftly on what is within our control. Perhaps the most fundamental factor in maintaining our industry's competitiveness in a rapidly changing world lies in the ability to generate new knowledge, turn it into innovation and apply it in the market. Without technology and knowledge transfer, we will not succeed in transforming our industry, and without transforming our industry, it will not be possible to tackle the challenges of competitiveness and well-being in the coming years.

This report analyses the Basque system of technology and knowledge transfer with a critical eye and a vision that extends beyond the Basque Country, seeking lessons and inspiration. It addresses three key questions: Does the system function adequately in the current context? What impact does it have on industrial competitiveness? And which elements need to be strengthened?

1. The Basque technology and knowledge transfer system in the international context

Innovation is a systemic and interactive process in which transfer is just one component of the ecosystem. This process, which begins with the generation of knowledge and ends with its application in products and processes, involves maturation, collaboration between stakeholders and the absorption capacity of businesses.

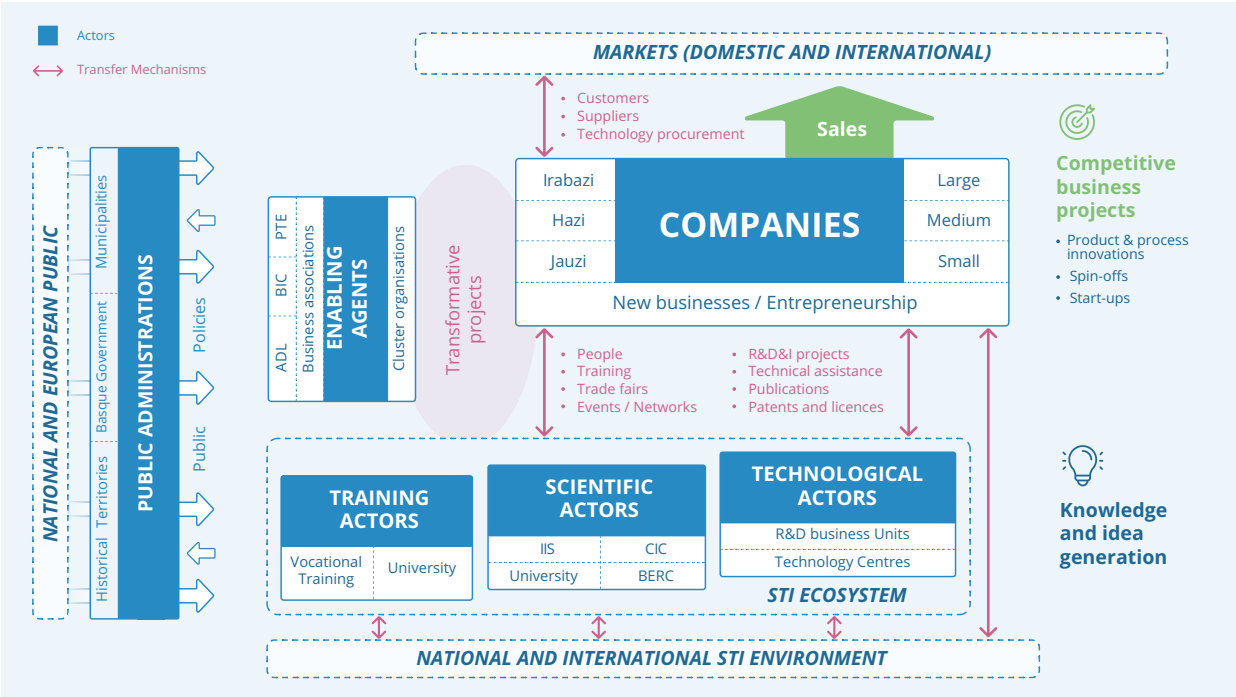
Transfer is primarily channelled through six categories: (i) R&D, knowledge, infrastructure and technology services; (ii) productive, commercial and value chain relationships; (iii) intangible assets, intellectual property and technology rights; (iv) people, mobility and skills; (v) entrepreneurship and organisational innovation; (vi) networks, interaction and dissemination. Public support for these activities is jus-

tified by the existence of market inefficiencies, systemic problems or transformative failures that affect the smooth functioning of the channels.

The Basque technology and knowledge transfer system brings together a wide range of stakeholders and is the result of a policy sustained over decades:

- **Businesses and the business environment:** these constitute an industrial fabric structured, according to the Industry Plan, into established sectors (*Irabazi*) and those with the potential to become new growth drivers (*Hazi*), alongside other disruptive business projects with a strong innovative character (*Jauzi*). They are supported by a range of enabling agents, notably the four BICs, which act as a link between knowledge centres and the creation of new businesses, and the 17 clusters, whose driving organisations connect 72 stakeholders within the science, technology and innovation (STI) ecosystem.
- **STI ecosystem:** 55 corporate R&D units, 16 technology centres, 3 major universities, 9 centres for basic research and excellence (BERC), 4 cooperative research centres (CIC) and 4 health research institutes (IIS), with training providers including, notably, the VET system, as well as various support agents and intermediaries.
- **Public policies:** revitalisation of the system through Transformative Projects (11 led by the public sector and 8 led by the private sector, the latter with initial investments ranging from €36 million to around €250 million) and Innovation Beacons, amongst other initiatives, and with the support of a broad portfolio of policies from the Basque Government, provincial councils and local authorities.

BASQUE TECHNOLOGY AND KNOWLEDGE TRANSFER SYSTEM



The European Commission's Regional Innovation Scoreboard (RIS) enables a comparison of innovation performance across more than 230 regions using over 20 in-

dicators. It classifies the Basque Country as a "Strong Innovator", with technology transfer indicators among its key strengths. In these indicators, the Basque Country's results exceed what might be expected given its framework conditions and level of investment, which highlights the added value of its culture and institutions.

Beyond the comparative analysis of indicators, it is important to learn from the experiences of other countries and regions. Flanders, in Belgium, and Dresden, in Germany, are two leading ecosystems. Flanders for its comprehensive ecosystem and success in open innovation, start-up acceleration and venture capital funds; and Dresden for the strength of its university as a broker and its inter-institutional partnerships for sharing infrastructure and driving SME growth. The analysis of these benchmark ecosystems is complemented by the UK's Knowledge Transfer Partnerships programme.

2. How does the Basque system work?

The Basque system for technology and knowledge transfer has the following characteristics:

- **Resources:** R&D expenditure stands at 2.1 per cent of GDP, slightly below the EU-27 average. 56 per cent of this expenditure is carried out by businesses, which receive public funding above the European average; 20 per cent by technology centres and CICs; 17 per cent by the university sector; and 7 per cent by the public administration. R&D personnel account for 2.5 per cent of employment, well above the European average. By contrast, resources per person are lower, both in terms of expenditure per person (€86,600, compared with €118,900 in the EU and €161,500 in Germany) and in the proportion of expenditure accounted for by salaries (47.2 per cent of expenditure, compared with around 60 per cent in the countries compared).
- **Business innovation:** the proportion of innovative SMEs has risen from 39.9 per cent in 2018 to 49.9 per cent in 2024, converging with the EU-27 average, but with a marked divide by size. Innovative activity is concentrated in larger enterprises, and whilst the Basque Country shows its greatest strength in the medium-sized enterprise segment (59.1 per cent innovate), its main comparative disadvantage vis-à-vis other regions lies in the small enterprise segment (48.3 per cent innovate).
- **Cooperation in innovation:** 42 per cent of Basque innovative enterprises cooperate, compared with 24.6 per cent in the EU-27 and 17.9 per cent in Germany. However, the size gap is wide: cooperation is 45.5 percentage points higher in large enterprises and 38.3 percentage points higher in medium-sized enterprises compared with small ones. The pattern of cooperation is atypical: amongst cooperating enterprises, only 28.7 per cent cooperate with suppliers (the lowest rate amongst the territories compared) and 24.7 per cent with customers (the second lowest), whilst technology centres and CICs are the second most frequent partner (35.3 per cent). Cooperation therefore does not take place along the value chain, but rather through actors within the STI ecosystem.
- **Public instruments:** the relevant support programmes are primarily coordinated by the Department of Industry, Energy Transition and Sustainability, through the SPRI Group, alongside other departments such as the Department of Science, Universities and Innovation or the Department of Education. Added to these are instruments at national and European level, as well as from provincial councils and other sub-regional bodies, which promote their own innovation support pro-

grammes, largely aimed at SMEs. This governance results in a diverse set of instruments covering both the promotion of scientific supply and the stimulation of business-driven technological demand.

- **International links:** the Basque Country has a high level of participation in European programmes, primarily through Horizon Europe. It has participated in 936 Horizon Europe projects between 2022 and 2025, and the share of funding secured out of the national total has grown steadily (from 8.4% to 12.4%). Stakeholders in the STI ecosystem are involved in 86.3 per cent of the projects, whilst businesses are involved in 31.1 per cent (a figure below the national average of 40 per cent). This international connectivity is also reflected in the Basque presence in relevant European networks and associations.
- **Science and patents:** this effort translates into a substantial scientific output (3.9 publications per thousand inhabitants, almost double the EU-27 average), specialising in materials, chemistry and nanotechnology, and with an impact exceeding the European benchmark. However, only 2.8 per cent are signed with companies (3.5 per cent in the EU-27; 6.3 per cent in Germany), and the Basque Country does not demonstrate specialisation in fields closer to the manufacturing sector. Patenting activity is lower than the European average, but is closely aligned with the region's industrial capabilities: the 1,832 EPO applications from 2014–2024 (a recent three-year average of 65.9 per million inhabitants, compared with 79.2 in the EU-27) accurately reflect the productive structure. Only 53 (2.9 per cent) are applications filed jointly by companies and agents from the STI network, as the Basque model is based primarily on subcontracting within the network, with the company retaining ownership.

In summary, the Basque system has a solid foundation of scientific and technological resources, reflected in abundant, high-quality scientific output, and a low level of patenting activity that nevertheless accurately reflects the productive structure. Its most distinctive feature is intense cooperation, channelled primarily through the STI ecosystem, rather than flowing along value chains. Furthermore, innovation and cooperation are less widespread amongst smaller firms. Overall, it is a comprehensive and well-established system, whose main limitation lies not so much in the knowledge it generates as in the breadth of the business sector it reaches.

3. What impact does it have on the business sector?

A detailed analysis of the various outcomes of the Basque technology and knowledge transfer system reveals the following impacts:

- **Cooperation helps to innovate more and better:** 86.9 per cent of Basque firms active in innovation that cooperate introduce an innovation (compared with 64.1 per cent of those that do not) and, amongst those innovating in products, 49.8 per cent achieve a market novelty (compared with 35.0 per cent). Across the EU-27 as a whole, and after controlling for region, sector and size, cooperation is associated with an 11.9 percentage point higher probability of launching a new product onto the market. Although Basque firms bring their innovations to fruition less frequently than their European counterparts, these innovations account for a larger share of their turnover (around 28 per cent). Furthermore, the results suggest that in the Basque Country, market novelty —and, consequently, the greater impact of innovations on industrial competitiveness— is associated not only with cooperation with the science and technology system, as in the EU-27, but also with cooperation with client firms.

- **The impacts are realised through a combination of different forms of innovation:** data obtained from a survey of "Hidden Champions", a joint workshop and a subsequent consultation show that, on the spectrum between innovation based on practice and customer interaction (DUI: *Doing, Using and Interacting*) and that based on codified scientific and technical knowledge (STI: *Science, Technology and Innovation*), the majority are closer to the DUI model but also incorporate the STI model. On average, these companies invest around 5 per cent of their turnover in R&D and turn to technology centres for specific development projects. Furthermore, 63 per cent have collaborated with centres outside the Basque Country. This collaboration has primarily resulted in new products (70 per cent) and technologies (60 per cent). Both companies and centres agree that the relationship is one of "co-creation", rather than a one-way transfer, and cite slowness and a mismatch in timelines and objectives as barriers.
- **Technology exports are resilient but not very diversified:** Basque exports of medium- and high-technology products reached €17,843 million in 2025, accounting for 59.8 per cent of total exports, a figure that remained virtually unchanged whilst overall exports fell by almost 9 per cent over two years. Transport (47.9 per cent) and machinery (39.7 per cent) account for the bulk of technology exports, and road vehicles and their components still account for 41.8 per cent (average 2023-2025), although this figure has fallen by 2.9 percentage points compared with 2016-2018, whilst electrical equipment (+1.7) and the railway, aeronautical and shipbuilding sectors (+1.2) have seen gains.
- **Start-up activity is outstanding, but there are barriers to scaling up:** between 2010 and 2025, 129 spin-offs were created in the Basque Country (51.8 per million inhabitants, compared with 17.1 in the EU-27) and 520 technology-based firms. Spin-off companies raise an average of €4.6 million (a figure that includes Multiverse Computing, which accounts for over 60 per cent of the investment; without it, the figure would be significantly lower), compared with €6.1 million in the EU-27. New technology-based firms raise €1.8 million per company. Non-repayable grants account for 26 per cent of investment in both cases, compared with 10 per cent and 9 per cent in the EU-27. Although a lack of funding is often cited as the main barrier to entrepreneurship, this constraint may also reflect a mismatch in the sequencing of instruments across different stages or the low appeal of starting and growing a business, which limits the supply of high-quality projects. In this regard, although referring to the population as a whole, the Global Entrepreneurship Monitor indicates that only 46.6 per cent of the population considers entrepreneurship to be a good career option (compared with 61.5 per cent in the EU) and barely 41.1 per cent of those who start a business do so to create wealth (compared with 51.4 per cent in Europe).

In summary, the Basque system of technology and knowledge transfer significantly boosts business innovation, both in established companies and through the creation of spin-offs and new technology-based firms. By combining different modes of innovation, companies and centres agree that the relationship is one of "co-creation", not of one-way transfer. The impacts are evident in the resilience of medium- and high-technology exports, concentrated in transport and machinery, as well as in the high rates of technology start-up creation, although limitations remain regarding their long-term scaling up.

4. Which components of the system need to be strengthened?

In general, the analysis carried out points to: i) preserving the system's strengths; ii) expanding its scope; and iii) correcting the imbalances that limit transformation and business growth. As a fundamental recommendation, investment in the capabilities of the STI ecosystem and in enterprises must be preserved and strengthened, to ensure that knowledge generation responds both to current needs and to future technological opportunities. The evidence analysed, and the lessons learnt from the international models studied, reveal **five key areas of action** that need to be addressed to strengthen the Basque technology and knowledge transfer system.

I. Scope: expanding the base of innovative companies

The system's limitation lies not in the knowledge it generates, but in the number of businesses it reaches, and the priority is to bring innovation to small businesses:

- Adapt the portfolio of instruments to the diversity of capabilities: agile and straightforward support for proof-of-concept tests, rapid diagnostics and pilot projects on the production floor.
- Promote lateral transfer (adapting and industrialising solutions tried and tested in other sectors within traditional SMEs), facilitated by cluster-driving organisations and development agencies.
- Establish a model of localised technological support tailored to the needs of SMEs, building on regional experiences and the vocational training network.
- Encourage leading companies to bring SMEs on board, as is already a condition in transformative projects, and strengthen learning processes within value chains.
- Strengthen absorption capacity with qualified staff acting as bridge figures (for example, the Knowledge Transfer Partnerships model).
- Avoid fragmentation amongst stakeholders and simplify access to ensure effectiveness and increase reach amongst the smallest businesses.

II. Guidance: transforming to foster competitiveness and well-being

The aim is not to promote more R&D, patents or cooperation for their own sake, but rather the continuous transformation of industry, which requires action on several fronts simultaneously:

- Transform the *Irabazi* sectors, which account for a significant share of employment but have lower levels of patent generation, with a particular focus on lateral transfer and enabling technologies.
- Supporting the emerging *Hazi* sectors and disruptive *Jauzi* business projects, with specific monitoring of the bio-health sector.
- Ensure that policies remain focused on strategic priorities for society, facilitating integration into priority European value chains (electrification, clean technologies, semiconductors, artificial intelligence).
- Monitor demand and the absorption capacity of the local business ecosystem: new capabilities only bring about transformation if there are companies capable of incorporating them.

III. Coordination: refining responses to the needs of industry

"Transfer" is an inadequate term: the relationship between businesses and stakeholders is one of "co-creation", and the instruments must serve the different ways of innovating:

- Review the catalogue of programmes and the selection criteria for beneficiary organisations, and promote mechanisms to involve those that currently participate little in the programmes.
- Combine short, applied and on-site validation formats for companies closest to practical application with multi-year frameworks, shared roadmaps and shared scientific and technical risk for those closest to formal R&D.
- Maintain a diversified range of programmes, paying attention to barriers relating to timelines and objectives, and strengthening technological foresight and consortia between companies from different sectors facing common challenges.
- Strengthen institutional coordination across administrative levels, integrating formal alliances between universities, BERC and BRTA centres to share unique infrastructure, coordinate the recruitment of research talent and unify the response to major industrial challenges.

IV. Impact: fostering the growth of new business ventures in the Basque Country

It is crucial for industrial diversification that companies emerging from the system scale up in the Basque Country, and the barriers to doing so lie both in capital and in the quality of the projects:

- Create specialised investment vehicles of sufficient scale, linked to the system's own stakeholders.
- Promote incentives for ambitious entrepreneurship through tax measures and mechanisms to mitigate risk in the event of failure.
- Strengthen integrated incubation and acceleration programmes that link the development of the centres with investor networks and provide early international exposure.
- To explore in greater depth the role of venture builder organisations, with complementary profiles (former entrepreneurs, PhD holders, former consultants), which bring technologies from the laboratory to the market.

V. Networking: capitalising on the system's international connections

International connections, which already have a solid foundation, must be used to gain scale, anticipate technological trends and access knowledge that the region does not generate on its own:

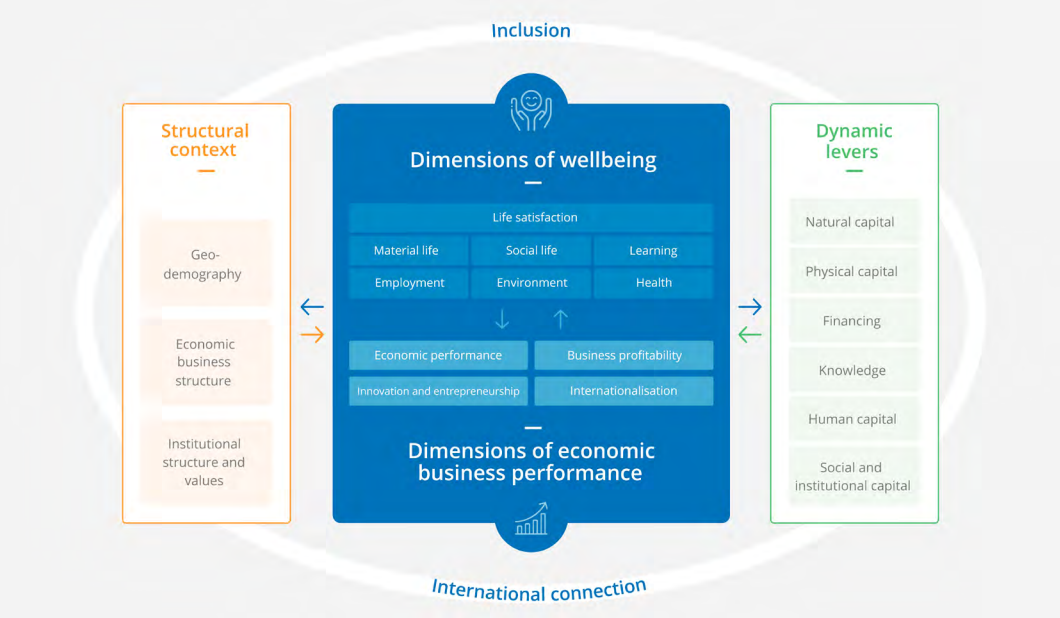
- Combine local capabilities with international knowledge, in line with the need to strengthen the industry's international connections through the flow of people and knowledge.
- Align scientific and technical efforts —which dominate Basque participation in European programmes— with technological areas and sectors possessing significant absorption capacity within the industrial fabric and/or the capacity for sectoral diversification.
- To learn from other leading systems in attracting international research talent, an effective catalyst for co-creation with industry.

These recommendations, based on an in-depth analysis of the Basque technology and knowledge transfer system, are complemented by a more general assessment of the state of competitiveness and well-being in the Basque Country.

5. General assessment of competitiveness and well-being in the Basque Country

The holistic assessment covers some 80 indicators organised into economic and business competitiveness and well-being outcomes, levers of competitiveness and structural context, in line with the Orkestra framework. The analysis reveals a solid starting point and positive trend across most indicators, accompanied by some signs of vulnerability that require attention.

COMPETITIVENESS FRAMEWORK FOR WELL-BEING



Source: Orkestra (2021).

Economic and business outcomes

- With a per capita GDP of 48,304 PPA€ in 2025, the Basque Country ranks 15.8 per cent above the EU-27, and slightly below Germany (48,622). Business margins have recovered following the pandemic, and indicators for innovative SMEs, the entrepreneurial activity rate and high-growth firms show a very positive recent trend.
- Recent economic growth has been driven more by rising employment than by productivity growth. Productivity per hour (€48.8 in 2023, the latest comparable year) is 22 per cent lower than in Germany (€62.7), and the gap with Germany and the benchmark regions has widened since 2015. This, combined with the relatively high unit labour costs in the manufacturing sector (61 per cent, still below Germany's 66 per cent but above the EU-27 average of 57 per cent), highlights the need to continue working on the levers that promote productivity growth.

- The internationalisation dimension has performed the worst, losing momentum in terms of goods exports (from 35.1 per cent of GDP in 2023 to 28.8 per cent in 2025) and seeing the trade surplus narrow (from 6.2 per cent to 3.1 per cent of GDP). This trend highlights the vulnerability of a highly internationally connected economy at a time when global value chains are being reconfigured, although high levels of outward foreign direct investment (stock of 109 per cent of GDP) represent another channel through which companies are gaining access to international markets.

Well-being indicators

- The Basque Country outperforms the European average and the benchmark regions in terms of median household income (€25,051), life satisfaction and social life, and has lower levels of inequality and risk of poverty or social exclusion (14.7 per cent).
- Also noteworthy are lifelong learning among the adult population, where the Basque Country is extending its lead over the comparison regions, and health indicators, although this lead is narrowing.
- Structural challenges persist in the labour market, with an unemployment rate that is falling (7.3 per cent) but remains above the EU-27 average (6 per cent).
- The PISA 2025 results (446 points, compared with 468 in the EU-27) call into question the quality of education for younger generations.
- On environmental issues, the trend in indicators is generally very positive, although there is still some way to go to achieve some of the targets set.

Dynamic drivers and structural context

- The Basque Country stands out in the areas of physical capital, financing and human capital. Gross capital formation and the stock of physical capital are above the EU-27 average (although the stock of inward foreign investment is lower); Basque companies stand out for their solvency (with a median net equity-to-assets ratio of 53.0 per cent); and the educational levels of the population are above the European average.
- In terms of the "knowledge" lever, R&D expenditure (2.1 per cent) is slightly below the EU-27 average (2.2 per cent), with notable scientific output and patenting activity still well below the European average, though with a high proportion of patents in environmental technologies.
- The DESI Report highlights a relative gap in the adoption of artificial intelligence amongst small enterprises (12.3 per cent of Basque enterprises were using it in 2024, compared with 13.5 per cent in the EU-27, with higher rates amongst medium-sized and large enterprises). In cybersecurity, the uptake of measures is high (93.5 per cent), but there is room for improvement in prevention, detection and risk management.
- In the area of natural capital, the results are largely positive, although they indicate that further work is needed to increase the penetration of renewables for decarbonisation (24.5 per cent of gross final consumption, compared with the target of 32 per cent for 2030).
- At a structural level, the ageing population (24.2 per cent of people aged over 65) and the low birth rate are affecting generational renewal, making the sustainability of the labour market dependent on greater participation and integration of people from abroad.

Introduction

With the annual publication of Orkestra's competitiveness report, we pursue two interrelated objectives. On the one hand, to focus on the present and the recent past in order to provide a detailed assessment of competitiveness and well-being in the Basque Country. On the other hand, to look to the future by conducting an in-depth analysis of a specific topic that will prove key to both in the coming years. The topic addressed this year is technology and knowledge transfer.

The theme addressed this year is technology and knowledge transfer

As in previous years, the analysis we present shows, overall, robust competitiveness, reflecting a strong and diversified economy capable of sustaining high levels of well-being. However, we recognise that we are at a time of particular concern regarding the future and our ability to maintain these levels of competitiveness and well-being. Whilst the 2025 report already analysed how the Basque Country was responding to a volatile international environment, in 2026 the competitive threats perceived from other parts of the world have only intensified.

In line with the proposals put forward by various stakeholders in the Basque Country, it is essential to recognise these threats and act with agility and a sense of urgency on the matters within our control to address them. Our response must be coordinated across multiple areas, including the talent ecosystem, the labour market, the energy transition and attracting investment, amongst others. However, perhaps the most fundamental factor in maintaining our industry's competitiveness in a rapidly changing world lies in the ability to generate new knowledge and turn it into innovation. Without technology and knowledge transfer, we cannot transform our industry. And without transforming our industry, we will be unable to meet the challenges facing our competitiveness and well-being in the coming years.

The response to competitive threats must encompass multiple areas

Orkestra's competitiveness framework for regional well-being specifically identifies knowledge as a key lever which, in turn, is linked to others such as human capital, social capital and funding. The interactions between these factors are critical to creating an effective system for the creation and (multidirectional) flow of knowledge, as well as for the assimilation, absorption and application of knowledge in a way that has a genuine impact on business competitiveness, environmental sustainability and people's well-being.

In the past, the Basque Country's innovation system has been one of the key drivers of the region's economic transformation. This is recognised by a large number of

studies carried out both by Orkestra and its professionals,[1] and by international experts and institutions.[2] However, these same studies had also identified weaknesses, including the system's capacity to transfer knowledge and technology to SMEs; in any case, the approaches of the past must evolve to adapt to the new environment of major transitions.

We analyse the technology and knowledge transfer system to understand its impact

For this reason, the 2026 Competitiveness Report analyses whether our technology and knowledge transfer system is functioning effectively given the current context, with the aim of identifying where we need to improve so that it becomes a genuine competitive lever for our businesses. This requires analysing our system with a critical eye, but also looking beyond the Basque Country to learn from and draw inspiration from other examples.

Thus, in the first three chapters of the report, we analyse the Basque technology and knowledge transfer system to understand its impact, particularly on the industrial fabric:

- The first chapter conceptualises the Basque technology and knowledge transfer system within the context of the international state of the art and introduces other leading examples that may serve as inspiration for our own system.
- The second chapter characterises the system as a whole through statistics on R&D, innovation, public programmes to promote R&D&I, and patents and publications, providing an overview of its performance.
- The third chapter examines in depth the impacts of technology and knowledge transfer, analysing business outcomes linked to transfer, on the one hand, and to the creation of spin-offs and new technology-based firms, on the other. This analysis enables us to identify how and to what extent knowledge reaches the market.

The thematic analysis of these three chapters is complemented by a fourth chapter, which provides a detailed assessment of the Basque Country's competitiveness and well-being. The most recent data available across 80 indicators are analysed comparatively to monitor the evolution of our structural context, drivers of competitiveness, and economic, business and well-being outcomes.

Finally, the chapter on conclusions and recommendations summarises the key messages and proposes five main areas for action.

[1] See, in particular, the 2013 and 2015 competitiveness reports and the studies by Navarro *et al.* (2013) and Navarro (2009).
[2] See, for example, OECD (2011), Morgan (2016) or Sandulli *et al.* (2021).

1
The Basque system of technology and knowledge transfer in an international context

A region's ability to remain competitive in a changing environment depends, to a large extent, on whether the knowledge generated within the region (and in collaboration with stakeholders from other regions) is successfully transformed into innovation. Indeed, flows of knowledge and technology are fundamental to bringing about the industrial transformation necessary to address the challenges of competitiveness and well-being in a world in transition.

Turning knowledge into innovation is key to competitiveness and the transformation of regions

In this chapter, we first draw on the academic literature to understand the importance of technology and knowledge transfer for competitiveness, and we introduce the various transfer mechanisms. We also present the rationale for public intervention and the policy instruments designed to promote technology and knowledge transfer. We then describe the Basque system for technology and knowledge transfer. Finally, we analyse case studies from leading European regions to draw relevant lessons for the Basque Country.

1.1 Technology and knowledge transfer as a driver of competitiveness

Since 2021, we have been analysing the competitiveness of the Basque Country using the "competitiveness for well-being" framework, which serves as the basis for the assessment we carry out in Chapter 4 (Figure 4-1). This year, we draw on the comprehensive perspective provided by this framework to analyse the significance of technology and knowledge transfer. One of the key dynamic levers highlighted in the framework is knowledge itself, the development of which is in turn influenced by other levers, such as human capital, institutional and social capital, physical capital and funding.

Knowledge is one of the key drivers within the competitiveness framework for well-being

Thus, technology transfer would be represented in the framework primarily by the flows between the levers and economic and business outcomes. Firstly, its impact will be reflected in innovation and entrepreneurship outcomes, but the utilisation of the knowledge generated for its application to the market will also have an impact on internationalisation, profitability and economic performance. Furthermore, knowledge flows will also have direct and indirect impacts (via economic and business outcomes) on the different dimensions of well-being (material life, social life, learning, employment, the environment, health and life satisfaction).

Technology and knowledge transfer within regional innovation systems

Innovation is a systemic and interactive process that requires collaboration between various stakeholders

It is indisputable that innovation is key to business and regional competitiveness. Innovations can be product- or process-based; they can be carried out by different types of actors (e.g. companies, public organisations, individuals); and they can be either technological or non-technological.[3] Furthermore, the process by which a company innovates is not linear or isolated, but rather a systemic and interactive process, as the knowledge and technology required for innovation are not concentrated in a single actor, but rather require collaboration and interaction between actors (companies, universities, etc.).[4]

This conception of innovation as a systemic process has had a major impact at regional level. Regional innovation systems were conceptualised in the 1990s and have since had an enormous influence on European policy.[5] Regional innovation systems are based on two fundamental premises: (i) the systemic nature of innovation and the need to establish links between different actors in order to innovate; and (ii) the region as the ideal geographical unit for establishing these links, given that, due to the tacit nature of knowledge, proximity plays a fundamental role in its transmission.

Public policies must develop the capacity to absorb and connect the regional system both internally and externally

In regional innovation systems, public policies play a very significant role. On the one hand, they must facilitate the existence and effective functioning of the system's components, including businesses, by promoting the development of capacities for the absorption of knowledge and technology. On the other hand, they must facilitate connections, both internally, amongst the agents of the regional system, and externally, with other levels, such as national innovation systems, international organisations or relevant actors from other regions.

However, it is important to recognise that the mere existence of a regional innovation system that facilitates the transfer of knowledge and technology with an impact on business is a necessary but not sufficient condition for tackling today's major challenges. Thus, new trends in academic literature and international organisations such as the European Commission and the OECD emphasise the directionality of innovation for the transformation of society.[6]

[3] The Oslo Manual defines innovation as a new or improved product or process (or a combination of both) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or put into use by the unit (process) (OECD and Eurostat, 2018, p. 20).

[4] The non-linear and interactive nature of innovation was addressed in the seminal work by Kline and Rosenberg (1986), and subsequently in the literature on national innovation systems (Freeman, 1987; Lundvall, 1992), the triple helix (Etzkowitz and Leydesdorff, 2000) and open innovation (Chesbrough, 2003). More recently, this premise has evolved to address, amongst other things: innovation ecosystems, where value creation is highly interdependent and guided by collaborative architectures (Adner, 2017; Granstrand & Holgersson, 2020); digital platforms, open architectures or real-time data, which accelerate non-linear co-creation amongst distributed actors (Khizar *et al.*, 2025; Nambisan *et al.*, 2017); or the mission-oriented approach to systemic innovation, which broadens interaction to include civil society and end-users in order to tackle complex social challenges (Hekkert *et al.*, 2020; Magro *et al.*, 2024; Magro and Wilson, 2026; Mazzucato, 2018).

[5] Early work on regional innovation systems by Phillip Cooke and other researchers cited the Basque Country as an example (Cooke, 1992; Cooke *et al.*, 1997; Cooke and Morgan, 1998). Very quickly, the concept came to influence European policy (Landabaso, 1997; Tödtling and Trippl, 2011) and this influence remains evident today in regional 'smart specialisation' (S3) strategies (Aranguren *et al.*, 2023; Foray and Kramer, 2026).

[6] See, for example, the European Commission (2026), Mazzucato (2018) and Schot and Steinmueller (2018). This aspect, which is not analysed in this report, was addressed in the context of environmental transformation (see Orkestra, 2023).

Mechanisms for knowledge and technology transfer

Transfer integrates technology and knowledge in a non-linear process towards innovation

We refer to knowledge and technology transfer because, in practice, it is not possible to separate these two elements; there is a knowledge base that always accompanies technology (Bozeman, 2000). In fact, technology and knowledge transfer is merely one element of a non-linear process that links knowledge with innovation: (i) knowledge generation; (ii) maturation or adaptation of knowledge to the needs of the productive sector; (iii) transfer between actors, from knowledge producers to those who can exploit it; (iv) absorption and integration of knowledge by the recipients; (v) application, exploitation and innovation in products and processes.

We analyse the Basque technology transfer system, focusing on the interaction between its stakeholders

Although this report includes evidence from all phases, it focuses primarily on the third phase and, specifically, on the functioning of the Basque technology transfer system. This can be defined as the process by which technological knowledge, know-how, technologies or associated rights pass from one actor to another, enabling recipients to access them and incorporate them into their own activities. In light of this definition, it is important to consider the types of actors involved (both in the generation and exploitation of knowledge), the vehicle or medium of transfer (people, artefacts, etc.), and the mechanisms or channels of transfer.

There are various criteria for characterising the channels, mechanisms or links between knowledge agents and businesses, including:[7]

- **formalisation**, ranging from licences to informal contacts within networks;
- the **cognitive or technological process** occurring between the actors: dissemination, transfer, exchange, co-creation and/or acquisition;
- **the vehicle** for what is transferred: codified knowledge, tacit knowledge/know-how, non-embedded technology and embedded technology;
- **origin of the impetus**, whether driven by the supply from knowledge actors (*push*) or by business demand (*pull*);
- **the organisational level of the links**, whether involving individuals or small groups, departments or faculties, technology transfer offices, etc.; and,
- **purpose**, whether economic (contracts, patents, spin-offs, etc.), scientific, social or environmental.

Although the list of transfer mechanisms can be very extensive, drawing on previous classifications by authors such as Testar (2012) or Debackere (2012), we can identify six broad families of technology transfer channels: (i) R&D, knowledge, infrastructure and technology services; (ii) productive, commercial and value-chain relationships; (iii) intangible assets, intellectual property and technology rights; (iv) people, mobility and skills; (v) entrepreneurship and organisational innovation; (vi) networks, interaction and dissemination.

[7] See, amongst others: Schartinger *et al.* (2002), OECD (2002), Perkmann and Walsh (2007), Schoen *et al.* (2006) and Laredo (2007).

Policies aimed at improving technology transfer

Public intervention is justified by market failures, systemic problems or transformative challenges

The main justification for public interventions to support knowledge transfer activities relates to the existence of market inefficiencies (Salmenkaita and Salo, 2002), systemic problems (Laranja *et al*., 2008) or transformative failures (Weber and Rohracher, 2012).

Among the former, the most significant obstacle is the **funding gap**, that is, the lack of available private funding sources to support technology transfer activities, start-ups and spin-offs, even amongst the most advanced or risk-tolerant investors, such as venture capital firms or business angels (Kochenkova *et al*., 2016).

Systemic problems relate to the difficulties in fostering interactions between the various stakeholders (for example, companies, government laboratories, universities or technology centres), each with different priorities, goals, characteristics and objectives. Of particular note are gaps in knowledge or capabilities, as researchers and entrepreneurs may lack the necessary management skills and competencies to develop their technologies or start-ups to a stage where they can successfully negotiate with industry or the investment sector (Kochenkova *et al*., 2016). Similarly, companies may lack the necessary capabilities to absorb knowledge. Furthermore, there are often cultural and language differences between the science, technology and innovation (STI) ecosystem and the business ecosystem.

Thus, public intervention can help mitigate systemic problems by creating incentives for interaction and collaboration, facilitating the mobility of people between different parts of the system (for example, the recruitment of research staff by companies), supporting intermediary organisations that act as bridges between different stakeholders, or stimulating demand for innovation (for example, through innovative public procurement).

Finally, **transformative failures** relate to the orientation of innovation itself towards the needs of society. Here, public policies seek to ensure that the direction of innovation addresses major challenges, such as environmental or demographic issues, as well as to foster coordination between the various public interventions in these areas.

Aligning innovation with social challenges requires the coordination and combination of various public instruments

In the context of these justifications for public policies supporting technology transfer, the OECD (2019) distinguishes **three categories of policy instruments**, within which multiple types of specific instruments can be identified that respond to different rationales (see Table 1-1). Depending on the characteristics of the system, these instruments can be used to target specific groups of stakeholders and/or to implement specific transfer channels or mechanisms (OECD, 2019). However, it is important to consider the interactions between these instruments and the policy mix to ensure the effectiveness of public policies (Magro and Wilson, 2013, 2019).

TABLE 1-1 Public policy instruments for technology transfer

Category of instruments	Examples of specific instruments
Regulatory instruments: to establish a framework for action for the various actors forming part of the technology transfer system	• Reforms to intellectual property rights (IPR) regimes • Other legislative reforms to support technology transfer (e.g. university-industry collaboration, regulation of spin-off companies, contractual arrangements for university staff, etc.) • Provisions for open access and open data
Financial, economic and fiscal instruments: financial transfers from public sources to companies, universities or research institutions, to foster collaboration between them	• Grants for intellectual property applications and the commercialisation of inventions • Seed funding • Proof-of-concept funds • Policies for the creation of infrastructure and facilities (e.g. Technology Transfer Offices) • Grants for science-industry collaboration (e.g. to fund shared infrastructure, support companies that hire doctoral or post-doctoral research staff, or support universities that temporarily host research staff from industry) • Innovation vouchers, particularly to enable SMEs to procure services from stakeholders in the science, technology and innovation ecosystem • Tax incentives, such as tax credits for companies participating in collaborative research
Soft instruments: less interventionist forms of public policy, focused on facilitating networks and fostering relationships between various stakeholders	• Training programmes for universities and private-sector stakeholders • Networking opportunities through workshops, events and trade fairs where companies and stakeholders from the scientific and technological sectors come together to share their research and technological needs, or to take part in collective exercises to draw up roadmaps and conduct foresight analysis

Source: Adapted from Kochenkova *et al.* (2016) and the OECD (2019).

1.2 The Basque technology and knowledge transfer system

Technology and knowledge transfer accelerates the transition of Basque industry towards advanced manufacturing

The foundations underpinning the Basque Country's competitiveness are rooted in a long-standing and resilient industrial tradition that has successfully evolved towards advanced manufacturing (Aranguren *et al.*, 2021; Orkestra, 2021). This transition is driven by a combination of factors, in which technology and knowledge transfer plays a fundamental role, embedded within an internationally recognised innovation system (OECD, 2011; Porter *et al.*, 2014; Morgan, 2016; Sandulli *et al.*, 2021).

Analysing how the Basque technology and knowledge transfer system operates today requires, first and foremost, characterising it. To this end, we start from four principles, which give rise to the conceptual map shown in Figure 1-1:

Four principles characterise the Basque technology and knowledge transfer system

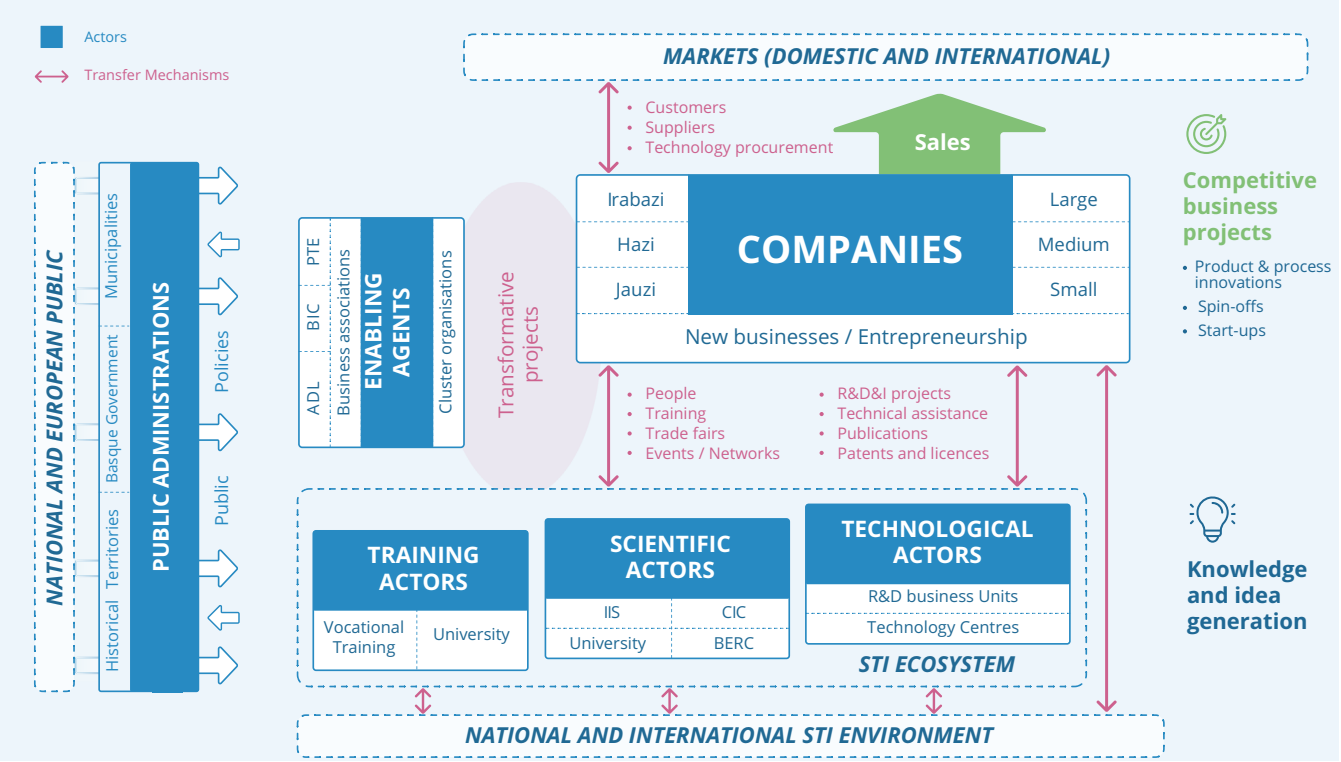
1. **There is a key distinction between the system's stakeholders and the mechanisms for the flow of knowledge and technology.** The main stakeholders are represented by the blue boxes in the figure: companies, enablers, technology stakeholders, scientific stakeholders and training providers. The sub-boxes illustrate, though not exhaustively, the specific stakeholders. The main transfer mechanisms are represented by the pink arrows and the accompanying text.

2. **The logic of the flows in the figure runs from the generation of knowledge, at the bottom, towards the consolidation of viable business projects, at the top.** The actors positioned higher up in the figure are closer to the market and develop competitive business projects, through product and/or process innovations or the formation of new companies. The actors situated lower down in the diagram are more focused on the generation of knowledge and ideas and the development of new technologies and solutions.
3. **Public administrations play a fundamental role.** Represented by the box and arrows on the left-hand side of the diagram, they fulfil a key role in shaping and coordinating the system, as well as providing direction for it, and they gear their policies towards: (i) supporting the actors within the system; and (ii) catalysing interactions between them.
4. **The system is connected internationally.** The diagram shows three main points of international connection. On the one hand, the system is connected to international markets for products and services, mainly through businesses (sales, cooperation with customers and suppliers, and the purchase of technology). On the other hand, the system is connected to the national and international science, technology and innovation landscape. Finally, the system is connected to national and European public administrations through their own policies and regulations.

We focus on the industrial fabric and the mechanisms and policies that connect it to the STI ecosystem

Although it is important to start with a broad overview, such as that shown in Figure 1-1, this report does not aim to provide an exhaustive analysis of every part of the system. We focus on the industrial fabric and on the mechanisms and policies that link this fabric to the STI ecosystem. Therefore, in the remainder of this section we explain in greater detail three key elements of the system characterised in Figure 1-1: (i) companies and their environment; (ii) the STI ecosystem; and (iii) public policies.

FIGURE 1-1 Basque technology and knowledge transfer system



Source: Compiled by the authors.

Businesses and their environment

Businesses are at the heart of the technology and knowledge transfer system

Businesses are at the heart of the system because the industrial fabric is the main focus of the technology and knowledge transfer discussed in this report.[8] It plays a central role in the process of transforming the knowledge generated by the system —and from outside the system within the national and international STI environment— into viable business projects with market potential, thereby generating competitiveness and prosperity for the region.

The business sector includes both established companies of various sizes and start-ups and new ventures. Within the context of the Basque Country Industry Plan 2030, a distinction is also made between two types of priority sectors (*Irabazi* and *Hazi*) and other disruptive business projects (*Jauzi*):

- ***Irabazi*:** established activities that form the core of Basque industry (automotive components, sustainable mobility, advanced manufacturing, energy, metallurgy);
- ***Hazi***: activities in the expansion phase that have high potential to become the new major drivers of Basque industry (aerospace; bio-health; advanced digital solutions; smart grids and energy storage; and renewable fuels);

[8] Although not addressed in this report, it should be noted that technology and knowledge transfer to the public sector, for example to the health or education systems, is a very relevant element for the competitiveness and well-being of the territory.

- ***Jauzi***: other opportunistic activities and new market niches characterised by a strong innovative nature and high technological risk, with the potential to make significant leaps forward.

A number of enabling agents facilitate technology transfer in various ways

The Basque business sector also comprises a number of **enabling agents** whose roles influence technology transfer processes in various ways. These actors include Local Development Associations (ADLs), the eight active campuses of the Basque Technology Park (PTE) and various business associations (general and sector-specific, chambers of commerce, social economy business associations, etc.), along with other organisations such as the Basque Innovation Agency (Innobasque), the Basque Agency for Advanced Management (Euskalit) and the Basque Artificial Intelligence Centre (BAIC).

Two types of enabling agents stand out for their integration into knowledge and technology transfer processes. On the one hand, **cluster-driving organisations (ODCs)**, which facilitate cooperation across 17 clusters (Table 1-2). Their aim is to increase competitiveness through collaboration, which includes, as a fundamental pillar, the promotion of collaborative innovation and technology projects.9 Thus, a total of 72 stakeholders in the Science, Technology and Innovation (STI) system are associated with the ODCs, including technology centres, Basic Research and Centres of Excellence (BERC), Cooperative Research Centres (CIC), Health Research Institutes (IIS), universities and corporate R&D units, as well as the Basque Research and Technology Alliance (BRTA). A large proportion are affiliated with two or more ODCs, totalling 203 links.

Furthermore, the Business Innovation Centres (BICs) act as a link between knowledge centres and the creation of new businesses. The Basque Country has four BICs (BIC Araba, BIC Bizkaia, BIC Bizkaia Ezkerraldea and BIC Gipuzkoa), promoted by the provincial councils and SPRI. Their role in the technology transfer system is manifested in at least three areas. Firstly, they co-manage the business incubators and incubation facilities located on the EHU's university campuses, thereby placing support for entrepreneurship right where knowledge is generated. Secondly, they carry out technology commercialisation activities alongside the technology centres, the CICs and the BERCs in their territory. Thirdly, they support projects from the formation of the founding teams through to the incorporation of the company and its initial rounds of funding. This role also explains their involvement in instruments such as Basque Tek Ventures or the Ekintzaile programme, analysed in Chapter 2.

[9] The role of the cluster-driving organisations (ODCs) in promoting cooperative R&D&I is recognised in both the Science, Technology and Innovation Plan 2030 and the Basque Country Industry Plan 2030. The latter highlights their close knowledge of the industrial fabric and their capacity to activate projects, and regards them as essential agents for detecting opportunities, anticipating changes and contributing to the strategic intelligence that underpins the Industry Plan itself.

TABLE 1-2 Clusters and Cluster Promotion Organisations (CPOs)

Cluster	CPO(s) / ODC(s)
Aeronautics	HEGAN Basque Aerospace Cluster
Food	BFC – Basque Country Food Cluster
Automotive	ACICAE – Basque Country Automotive Cluster
Biohealth	BHC – Basque Health Cluster
Construction	BUILD:INN – Basque Construction Cluster
Energy	Basque Energy Cluster
Railway Equipment	MAFEX – Spanish Railway Industry Association
Finance and Investment	BASQUEFIK
Foundry & Forging	AFV – Basque Foundry and Forging Cluster
Housing, Timber, Office and Contract	HABIC – Basque Country Equipment, Furniture and Design Cluster
Maritime Industries	FMV – Basque Maritime Forum
Environment	ACLIMA – Basque Environment Cluster
Paper	CLUSTERPAPEL – Euskadi Paper Cluster Association
Steel Products and Facilities	SIDEREX – Steel Industry Cluster Association
Advanced Manufacturing Technologies	AFM Cluster – Advanced and Digital Manufacturing
TEICs and Knowledge	GAIA – Basque Country Association of Knowledge and Technology Industries
Transport, Mobility and Logistics	MLC-ITS Basque Country Mobility and Logistics Cluster / UNIPORT

Source: Compiled by the authors.

Transformative projects are a key large-scale tool for industrial transformation

Returning to Figure 1-1, it can be seen that, within the space between companies, enabling agents and the STI ecosystem, we include **transformative projects**, a key tool of the Basque Country Industry Plan 2030. Transformative projects are large-scale strategic initiatives that respond to the need for proactivity, collaboration and adaptability in order to tackle industrial transformation.

- On the one hand, the **11 projects launched under public leadership** tackle various cross-cutting challenges to industrial development, some of which —such as the Scale UP Fund, Euskadi Spacelab and Basque Zirkular Metals— focus on critical aspects of the technology transfer process.
- On the other hand, the **eight projects launched under private leadership** involve significant investment in R&D and the development of cutting-edge knowledge; as such, they aim to play fundamental roles in the technology transfer system within their specific fields over the coming years (see Table 1-3).

TABLE 1-3 Privately-led transformative projects

Project	Objective	Private sector involvement	Associated ODC	Initial investment
New aircraft engine architectures	Development of technologies and new engine architectures for the next generation of sustainable commercial aviation	• Leadership: ITP AERO • >12 companies • 6 R&D centres	HEGAN	>€110M
ROBOOST	Leading the new paradigm of advanced manufacturing for the development of industrial robots	• Leadership: DANOBAT • 18 companies • 10 R&D centres	AFM HEGAN	~€50M
Smart hydrogels	Development of personalised nanomedicine solutions based on smart hydrogels	• Leadership: i+Med • 10 companies • 9 CTI centres	Basque Health Cluster	€72M
Renewable Fuels Hub	Development of technologies related to synthetic fuels, biofuels, CO_2 and renewable hydrogen	• Leadership: Petronor • 51 companies • 4 CTI centres	Basque Energy Cluster	~€250M
GRID4INDUSTRY	Digitalisation of industrial electricity grids as enablers of industrial electrification	• Leadership: Iberdrola • 62 companies • >3 R&D centres	Basque Energy Cluster	~€160M
Zero-emission marine vessel	Development of the new generation of electric and decarbonised recreational craft	• Leadership: LASAI • 6 companies • 7 CTI centres	Basque Maritime Forum	€36M
Flexible manufacturing for the new automotive industry	Development of more flexible and adaptable manufacturing models geared towards the electrification of the automotive sector	• Leadership: Mercedes-Benz • 11 companies • >1 CTI centres	ACICAE	€181M
BasqTrain 35	Development of a new generation of trans-European high-speed trains, with modular and sustainable traction	• Leadership: Talgo • 12 companies • >1 CTI centres	MAFEX	€105M

Note: The projects are listed in order of the date they were announced: the first in February 2026 and the last in October 2026.

Source: Compiled by the authors based on information found at https://www.spri.eus/.

STI Ecosystem

In Figure 1-1, the STI ecosystem comprises three types of stakeholders. In addition to the technology and science stakeholders that make up the Basque Network for Science, Technology and Innovation (RVCTI),10 a group of education and training stakeholders has been included to highlight the role of human capital in technology and knowledge transfer.

Technology players are closely linked to the business community

Technology stakeholders are those situated closest to the business sector and tend to work at higher Technology Readiness Levels (TRLs).11 Through technical assistance, they develop collaborative R&D&I projects alongside companies, formalise and disseminate technological developments via patents and licences, and foster spin-offs. These

[10] The RVCTI is the network of scientific and technological bodies accredited by the Basque Government that generate knowledge and transfer it to businesses; it is currently undergoing review as part of the update to the decree on the Basque Network for Science, Technology and Innovation.

[11] TRL is the analytical scale used to assess the maturity level of a specific technology. It consists of 9 levels, where TRL 1 represents the basic principles of research and TRL 9 corresponds to a system that has already been successfully tested in a real, commercial environment.

stakeholders include, on the one hand, the 55 registered corporate R&D units, and, on the other hand, the 16 technology centres (see Table 1-4).

Of these technology centres, 13 form part of the Basque Research and Technology Alliance (BRTA), a consortium established in 2019 by the Basque Government, the SPRI Group, the three Provincial Councils and a group of technology centres and co-operative research centres. The BRTA aims to anticipate future socio-economic challenges and respond to them through research and technological development, whilst projecting itself internationally.

TABLE 1-4 Technology centres

Centre	Main areas/specialisations
AZTERLAN	Development of new materials; optimisation of manufacturing processes; AI and Industry 4.0; heat treatment, corrosion and surface treatments; sustainability and the environment
AZTI	Marine; food
CEIT	Materials and manufacturing; transport and energy; water and waste; information and communications technologies
CIDETEC	Energy storage; surface engineering
GAIKER	Biotechnology; materials; sustainability assessment and improvement; process digitalisation and sensor technology
IDEKO	Precision design and engineering; manufacturing processes; dynamics and control; ICT and automation
IKERLAN	Digital technologies and artificial intelligence; embedded electronic systems and cybersecurity; energy and mechatronics
LEARTIKER	Food technology; polymer technology
LORTEK	Joining technologies; additive manufacturing technologies; digitalisation technologies
NEIKER	Agritech; bioeconomy; holistic health; biotechnology
TECNALIA	Smart manufacturing; digital transformation; energy transition; sustainable mobility; health and nutrition; urban ecosystem; circular economy
TEKNIKER	Advanced manufacturing technologies; surface and materials technologies; digital technologies. Technological solutions for various industrial sectors
VICOMTECH	Computer vision and interaction; artificial intelligence
BCC	Gastronomy
CTA	Aerospace technologies
MIK	Business Management, Innovation and Entrepreneurship

Note: The centres are listed in alphabetical order, first the 13 centres affiliated with BRTA, followed by the 3 centres not affiliated with BRTA.

Source: Compiled by the authors based on information found at https://brta.euskadi.eus/ and the centres' own websites.

Actors in the scientific sphere are generally somewhat more removed from the business sector, working at lower TRLs, but with significant flows of knowledge towards companies, project collaborations and spin-off initiatives. Four main groups of actors stand out (Table 1-5).

Scientific stakeholders also contribute significant flows of knowledge

TABLE 1-5 Scientific stakeholders

Type of Stakeholder	Key actors	Summary / Research areas (year of foundation)
UNIVERSITY[11]	University of the Basque Country (EHU)	Public university (1980)
	University of Deusto	Social initiative university (1886)
	Mondragon Unibertsitatea	Cooperative university (1997)
CENTRES OF BASIC AND APPLIED RESEARCH EXCELLENCE (BERC)	Basque Centre for Neuroscience	Biology of neuron-glia interactions (2012)
	Basque Centre for Climate Change	Health, climate and the natural environment (2008)
	Basque Centre for Applied Mathematics	Applied Mathematics and Computing (2008)
	Basque Centre on Cognition, Brain and Language	Cognitive neuroscience and language studies (2008)
	Basque Centre for Materials, Applications and Nanostructures	Materials science (2012)
	Donostia International Physics Centre	Basic and Applied Physics (1999)
	Bizkaia Biophysics Foundation	Molecular and Cellular Biophysics (2008)
	Basque Centre for Macromolecular Design and Engineering	Synthesis, assembly and processing of polymers (2012)
	Materials Physics Centre	Materials Physics (2008)
COOPERATIVE RESEARCH CENTRES (CIC)	CIC bioGUNE	Development of more precise medicine (2002)
	CIC energiGUNE	Electrochemical and thermal energy storage and conversion (2011)
	CIC biomaGUNE	Nanobiomaterials and molecular imaging (2006)
	CIC nanoGUNE	Nanoscience and nanotechnology (2006)
HEALTH RESEARCH INSTITUTES (IIS)	BioAraba	Health research institutes promoted by the Basque Government's Department of Health and coordinated by BIOEF (Basque Foundation for Innovation and Health Research) (2008–2012)
	BioBizkaia	
	BioGipuzkoa	
	Biosistemak	

Source: Compiled by the authors based on information found in the Science, Technology and Innovation Plan 2030, the Basque University System Plan 2023–2026 and at https://brta.euskadi.eus/.

In addition to the main stakeholders listed in Table 1-5, the scientific sector comprises system support organisations and intermediary bodies, including:

- Ikerbasque, the Basque Foundation for Science, whose mission is to develop scientific research by attracting, retaining and bringing back researchers on the basis of criteria of excellence;
- Unibasq, a body attached to the Basque Government's Department of Education, whose purpose is the evaluation, accreditation and certification of quality in the university sector;

[12] In addition to the three main universities, the university system comprises other research structures, including: Tecnun at the University of Navarra; the Deusto Foundation (Orkestra), attached to the University of Deusto; the five research centres of the EHU (EHUQuantum, Hitz, PIE, CFAA and i-Bio); and the six Joint Research Labs (JRLs) currently established as collaborative research programmes within the framework of the Euskampus initiative.

- Euskampus Fundazioa, an inter-institutional body for the management and governance of the EHU's Euskampus – Campus of International Excellence project, which includes the launch of six Joint Research Labs (JRLs);
- the Euskoiker Foundation, a liaison agency between the University of the Basque Country (EHU) and Basque society, for the promotion of research and the organisation of training activities; and
- the 4Gune training cluster, focused on strengthening collaboration between the university and industry in engineering, science and technology, and KSIGune, focused on the Cultural and Creative Industries (CCI).

University and vocational training provide specialised talent and build bridges with the business community

Finally, **stakeholders in the field of education** and training play a critical role in the STI system in relation to the development of human capital and the flow of skilled individuals within the system. The university system and the vocational training system stand out for their direct impact on the flows of skilled people in specialised fields.[13] These flows are relevant both to the business sector and to other stakeholders in the STI ecosystem and, in turn, indirectly foster the capacity to absorb emerging technologies and new developments in the Basque labour market.

Dual training, for example, is a mechanism used by universities and vocational training centres to build bridges between training processes and the needs of the technology transfer system. Furthermore, the TKgune programme, developed by Tknika —a centre for applied research in VETCs— promotes technological innovation in business through VETCs and is primarily aimed at SMEs facing various barriers to innovation (including limited financial and human resources and the absence of an R&D department, amongst others).

Public authorities

Public policies have a cross-cutting and multi-level impact on the flow of transfer

Public administration policies have a cross-cutting impact on the technology and knowledge transfer system. They support multiple stakeholders through various programmes and catalyse flows between them, taking a holistic view of how the system operates. They also generate their own knowledge and represent a relatively advanced market for other actors in the system, for example through innovative public procurement. They are thus represented by the box and arrows on the left-hand side of Figure 1-1, which reflect the different levels of government that implement these policies: the Basque Government, historical territories and local authorities, with links also to central government and the European Union.

There are numerous plans, programmes and strategies that impact different parts of the technology and knowledge transfer system. However, due to their regional scale and their direct impact on the STI ecosystem and the business sector, the Basque Country Industry Plan 2030, the Science, Technology and Innovation Plan 2030, the Basque University System Plan 2023–2026 and the 4th Basque Vocational Training Plan are particularly significant.

Table 1-6 summarises a selection of the most significant public programmes and initiatives relating to technology and knowledge transfer between the STI system and the business community, some of which are analysed in greater detail in Chapter 2.

[13] The primary and secondary education system plays a more indirect role, fostering a foundation of skills amongst the population.

TABLE 1-6 Public programmes and initiatives to promote technology and knowledge transfer

Programme	Beneficiary stakeholders	Finalidad
FAST TRACK INNOBIDEAK	Companies (manufacturing and industry-related services)	To accelerate the development of innovation projects that promote competitiveness, specialisation and diversification
HAZITEK	Companies (engaged in R&D)	To promote market-oriented industrial research and experimental development through three types of projects: competitive, strategic and transformative (see Table 2-5)
ELKARTEK	Technology and scientific organisations	To fund collaborative research in the strategic priorities of the Industry Plan
EMAITEK INDUSTRIA HOBEA	Technology centres	Promoting R&D geared towards the Basque Country's industrial challenges
AZPITEK	Technology centres	Strengthening research infrastructure through the upgrading, acquisition and renewal of equipment
BASQUE DIGITAL INNOVATION HUB	Companies (particularly SMEs)	Connecting and facilitating access to smart industry assets and services for training, research, testing and validation
BIKAINTEK	Companies and technology stakeholders	Development of R&D projects, through the recruitment of PhD holders and the delivery of industrial PhD programmes
TKGUNE	SMEs and VETCs	To facilitate the two-way transfer of knowledge and technological innovation between vocational training centres and businesses
BASQUE TEK VENTURES	New technology-based business projects	To support and guide the creation of new technology-based (deep tech) start-ups underpinned by technologies generated by the science, technology and innovation (STI) ecosystem
BEACONS OF INNOVATION	Technology organisations, scientific organisations and businesses	To coordinate innovation policies and direct public resources towards shared strategic challenges, promoting public-private collaboration to strengthen scientific, technological and industrial capacity
IKUR STRATEGY	Scientific stakeholders	To position the Basque Country as an international hub of scientific excellence, through specific strategies in four priority areas: neurobiosciences; quantum technologies; neutron science; and supercomputing and AI

Source: Compiled by the authors based on information found on the websites of the Basque Government and SPRI.

1.3 Inspiring examples of technology and knowledge transfer

Other regions and countries are an important source of learning for our technology and knowledge transfer system, both passively —through observation and analysis— and actively, through collaborative relationships. In fact, last year's Competitiveness Report (Orkestra, 2025) highlights the need to strategically strengthen the Basque industry's international connections through the flow of people and knowledge.

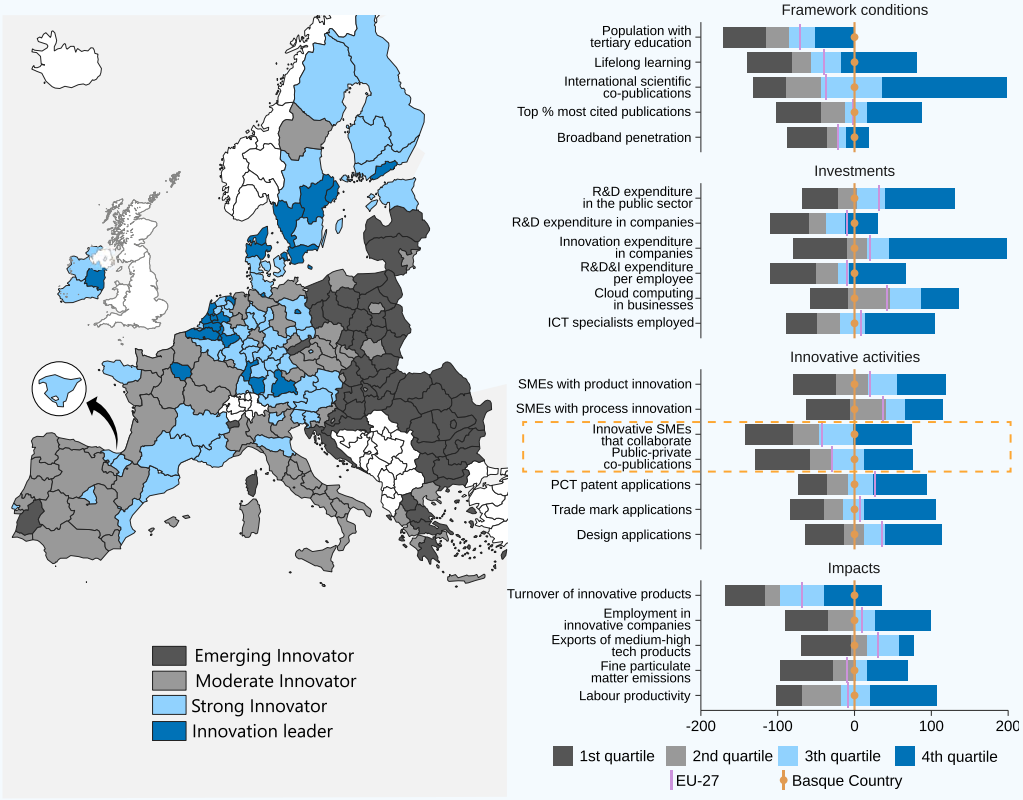
The Regional Innovation Scoreboard assesses the innovation performance of 230 European regions

A first step is to understand how the Basque Country is positioned in relation to other regions in terms of indicators that reflect different dimensions of the system's performance. The European Commission's Regional Innovation Scoreboard (RIS) enables a comparison of innovation performance with over 230 regions across more than 20 indicators. Box 1-1 explores the Basque Country's position in this index, delving deeper into the indicators relating to technology and knowledge transfer.

BOX 1-1: Technology transfer in the Basque Country according to the RIS

The RIS 2025 ranks the Basque Country above the European average, in the "Strong Innovator" category, and in a leading position within southern Europe. The RIS indicators are grouped into four categories: (i) framework conditions; (ii) investment; (iii) innovation activities; and (iv) impacts. The Basque Country clearly stands out in terms of framework conditions, whilst in investment, innovation activities and impacts it ranks closer to the European average, with greater variation in the ranking of each individual indicator.

THE BASQUE COUNTRY IN THE REGIONAL INNOVATION SCOREBOARD (EU-27 COUNTRIES, 2025)



Source: Compiled by the authors based on the Regional Innovation Scoreboard (European Commission, 2025).

Among the RIS indicators in which the Basque Country excels are those relating to technology transfer, specifically collaboration between businesses and the knowledge ecosystem (approximated by the European Commission using the indicators for public-private co-publications and SMEs collaborating on innovation). However, statistical analysis of a panel of data covering all regions between 2018 and 2025 suggests that the Basque Country's performance on these indicators cannot be understood in isolation from the provision of framework conditions and investment.

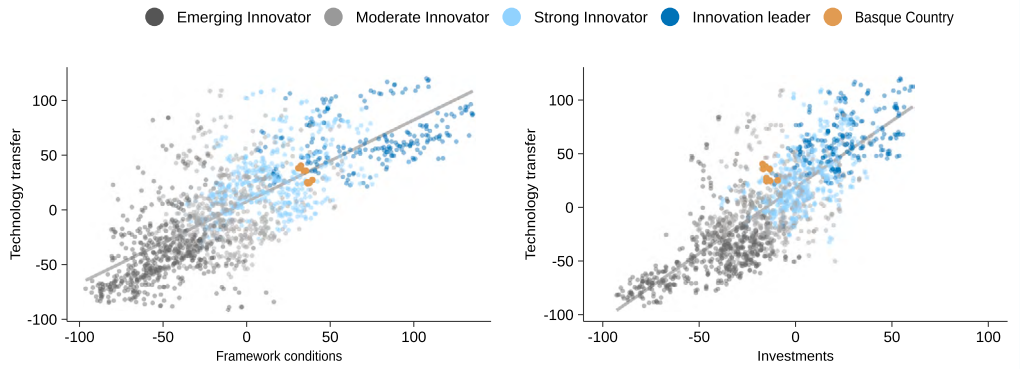
Firstly, the analysis shows that the indicators for framework conditions and investment together explain 69.1 per cent of the variance in technology transfer outcomes across European regions, with investment emerging as the main explanatory factor. This result is also evident when the two technology transfer indicators are considered separately.

Investment and framework conditions account for part of the Basque Country's outstanding performance in technology transfer

Basque cultural, social and institutional factors add value to technology transfer

Secondly, the analysis reveals the proportion of a region's innovation collaboration that does not stem from its initial endowment, but rather responds to other factors such as a collaborative culture, the efficiency of intermediation mechanisms or other unobserved elements. The graphs show that the Basque Country's technology transfer results exceed what its observed enabling factors would predict, particularly its level of investment. This finding reinforces the idea of a Basque model of technology transfer in which cultural, institutional and social aspects add value to the enabling factors.

RELATIONSHIPS BETWEEN TECHNOLOGY TRANSFER INDICATORS, FRAMEWORK CONDITIONS AND INVESTMENT IN THE RIS (2018-2025)



	Average collaboration of technology transfer indicators (I-3.2)	SMEs collaborating on innovation (I-3.2.1)	Public-private co-publications (I-3.2.2)
Framework conditions (FC)	0.376*** (0.038)	0.221*** (0.063)	0.531*** (0.040)
Investment (INV)	0.806*** (0.063)	0.858*** (0.109)	0.754*** (0.073)
Constant	−1.085 (4.592)	8.792 (8.281)	−10.962*** (4.225)
R^2	0.691	0.343	0.760

Note: The regressions presented have been controlled for fixed-effect year and standard errors by regional cluster. The analysis comprises 1,736 observations from the Region (217) – Year (2018–2025) panel. Standard errors are shown in brackets. Statistical significance is indicated by *** p < 0.01; ** p < 0.05; * p < 0.10.

Source: Compiled by the authors based on the Regional Innovation Scoreboard (2018–2025).

International learning requires the identification of comparable regions in terms of industrial structure and innovation

Beyond the comparative analysis of indicators and results, it is worth delving deeper into the experiences of other countries and regions to understand how their systems work in practice and to identify specific lessons relevant to the Basque Country. However, it is important to choose carefully where to look for inspiration. As a starting point, we have taken into account, as criteria for selecting comparable regions, a combination of: (i) regions that are "innovation leaders" or "strong innovators" in the RIS; (ii) regions with high rankings in the technology transfer indicators in the RIS; and (iii) regions with a level of employment similar to that of the Basque Country in high- and medium-high-technology sectors.

Based on the shortlist resulting from the application of these criteria, we have carried out a review of the available documentation and literature on two regions of particular interest in the Basque context: Flanders (Belgium) and Dresden (Germany).

The case of Flanders

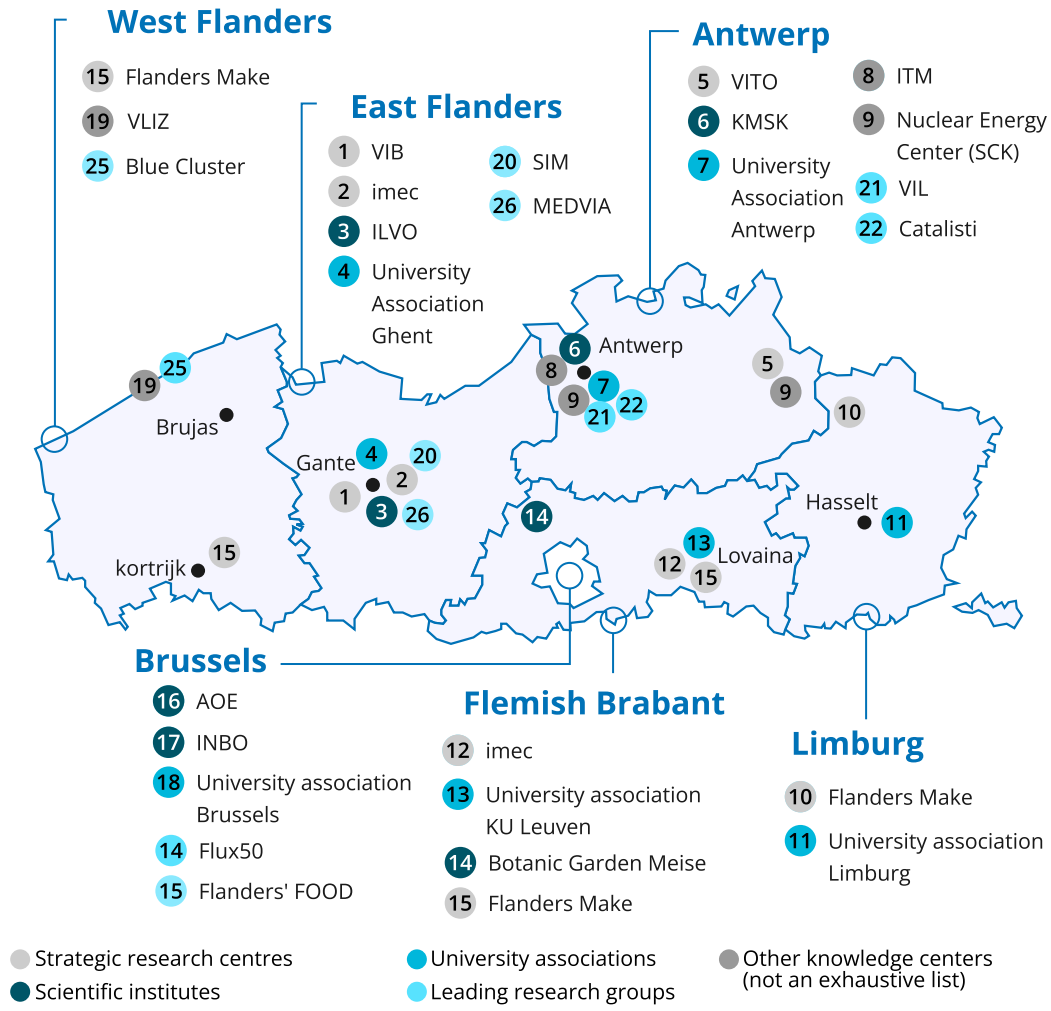
The region of Flanders, in Belgium, is positioned as a leader in innovation within the RIS. R&D intensity has stood at over 3 per cent of GDP since 2020, and the estimate for 2024 is 3.57 per cent (Statistics Flanders, 2025). One of Flanders' strengths is the significant proportion of companies —both SMEs and large firms— that invest in innovation, as well as the collaboration between innovative SMEs (European Commission, 2025; Centre for Research & Development Monitoring, 2024).

Flanders stands out as a European leader in innovation, with R&D investment exceeding 3.5 per cent

Flanders has an integrated ecosystem of government bodies, knowledge institutions, businesses and civil society, which has facilitated the development of significant capacity for knowledge and technology transfer (Figure 1-2). The cornerstone of the system is the collaboration between industrial players and knowledge institutions, which comprise:

- **university consortia**: across five regions, each with its own research centres and technology transfer offices (TTOs). The TTOs share a portal, TTO Flanders, which provides a central point of contact for businesses;
- **strategic research centres:** public research organisations such as imec (nanotechnology and digital technology), VIB (life sciences), VITO (clean technologies) and Flanders Make (Industry 5.0); and
- **scientific institutes and other centres of expertise** in specialised fields.

FIGURE 1-2 Map of research institutions and centres in Flanders



Source: Flanders Investment and Trade (2026).

The case of imec is an example of the close relationship between stakeholders in Flanders

The close working relationship between its research centres, inter-university strategies and the industrial sector —particularly through the promotion of start-ups and spin-offs— is illustrated by the case of imec (Interuniversity Microelectronics Centre), a key player in the nanoelectronics and technology sector, with the following characteristics:[14]

- it employs more than 5,000 people from over 100 countries and collaborates with more than 600 world-leading industrial partners;
- it hosts approximately 850 PhD students from a wide range of international universities;
- it runs an accelerator programme (imec.istart) which offers pre-seed funding and personalised support, and which has contributed to the creation of more than 300 technology start-ups, many of which operate internationally (born international);

[14] Information from its website (https://www.imec-int.com/en) and from DeDecker and Loiseau (2025).

- it has an independent venture capital fund (imec.xpand) with approximately 420 million euros available for investment in semiconductor and deep tech start-ups; and
- it has generated more than 120 spin-offs involving researchers, technology transfer staff and senior managers.

Under an open innovation model, imec promotes pre-competitive collaborative research, bringing together stakeholders across the entire value chain to share R&D infrastructure and knowledge, as well as the associated costs and risks. The main avenues for collaboration are: (i) collaborative pre-competitive research; (ii) bilateral research, involving R&D contracts between imec and private organisations; and (iii) publicly funded research. Contracts with private entities generate the bulk of the centre's total funding, but public funds are crucial for financing fundamental research, building high-value intellectual property and ensuring that the economic and social returns flow directly back into the region (Schneider, 2026).

The Flemish government promotes technology transfer through financial support, tax incentives and talent recruitment

The Flemish Government plays an important role, both directly and indirectly, in technology and knowledge transfer. Various policy instruments are deployed by the Department of Economy, Science and Innovation and its agencies. Public funding is available to the various stakeholders (companies, research centres, individuals, service providers, non-profit organisations) involved in innovation. These funds are used to support, amongst other things, innovative start-ups, collaborative research projects, business R&D projects, R&D feasibility studies, co-funding for international projects, living labs, and scholarships for PhD and postdoctoral students (Department of Economy, Science and Innovation, 2024). In addition, the government offers tax incentives, for example, for the development of patents. Another initiative has been the development of programmes such as Odysseus, Methusalem and Baekeland to attract talent and promote mobility in the field of research within the region.

The case of Dresden

The German region of Dresden promoted its innovative model until it established the Silicon Saxony cluster

Dresden, situated in the federal state of Saxony (Germany), has a long-standing tradition in manufacturing industries, particularly in electronics and mechanical engineering. According to the RIS, Dresden's relative strengths lie in international scientific co-publications, public expenditure on R&D, and collaboration between innovative SMEs and other organisations (European Commission, 2025).[15]

In the early 1990s, a lack of resources following reunification spurred cooperation between regional stakeholders. The Saxony state government drew up technology policy guidelines aimed at modernising the R&D infrastructure, improving technology-oriented economic structures and stimulating R&D expenditure by companies and research centres. Today, the region is home to the microelectronics cluster known internationally as Silicon Saxony, where some of the world's largest semiconductor manufacturing plants are located (Broll and Roldán-Ponce, 2011). There is a regional culture characterised by a high intensity of interaction and knowledge flows, which explain the region's productivity in terms of patents and industrial innovations.

[15] Furthermore, a study of various regional case studies in Germany notes that, in the case of Dresden, private companies are particularly involved in publicly funded R&D collaborations (Fritsch *et al.*, 2020).

Dresden's innovation ecosystem is underpinned by institutional density and public-private collaboration

Dresden's innovation system is characterised by high institutional density and close collaboration between universities, non-university research institutes and industry. Indeed, one objective of public policy has been to foster the creation of networks between public and private R&D units to unlock synergies for the benefit of the state's economic development (Röhl, 2000).

The Technical University of Dresden (TU Dresden) plays a central role in the system. It acts as an intermediary in networks of co-patents, co-authored research publications and joint projects, establishing connections through these knowledge-transfer links (Fritsch & Graf, 2011; Fritsch et al., 2020). In fact, it ranks among the leading universities in Germany in terms of patent applications (including co-patents) and the exploitation of intellectual property through patents and other rights (Saxon State Ministry for Economic Affairs, Labour, Energy and Climate Protection, 2025).

As an evolution of its technology transfer office, TU Dresden operates the Centre of Excellence for Innovation, Transfer and Entrepreneurship (TU EXCITE), funded by the Federal Ministry of Research, Technology and Space and the State of Saxony. Its focus is on accelerating the industrial adoption of university innovations, supporting SMEs in R&D activities, and facilitating collaborations between academic staff and external partner organisations regarding the commercialisation of intellectual property rights, the creation of spin-offs, and the negotiation of contracts and licensing agreements.

The DRESDEN-concept drives research through shared infrastructure, a common strategy and the attraction of talent

Another notable initiative is the DRESDEN-concept research alliance (Dresden Research and Education Synergies for the Development of Excellence and Novelty), established in 2010 by TU Dresden in collaboration with cultural and non-university research institutions. The alliance, which has grown from 15 founding partner organisations to 47 today, enables the coordination of strategic research priorities, the shared use of sustainable infrastructure, the reduction of administrative burdens and the joint attraction of international talent.

Dresden is also home to a concentration of prestigious non-university institutes and specialised research centres such as Fraunhofer (11 institutes), Max Planck (3 institutes), the Leibniz Institute for Solid State and Materials Research (IFW Dresden) and the Helmholtz-Zentrum Dresden-Rossendorf (HZDR). These institutes collaborate with various academic departments at TU Dresden and DRESDEN-concept, as well as with industry partners, thereby enabling companies to outsource costly research, reducing the financial risk associated with new product development and lowering R&D costs.

Another key regional player working closely with TU Dresden on technology transfer and to enhance opportunities for spin-offs is the Dresden Technology Centre, established in 1991 jointly by the city, the university and the Dortmund Technology Centre.

The Basque Country's similarities with Flanders and differences with Dresden provide valuable lessons

Lessons for the Basque Country from the cases of Flanders and Dresden

This brief analysis of the experiences of Flanders and Dresden reveals, on the one hand, significant similarities between the systems in Flanders and the Basque Country, both in terms of the roles of the main stakeholders and the mix of policies supporting the ecosystem as a whole. On the other hand, the Dresden sys-

tem, centred on a leading university and the presence of prestigious federal state institutes, is quite different from the Basque system. However, both offer experiences from which valuable potential lessons can be drawn for the Basque Country (Table 1-7).

TABLE 1-7 Key learning points for the Basque Country from the experiences of Flanders and Dresden

Flanders	Dresden
An integrated R&D ecosystem: comprising various institutions (academic and non-academic) specialising in technological areas aligned with industrial sectors; there is a high degree of alignment between the institutions and the needs of the economy and society. Universities form part of the fundamental R&D structure, with strong links between them and with other research/knowledge organisations and industry. **International connections:** a strong emphasis on international positioning through scientific cooperation agreements, 'big science' programmes, funding for start-ups to access European markets, and talent mobility programmes, amongst others. **Various sources of funding supporting technology transfer:** stable public funds, competitive Flemish and European funds, and revenue from contracts with private companies. Venture capital instruments (such as imec.xpand) play a key role in enabling spin-offs and start-ups to grow competitively. **Ability to attract talent:** the Flemish model demonstrates that attracting and integrating PhD/postdoctoral students and international research staff is a powerful mechanism for accelerating the transfer of knowledge to industry.	**Inter-institutional strategic alliances (DRESDEN-concept model):** this illustrates the value of establishing formal alliances between universities within the system and applied research centres (such as those within the BRTA) to share unique scientific infrastructure, coordinate talent recruitment and strengthen dialogue with industry. **The university as a broker and integrator:** an example of a model that equips regional universities with advanced technology transfer and entrepreneurship frameworks (such as TU EXCITE), capable of acting as active connectors between basic research, patent management and the technological needs of SMEs. **Funded collaborative projects as a driving force for SMEs:** this reaffirms the key role of public collaborative R&D programmes (equivalent to initiatives such as Hazitek or Elkartek in the Basque Country) in systematically integrating private companies into regional knowledge and innovation networks. **Long-term alignment and sectoral specialisation:** this illustrates the effectiveness of maintaining a consistent policy focus over time, aligning university education and research capacity with the needs of leading industrial clusters (Silicon Saxony).

Source: Compiled by the authors.

To conclude this section, Box 1-2 describes another widely cited international example of particular relevance to mechanisms for collaborative research transfer and the flow of people: the UK's Knowledge Transfer Partnerships programme.

BOX 1-2: Knowledge Transfer Partnerships (United Kingdom)

Between 2010 and 2020, KTP projects generated over 2,000 million pounds sterling

The regions of the UK are listed as leading or strong innovators in the RIS 2025. One programme operating across the UK to promote and facilitate knowledge transfer and innovation is the Knowledge Transfer Partnership (KTP). It currently supports around 800 businesses, 100 knowledge organisations and more than 850 university graduates. It is estimated that, between 2010 and 2020, KTP projects generated over 2 billion pounds for the UK economy.[16]

What is a KTP?

It is a three-way partnership between a business (a company or a not-for-profit organisation registered in the UK), a knowledge organisation (a university, higher education institution, research and technology organisation, or a Catapult centre[17] with advanced R&D facilities) and an associate. Although this individual —a recent university graduate or postgraduate with the ability to lead a strategic project— is employed by the knowledge organisation, they carry out their work at the business. Over a period of between 12 and 36 months, the Knowledge Transfer Partner helps the business to develop and implement a strategic project using innovative solutions and specialist knowledge. A KTP project receives funding of between 80,000 and 100,000 pounds per year.

How is a KTP funded?

KTP projects are partially funded by a grant from the public agency Innovate UK and other public bodies. The company covers the remainder of the project costs. This amount covers the costs of consumables for the project (e.g. equipment), training and development, the associate's salary, access to the university's specialist knowledge, as well as travel and subsistence expenses. For SMEs, the grant covers 67 per cent of the project cost, whilst for large companies it covers 50 per cent. In addition, 10 per cent of the academic team's involvement in the project is funded.

Key elements of the KTP programme

1. To facilitate links between businesses and expert academic staff to tackle strategic innovation challenges and generate economic, social or environmental outcomes.
2. To boost the competitiveness, productivity and capabilities of businesses through knowledge transfer, by harnessing the expertise and technologies of the UK's scientific ecosystem. This particularly benefits SMEs, which often lack the resources or capacity needed to develop and adopt new knowledge and technologies.
3. To generate new material, whether applied or validated, for research and teaching.
4. To develop talent through joint supervision by experts from the academic and business sectors, providing valuable practical experience for research associates in applied research, experimental development and industry-related activities, thereby enhancing their skills and employability.

[16] See: https://iuk-ktp.org.uk/discover/.
[17] Catapult centres are non-profit technology and innovation centres established by the public agency Innovate UK to bridge the gap between academic research and the business sector.

1.4 Summary

This first chapter lays the conceptual foundations, provides a territorial characterisation and sets out the international context of the Basque technology and knowledge transfer system.

Technology and knowledge transfer is a critical driver of competitiveness for well-being, as it channels the flows of knowledge generated within the region (and with actors outside the region) towards outcomes in innovation, entrepreneurship and economic and business performance. Conceiving innovation as a systemic and interactive process, transfer is organised through six broad categories of channels: (i) R&D, knowledge, infrastructure and technological services; (ii) productive, commercial and value-chain relationships; (iii) intangible assets, intellectual property and technology rights; (iv) people, mobility and skills; (v) entrepreneurship and organisational creation; (vi) networks, interaction and dissemination. The main justification for public interventions to support knowledge transfer activities relates to the existence of market inefficiencies, systemic problems or transformative failures that affect the smooth functioning of these channels.

The Basque technology and knowledge transfer system conceptualised in this report seeks to steer knowledge generation within the science, technology and innovation ecosystem towards the consolidation of viable business projects that transform industry, supported by enabling agents such as BICs and organisations that drive clusters. It is underpinned by the interaction between technological actors (technology centres, sectoral centres and corporate R&D units), scientific actors (universities, BERC, CIC and IIS) and educational actors (notably vocational training, through the TKgune programme). The system as a whole is driven by transformative projects and 'beacons of innovation', amongst other initiatives, and receives cross-cutting support from public administrations through a wide range of policy instruments.

In an **international context**, the Basque Country is classified as a "Strong Innovator" in the Regional Innovation Scoreboard (RIS) and achieves results that exceed those predicted on the basis of its underlying conditions and levels of investment, which demonstrates the added value of its cultural and institutional capabilities. Beyond the comparative analysis of indicators, it is worthwhile to study the experiences of other countries and regions in order to identify specific lessons relevant to the Basque Country. In this regard, the chapter concludes by drawing lessons from two benchmark ecosystems: Flanders, for its comprehensive ecosystem and success in open innovation, acceleration and venture capital funds; and Dresden, for the strength of its university as a broker and its inter-institutional partnerships for sharing infrastructure and driving SME growth.

2
An overview of the Basque system for technology and knowledge transfer

This chapter provides an overview of the Basque technology and knowledge transfer system

Whilst the previous chapter placed the Basque system for technology and knowledge transfer in an international context and explained why it is critical for competitiveness, this chapter delves deeper into its characteristics and specific features:

- Firstly, we outline the resources that the Basque Country allocates to R&D, their intensity, their distribution, and their sources of funding, paying particular attention to the distinctive role of technology centres (CCTT) and cooperative research centres (CIC).
- Next, we analyse how this R&D effort translates into innovative activity by Basque firms, distinguishing between product and process innovation and exploring how this varies according to firm characteristics such as size and sector.
- Thirdly, we examine how knowledge flows between actors through collaboration on innovation, focusing on the intensity of this collaboration and the profile of the partners with whom Basque firms cooperate.
- Fourthly, we review the public instruments that foster such collaboration, including platforms relevant to the Basque Country at national level and those with a European dimension.
- Finally, we conclude the chapter with patterns of scientific publications and patents, and the presence of industry-academia collaboration within them, which enable us to assess the extent to which efforts in technology and knowledge transfer are reflected in these indicators.

2.1 Resources allocated to R&D

Investment in R&D is essential for innovation, but it is not sufficient on its own

A region's capacity to generate and transfer knowledge to the productive sector depends, to a large extent, on the strength of its research and development system. In this regard, investment in R&D is a necessary condition for the generation of scientific and technological capabilities that can be transferred; however, it is insufficient on its own to guarantee their effective commercialisation. Therefore, characterising the R&D environment requires analysing not only the intensity of the resources allocated to these activities, but also how their implementation is distributed amongst the various actors that make up the ecosystem, and what sources underpin its funding. These elements make it possible to identify

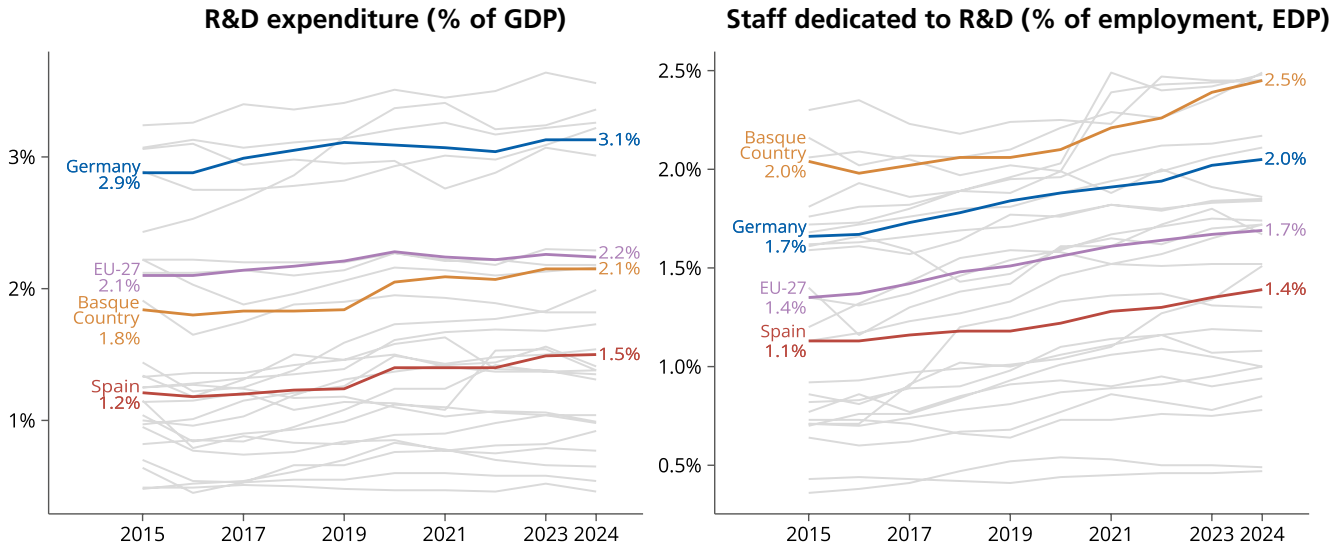
the structural capabilities of the Basque innovation system and to understand the foundations upon which transfer processes are developed.

R&D effort: expenditure and personnel

A region's R&D effort can be measured across two complementary dimensions: (i) in monetary terms, through R&D expenditure; and (ii) in terms of personnel engaged in R&D.[18] Chart 2-1 shows how the Basque Country's position on both resource indicators is significantly higher than that of Spain as a whole, whilst also displaying an upward trend over time. According to the latest figures, R&D expenditure in the Basque Country accounts for 2.1 per cent of GDP, placing it practically on a par with the EU-27, although below the 3 per cent target set by the EU.[19] However, where the Basque Country really stands out is in the number of people engaged in R&D activities, which accounts for 2.5 per cent of total employment, placing it well above the EU-27 average.[20]

R&D expenditure is on a par with the EU-27 (2.1 per cent) and stands out in terms of staff numbers (2.5 per cent)

CHART 2-1 Resources allocated to R&D in the Basque Country, EU countries and the EU-27



Note: The results for the 27 EU countries are shown in grey shading.

Source: Eustat and Eurostat.

The results can be analysed in greater depth through disaggregations, indicators and ratios applied to the data, such as those included in Table 2-1. The average expenditure per person engaged in R&D is of particular interest for understanding striking a balance between the resources available for research and the staff involved in it. In the Basque Country, this stands at 86,600 euros, a figure higher than

[18] In this context, it is important to take into account staff on a full-time equivalent (FTE) basis.

[19] Only the countries of Northern Europe have achieved this target (Germany, Austria, Belgium, Finland and Sweden recorded expenditure of between 3.0% and 3.6% of GDP in 2024).

[20] It is worth qualifying this comparison with national averages, however. Given that R&D tends to be geographically concentrated within each country, it is more accurate to compare the Basque Country's figures with those of regions of a similar size and industrial profile rather than with those of the countries as a whole. Regions with industrial and technological specialisation similar to that of the Basque Country generally also tend to rank above the average for their respective countries (Navarro, 2021).

the Spanish average (81,000 euros), but significantly lower than the European average (118,900 euros) and, in particular, that of European leaders in R&D expenditure such as Germany (161,500 euros).

Staff remuneration and capital investment are below the EU-27 average

Staff remuneration accounts for 47.2 per cent of R&D expenditure in the Basque Country, well below the comparable regions, which hover around 60 per cent; a difference that widens in absolute terms (40,900 euros per person engaged in R&D in the Basque Country, compared with 69,400 euros in the EU-27). This finding also contrasts with the high number of staff engaged in R&D in the Basque Country noted earlier. Furthermore, the ratio of capital investment to total R&D expenditure in the Basque Country (7.9 per cent in 2024) is the lowest of the four territories compared, although it is also the one that has grown the most since 2015. Thus, both staff remuneration and capital investment —which encompasses the acquisition of equipment, machinery, facilities and software— lag behind the European average, and this may act as a constraint on the competitive development of R&D.

The growing importance of the research profile reflects the higher calibre of the Basque R&D system

The composition of R&D staff shows a marked increase in the proportion of researchers (compared to technicians and assistants) in the Basque Country, rising from 66.4 per cent in 2015 to 70.9 per cent in 2024. This figure is also higher than that for Spain (62.4 per cent), the EU-27 (65.2 per cent) and Germany (61.1 per cent) in the last year. This greater and growing relative proportion of research staff can be interpreted as a sign of the increasing calibre of the Basque R&D system.

TABLE 2-1 Additional indicators on resources allocated to R&D in the Basque Country, EU countries and the EU-27 average

Territory	Expenditure on R&D personnel in R&D per FTE (€)		Employee remuneration / Total R&D expenditure		Capital investment in R&D / Total R&D expenditure		Ratio of researchers (as a proportion of total R&D staff at EDP)	
	2015	2024	2015	2024*	2015	2024*	2015	2024
Basque Country	69 890	**86 612**	46.3%	**47.2%**	6.5%	**7.9%**	66.4%	**70.9%**
Spain	65 576	**81 041**	62.4%	**59.9%**	8.5%	**8.4%**	61.0%	**62.4%**
Germany	138 609	**161 450**	59.8%	**61.3%**	8.7%	**8.5%**	60.6%	**61.1%**
EU-27	104 429	**118 918**	58.9%	**58.4%**	9.4%	**9.7%**	63.2%	**65.2%**

Note: (*) Data for Spain, Germany and the EU-27 for 2023, the latest year for which figures are available.

Source: Eustat and Eurostat.

Having examined the resources allocated to R&D, Table 2-2 provides a more detailed insight into the structure of this expenditure, analysing how it is distributed according to the institutional sector carrying out the R&D expenditure. In the case of the Basque Country, the data highlight the significant importance of the business sector, which accounts for expenditure equivalent to 1.6 per cent of GDP.[21]

[21] The statistics classify technology centres (CCTT) and cooperative research centres (CIC) within the business sector, which partly explains the high figures for this institutional sector in the Basque Country, as analysed in greater depth below.

This places the business sector's contribution slightly above the EU-27 average (1.5 per cent of GDP), but still below that of Germany (2.2 per cent of GDP). Business expenditure on R&D in the Basque Country thus accounts for 76 per cent of total expenditure, whilst higher education contributes 17 per cent and the public sector 7 per cent.

Business expenditure on R&D, which includes CCTT and CIC, accounts for 76 per cent of total expenditure

It should be noted that, due to the methodology employed by the statistical bodies, the CCTTs and CICs in the Basque Country are classified within the institutional sector of enterprises, unlike in other regions where scientific and technological bodies are classified within the public administration.[22] These entities, which specialise in the generation, development and transfer of knowledge, play a significant role in the Basque innovation ecosystem, the result of a unique commitment by the Basque authorities, as opposed to the development of university research or public research centres.[23] This statistical peculiarity partly explains why the business sector stands out as the main driver of Basque R&D, as will be seen later. If the CCTTs and CICs are excluded, business expenditure falls to 1.2 per cent of GDP, below the EU-27 average, and its share of total R&D expenditure drops to 57 per cent.

TABLE 2-2 R&D expenditure by sector of implementation (2024, % of GDP and % of total)

Region	Total	Businesses	Public Administration	Higher Education
Basque Country	**2.1**	1.6 (76%)	0.1 (7%)	0.4 (17%)
Spain	**1.5**	0.8 (56%)	0.3 (19%)	0.4 (25%)
Germany	**3.1**	2.2 (71%)	0.4 (12%)	0.6 (18%)
EU-27	**2.2**	1.5 (68%)	0.2 (11%)	0.5 (21%)

Note: Figures and percentages may not add up to the exact total due to rounding.

Source: Eustat and Eurostat.

The characterisation of the R&D system is completed by analysing the origin of the resources that fund these activities. Chart 2-2 shows the distribution of R&D expenditure by funding source and sector of implementation. Taking R&D activity as a whole, funding from businesses constitutes the main source of resources (56 per cent of the total in the Basque Country), at a level similar to the EU-27 average (58 per cent), notably higher than in Spain (48 per cent) and lower than in Germany (63 per cent). Virtually all the resources funded by businesses are allocated to the business sector itself, although in the Basque Country a significant proportion (8 percentage points) is directed towards technology centres (CCTT) and the Basque Research Council (CIC). The proportion allocated to higher education and the public administration is small.

Virtually all the resources funded by businesses are allocated to the business sector itself

[22] This classification is based on the criteria of being governed by private law and being market-dependent (OECD Frascati Manual). This criterion differs from that of other European transfer models, such as the German one, where the Fraunhofer-Gesellschaft centres, despite having a similar private legal structure, are statistically classified within the general government sector due to their high level of core funding and institutional control by the State.

[23] See Sanz-Menéndez and Cruz-Castro (2005) and Magro and Navarro (2013).

Public funding of business R&D expenditure is higher than the European average

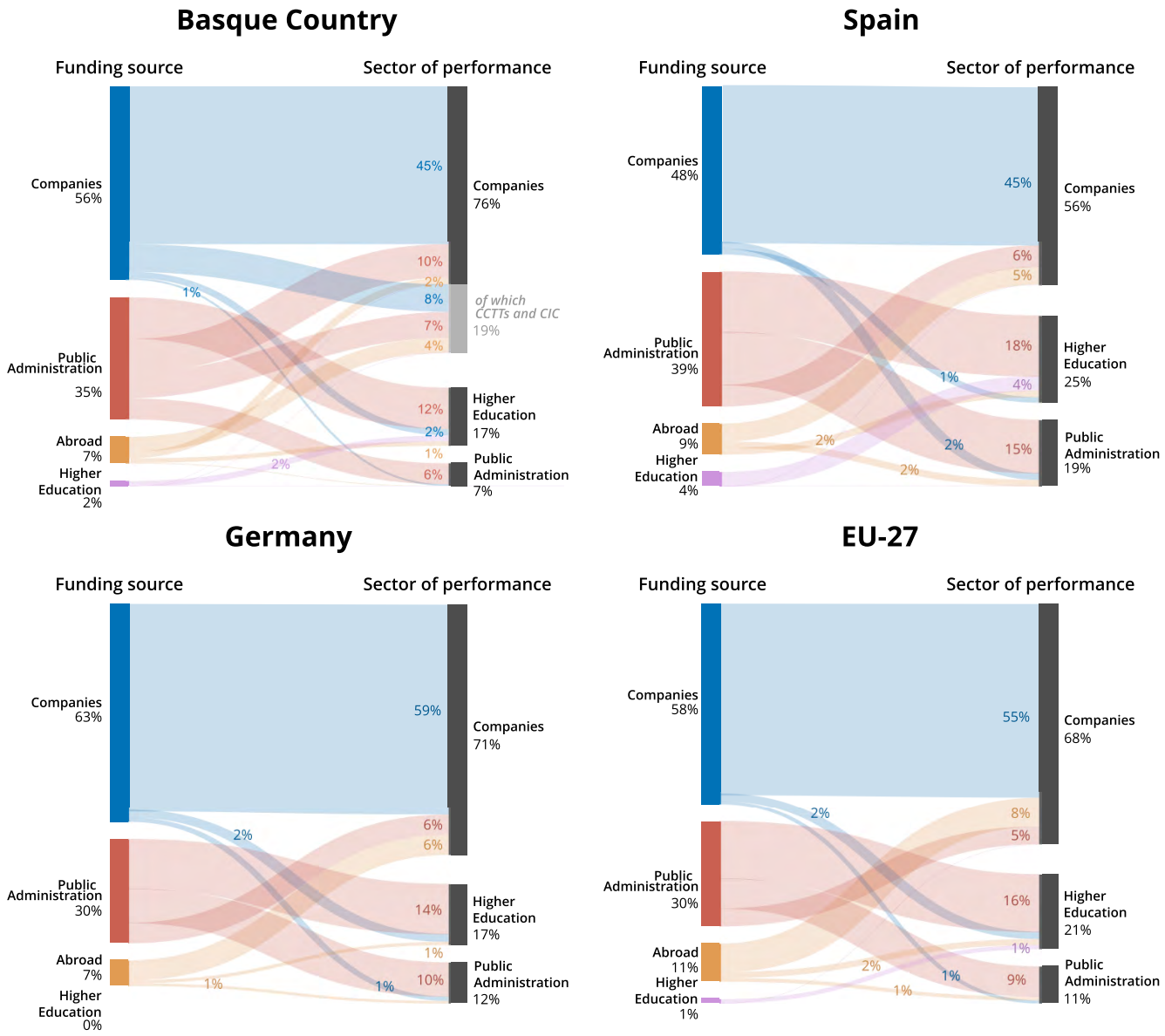
The public sector plays a much greater role as a funder than as a performer of R&D, as it funds almost all of the R&D expenditure in the higher education and part of the funding allocated to the business sector. Whilst this pattern is observed across all the territories analysed, the Basque Country presents certain distinctive features. These do not lie so much in the volume of funding (35 per cent of the total, higher than the 30 per cent for the EU-27 and Germany, although lower than Spain's 39 per cent), but rather in how it is allocated. Nearly half of this funding (17 percentage points) is directed towards the business sector, compared with 5-6 percentage points in the other regions. Of this, 7 percentage points correspond to public research centres (CCTTs and CICs) and 10 to businesses themselves; consequently, even excluding these centres, public support for Basque businesses is almost double that of the comparable regions.

Scientific and technological organisations attract a significant share of public R&D funding

These results can be attributed both to the region's innovation model and to the statistical peculiarity of the CCTTs and CICs mentioned above. The Basque Country does not have a large public research organisation of its own, which explains the low proportion of public administration as a funding body (7 per cent, compared with 12 per cent and 11 per cent in Germany and the EU-27); this role is largely fulfilled by the CCTTs and CICs. However, the source of their funding sets them apart from the public sector profile of other regions, where public research centres are integrated. The CCTTs and CICs obtain a significant proportion of their funding from businesses, a marginal source in the public sector of other regions. This feature is examined in greater detail below and is partly due to the design of public programmes, as will be seen in section 2.4.

Finally, higher education plays a relatively minor role in funding R&D expenditure. By contrast, funding from other countries accounts for 8 per cent of R&D expenditure in the Basque Country (below the EU average, but similar to that of Germany), and is mainly received by public research centres and the CIC (unlike in the other territories under comparison, where companies receive the bulk of foreign funding).

CHART 2-2 Funding of R&D expenditure by sector of implementation (2024, % of total)



Note: Data from 2023 are used for Germany and the EU-27, as this is the most recent year for which disaggregated data are available from Eurostat.

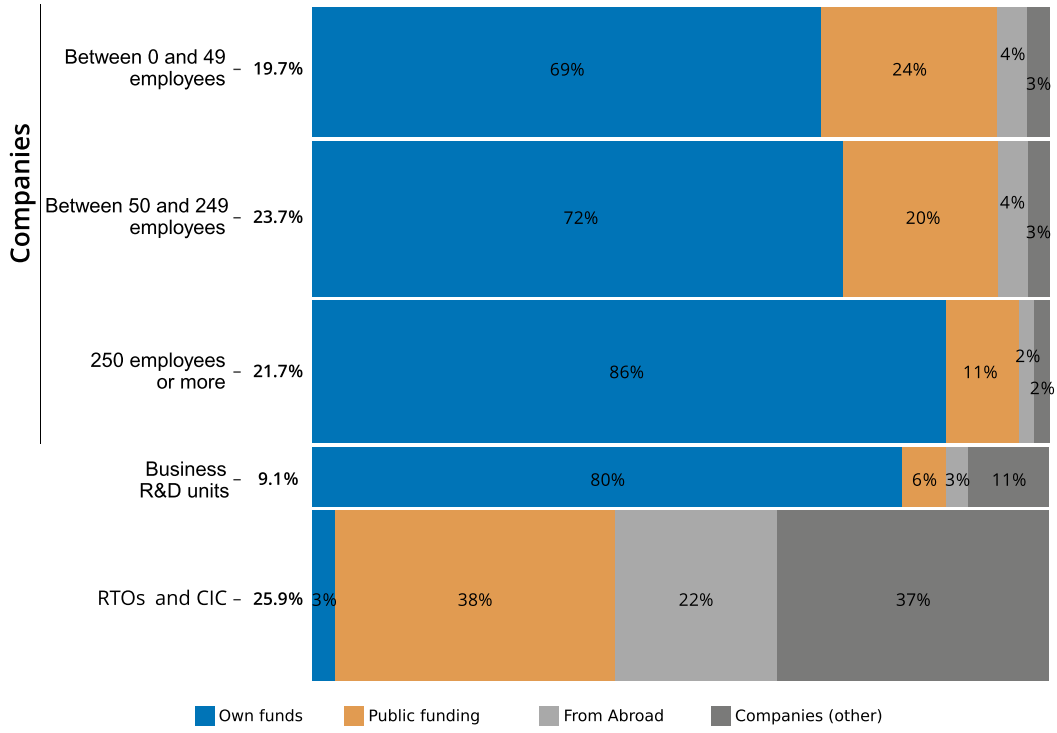
Source: Eustat, INE and Eurostat.

The business sector as a key pillar of the Basque R&D system

As we have seen, the business sector constitutes a central pillar of the Basque R&D system, as it accounts for the largest share of R&D expenditure and is its main source of funding, and because the aggregate data show that it attracts a disproportionate amount of public funding. Consequently, this section analyses the disaggregated data on R&D expenditure to examine how research activity is distributed amongst the different types of actors that make up the business sector. Particular attention is paid to public research centres (CCTTs) and public research institutes (CICs), whose significance and distinct funding model help to explain many of the specific features identified in the previous section.

As shown in Chart 2-3, 25.9 per cent of R&D expenditure in the business sector is carried out by technology centres (CCTT) and the Spanish National Research Council (CIC). These are followed, in descending order of share, by enterprises with 50 to 249 employees (23.7 per cent), those with 250 or more (21.7 per cent) and those with fewer than 50 (19.7 per cent). Business R&D units, the other category of specialised agent, account for 9.1 per cent.

CHART 2-3 Distribution of R&D expenditure in the business sector of the Basque Country by type of agent and employment bracket (2024, % of total)



Source: Eustat.

The central role of scientific and technological actors is evident in their financial structure

The funding model is the feature that most distinguishes public research centres (CCTTs) and public research institutes (CICs) from other players in the business sector. For these organisations, own funds account for a small proportion of internal R&D expenditure (3 per cent), whilst funding from the public sector amounts to 38 per cent, from other companies 37 per cent, and from abroad 22 per cent. This structure reflects, in financial terms, their role as key players in technology and knowledge transfer, with their activities based on collaboration with companies, public support and the attraction of foreign funding. Thus, funding from other companies reflects the real demand for knowledge and technology from the business sector, whilst both public and foreign funding represent institutional and international support for their activities.

By contrast, Basque companies finance the majority of their R&D activities from their own resources. It is worth noting the inverse relationship between company size and public funding, a pattern that is largely due to European regulations on R&D aid, which allow for higher aid intensities the smaller the company is.[24] However, pub-

[24] The General Block Exemption Regulation (Regulation (EU) No 651/2014) sets a maximum aid intensity for companies, which may be increased for medium-sized enterprises and, to a greater extent, for small enterprises.

lic funding of R&D carried out by Basque enterprises —excluding technology centres (CCTT) and cooperative research centres (CIC)— remains higher than that of comparable countries: 24 per cent of expenditure incurred by enterprises with 0 to 49 employees, falling to 20 per cent for those with 50 to 249 employees and to 11 per cent for those with 250 or more employees; these figures exceed, across all size categories, the EU-27 and German averages (both around 8 per cent).

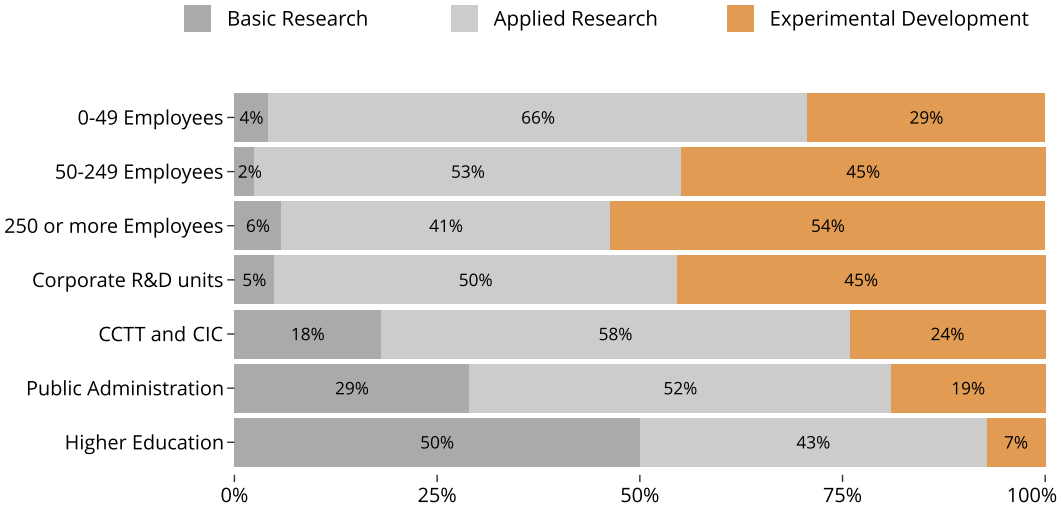
Types of research: basic, applied and experimental

Three types of research are distinguished: basic, applied and technological development

Another important factor in characterising the system's capacity for knowledge transfer is the type of research carried out (Chart 2-4). We distinguish three categories here: i) basic research, focused on generating knowledge about observable phenomena and facts without a specific application; ii) applied research, aimed at addressing a specific practical objective based on the knowledge generated; and iii) experimental development (or technological development), which builds on existing knowledge to produce new materials, products, devices or processes.

These three activities thus form a continuum ranging from the generation of knowledge furthest removed from the market to its most immediate productive application.

CHART 2-4 R&D expenditure by type of research (2024)



Source: Eustat.

SMEs prioritise applied research, whilst large companies lead the way in experimental development

Virtually all R&D expenditure in the business sector is concentrated on applied research and experimental development, although its distribution varies significantly depending on the size of the company. Applied research accounts for 66.5 per cent of expenditure in small enterprises, a figure that falls to 40.6 per cent in large enterprises. Experimental development follows the opposite pattern, with its share rising from 29.3 per cent in small enterprises to 53.6 per cent in large enterprises. Business R&D units show a similar pattern to the enterprises themselves, with barely 4.9 per cent allocated to basic research and a fairly balanced distribution between applied research (49.7 per cent) and experimental development (45.4 per cent).

This reflects the specific profile of the business sector, which is geared towards the stages of the knowledge-generation chain that are closest to the market. However,

the fact that the smaller the company, the more applied research it carries out at the expense of experimental development suggests that SMEs undertake R&D more to increase their absorption capacity and opportunities for interaction with R&D&I stakeholders, rather than to develop their technological capabilities.

The CCTTs and CICs allocate 18.1 per cent of their expenditure to basic research

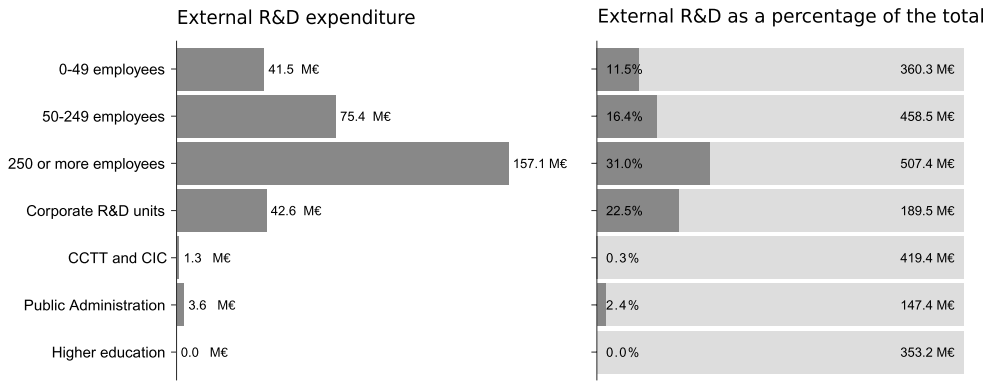
The CCTTs and CICs, however, have a distinctly different profile. 18.1 per cent of their expenditure is allocated to basic research (driven in particular by the CICs). This greater emphasis on basic research is mainly offset by a lower proportion of experimental development, which accounts for 24.1 per cent. This focus on the earlier stages of research, which is closer to the profile of public administrations and higher education, places the CCTTs and CICs in an intermediate position within the knowledge-generation chain, and reinforces their role as bridge-building agents between the most basic research and its application within the business sector.

External R&D expenditure

Companies account for 98.9 per cent of external R&D expenditure, and their R&D intensity increases with company size

To conclude the section on contextualising the R&D environment, it is worth considering the procurement of R&D from third parties (external R&D expenditure), which in 2024 amounted to 321.5 million euros in the Basque Country, equivalent to 13.1 per cent of total expenditure (internal and external) (Chart 2-5). This activity is concentrated almost entirely in the business sector, which accounts for 98.9 per cent of external R&D expenditure. Within the business sector, the intensity of R&D procurement increases significantly with company size: it rises from 13 per cent of internal R&D expenditure in small enterprises to 44.8 per cent in large ones. Public research centres (CCTTs) and public research institutes (CICs), by contrast, make very little use of external R&D.

CHART 2-5 Distribution of external R&D expenditure by type of organisation (2024)



Source: Eustat.

This overview of the Basque R&D system is supplemented in Box 2-1 by an analysis of the specific characteristics of cooperative enterprises, a particularly significant group of enterprises within the Basque economy.

BOX 2-1: Technology and knowledge transfer in cooperative enterprises

This box focuses on cooperative enterprises, a specific type of organisation within the Basque productive fabric. Identified via KoopBehatokia (www.koopbehatokia.eus), they exhibit a distinct pattern in the development of R&D capabilities. They stand out for their greater frequency and intensity of R&D activities, as well as greater collaboration to complement their internal R&D and innovation capabilities.

A greater propensity to carry out R&D than other enterprises

In 2024, 5.7 per cent of Basque cooperatives carried out R&D activities, compared with 1.0 per cent of non-cooperative enterprises. Although part of this difference is due to their larger average size, within each employment bracket the propensity of cooperatives to conduct research remains between 1.4 and 1.9 times higher than that of other enterprises.

R&D activity in cooperatives is between 1.4 and 1.9 times higher than in other companies

This greater propensity translates into a more intensive research effort: in 2024, R&D expenditure accounted for 2.7 per cent of cooperatives' turnover, compared with 1.8 per cent for non-cooperatives. Even when public research centres (CCTTs) and public research institutes (CICs) are excluded, the intensity remains 1.5 times higher (2.0 per cent versus 1.3 per cent), and the difference persists when corporate R&D units are also excluded. This greater commitment is, therefore, a characteristic of the cooperative productive fabric itself.

Thus, although cooperatives account for only 7.2 per cent of enterprises engaged in R&D in the Basque Country, they account for 13.4 per cent of R&D expenditure and 13.9 per cent of research staff – a share of expenditure and research staff that is clearly higher than would be expected given their number of enterprises.

INCIDENCE OF R&D BY EMPLOYMENT BRACKET IN THE BASQUE COUNTRY (COMPANIES ENGAGED IN R&D / TOTAL COMPANIES, 2024)

Employment bracket	Cooperatives (%)	Non-cooperatives (%)	Ratio
0-9 employees	0.5	0.3	1.9x
10-49 employees	12.5	7.5	1.7x
≥50 employees	39.2	27.7	1.4x
Total	5.7	1.0	5.6x

Source: Compiled by the authors based on Eustat data.

Greater stability in research

Cooperative R&D also stands out for its continuity over time: in 2024, 87.6 per cent of cooperatives engaged in R&D carried out such activities systematically (92 out of 105), compared with 80.4 per cent of non-cooperatives (1,088 out of 1,354). This regularity suggests the existence of relatively well-established organisational and knowledge-absorption capacities, which facilitate the accumulation of knowledge and stable relationships with other actors in the innovation system. This pattern has remained stable over the period 2013-2024.

The continuity of collaborative R&D reflects well-established organisational and knowledge absorption

TRENDS IN COOPERATIVE R&D IN THE BASQUE COUNTRY (2013-2024)

Indicator	2013	2019	2024
No. of companies engaged in R&D	134	115	105
% of systematic activity	82.8	87.8	87.6
R&D expenditure (M€)	150.3	154.9	216.2
R&D staff, EDP	1943.2	2077.9	2404.1
Average expenditure per company (k€)	1121.8	1347.0	2058.6
R&D intensity / turnover (%)	2.4	2.6	2.7

Source: Compiled by the authors based on Eustat data.

Rising intensity and a process of concentration

Although the number of cooperatives carrying out R&D fell from 134 in 2013 to 105 in 2024, R&D expenditure rose from 150.3 to 216.2 million euros and the R&D workforce from 1,943 to 2,404 people (EDP). This reflects a process of concentration in which a smaller number of organisations mobilise a greater volume of resources, which is concentrated primarily in large organisations, given that cooperatives with more than 250 employees account for 57.4 per cent of R&D expenditure and 60.1 per cent of research staff.

Use of external R&D: a distinct pattern

In 2024, cooperatives allocated 39.9 million euros to external R&D (18.4 per cent of their internal expenditure). This outsourcing is concentrated primarily in the medium-sized category (50 to 249 employees), where it accounts for 31.3 per cent of their internal expenditure, exceeding that of cooperatives with more than 250 employees (16.2 per cent), whilst remaining negligible in those with fewer than 50 (1.5 per cent–2.3 per cent). This suggests that medium-sized cooperatives are the ones that rely most heavily on external collaboration to complement their own R&D capabilities.

What kind of knowledge do cooperative enterprises generate?

In cooperative R&D, applied research accounts for the lion's share of expenditure, whilst basic research is gaining ground

Like the rest of the business sector, cooperative R&D is predominantly applied in nature. In 2024, more than half of internal R&D expenditure was concentrated on applied research (51.3 per cent) and 41.8 per cent on experimental development, with basic research playing a minor role. Over the last decade, the relative share of basic research in the cooperative sector has almost doubled (from 3.3 per cent to 6.9 per cent), whilst applied research has become the dominant category (rising from 43.9 per cent to 51.3 per cent), to the detriment of experimental development (falling from 52.8 per cent to 41.8 per cent).

RESEARCH FOCUS BY TYPE OF DOMESTIC EXPENDITURE IN THE BASQUE COUNTRY (2024, % OF DOMESTIC EXPENDITURE)

Group	Basic research (%)	Applied research (%)	Experimental development (%)
Cooperatives	6.9	51.3	41.8
Non-cooperatives	8.0	54.2	37.8

Source: Compiled by the authors based on Eustat data.

2.2 Innovation activity among businesses

Having characterised the resources, stakeholders and funding base of the Basque R&D system, this section shifts the focus to the overall efforts that Basque enterprises devote to innovation, as well as to the results that these activities generate in the form of new products, processes and business models.[25]

The analysis of innovation focuses on SMEs, which constitute the majority of the Basque business sector

The analysis focuses on SMEs (with between 10 and 249 employees), which make up the bulk of the Basque business sector. Large firms are considered later, when analysing differences by size specifically.[26] First, the dynamism and critical mass of business innovation are analysed in comparative terms, before delving deeper into how this activity is distributed according to the size and sector of Basque firms.

To characterise this innovation rigorously, data from Eustat —essential for reconstructing the historical evolution of the Basque Country— are combined with those from Eurostat, which are necessary to situate the region within the European context. Although both sources present methodological differences in their coverage and units of analysis, which make it inadvisable to construct a continuous, comparable time series, their combined use offers a complementarity that is meaningful both statistically and narratively.[27]

The growth in innovative SMEs is led by process innovation, with sustained progress in product innovation

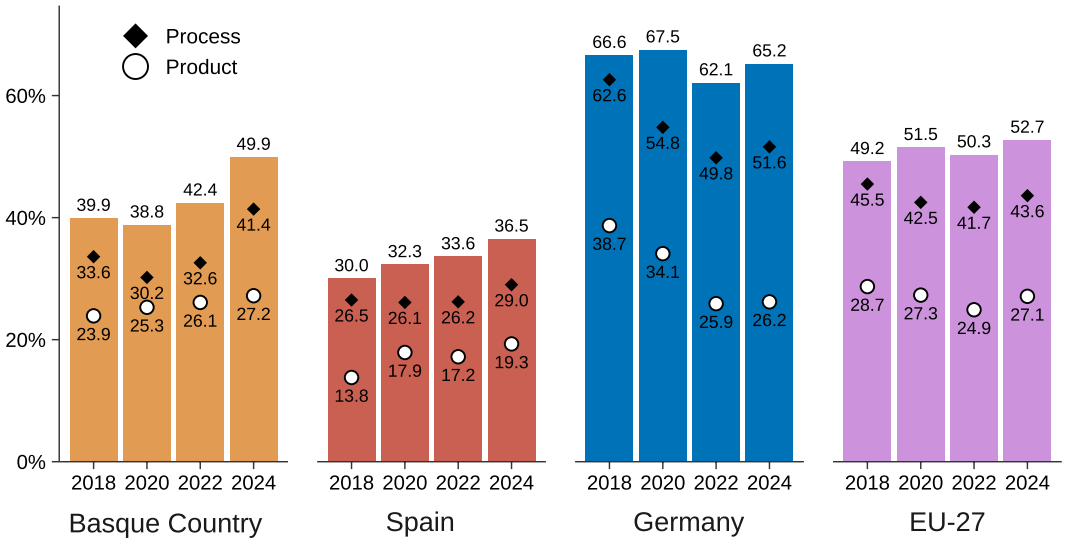
We begin our assessment of business innovation by analysing the **number of firms engaged in innovation activities**. Chart 2-6 shows that the proportion of innovative SMEs in the Basque Country has grown steadily in recent years, rising from 39.9 per cent in 2018 to 49.9 per cent in 2024. This progress is mainly due to the growth in process innovation (a new or significantly improved operational method aimed at optimising internal efficiency, reducing costs or improving quality), which has risen by 7.8 percentage points over the period (from 33.6 per cent to 41.4 per cent), compared with a more moderate, albeit steady, increase in product innovation (a new good or service, or one with significant improvements, that has been introduced to the market) of 3.3 percentage points (from 23.9 per cent to 27.2 per cent).

[25] Some of the statistics presented here relate to companies, whilst others relate to establishments. The differences between these two units of analysis do not prevent them from being compared (Navarro, 2021). For this reason, and to make the text easier to read, we shall henceforth refer to 'companies' without distinction.

[26] Micro-enterprises (fewer than 10 employees) are excluded from the analyses and results in this section, which are not covered by the harmonised innovation statistics, as well as enterprises belonging to sectors that are not included in the mandatory scope of the European regulations for these statistics (sectors B, C, D, E, H, J, K and divisions 46, 71, 72 and 73).

[27] Eustat carries out its own statistical survey, characterised by a large sample size and temporal continuity, which draws on the establishment as the unit of observation. For its part, Eurostat compiles the *Community Innovation Survey* (CIS), which is harmonised at European level and uses the enterprise as its unit of analysis. At regional level, the Eurostat sample is restricted solely to the year 2022, which limits its use to one-off comparisons where the similarity of the results for that year validates its consistency with the Eustat series. For further information, see Alkorta *et al*. (2024).

CHART 2-6 Participation of SMEs in innovative activities (% of total)



Notes: The data for the Basque Country are from Eustat and those for the other territories from Eurostat. Both sources are considered comparable for the total number of innovative SMEs, as the figure provided by Eurostat for the Basque Country in 2022 is very similar to that of Eustat (42.0 per cent compared with 42.4 per cent). The figures for Spain and Germany for 2024 are provisional, and the figure for the EU-27 is an estimate.

Source: Eurostat and Eustat.

Compared with the other territories under review, despite the increase observed, Basque SMEs still fall short of Germany's performance, but are in line with the EU-27 average, thereby consolidating their relative position. This is due to the Basque Country maintaining its strong performance in product innovation and making significant progress in process innovation, thereby narrowing the gap with the other territories. The comparison is even more favourable when set against Spain, where the proportion of innovative SMEs has grown to a lesser extent over the same period.

The concentration of innovation in larger SMEs limits the absorption capacity of the business sector

Along the same lines, the share of employment in innovative SMEs remains higher than in Spain as a whole, but lower than in Germany and the EU-27 (Table 2-3). This data allows us to assess the extent to which innovation permeates the wider workforce or is concentrated within a smaller group of firms. Taking 2022 as the reference year, in the Basque Country, the share of employment in innovative SMEs (54.3 per cent) exceeds the proportion of innovative SMEs out of the total (42.4 per cent, in 2022), which is the largest difference amongst the four territories compared (9.6 points in Spain, 9.2 in Germany and 7.6 in the EU-27). This suggests that, compared with the other territories, innovation in SMEs in the Basque Country tends to be concentrated in relatively larger firms, which limits the capacity to absorb transferred knowledge across a broader business base.

TABLE 2-3 People employed in innovative SMEs (2022, % of total)

Basque Country	Spain	Germany	EU-27
54.3%	43.2%	71.3%	57.9%

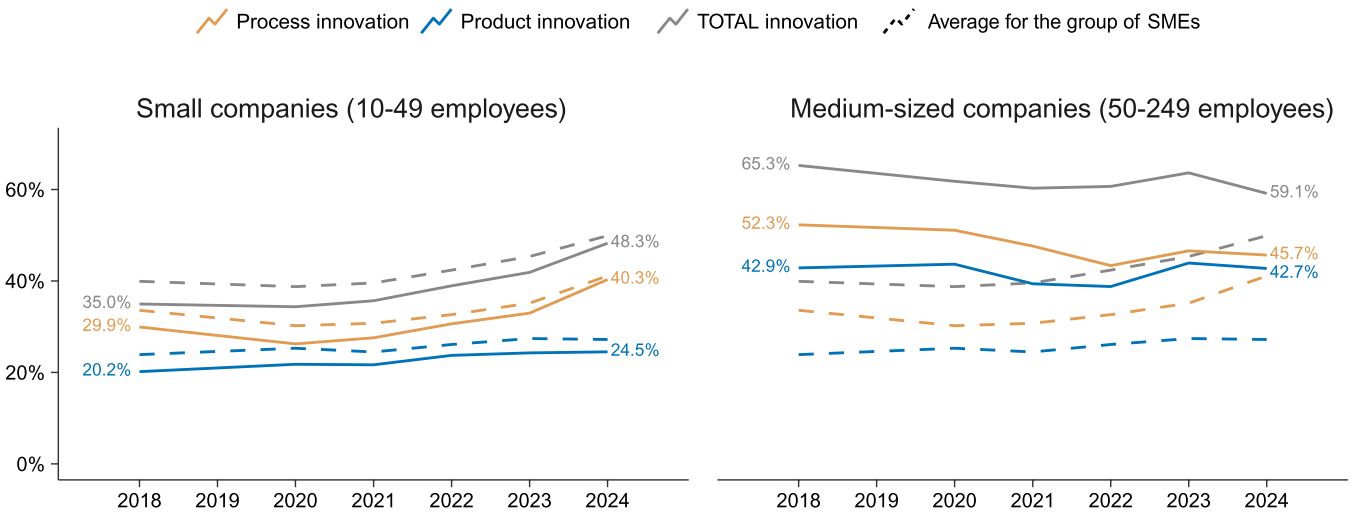
Source: Eurostat and Eustat.

As can be seen in Chart 2-7, **company size** is a clearly distinguishing factor in innovation amongst Basque SMEs. 59.1 per cent of medium-sized enterprises (50-249 employees) are innovative, compared with 48.3 per cent of small enterprises (10-49 employees). This difference of almost 11 percentage points is repeated, to varying degrees, in both types of innovation (18.2 points for product innovation, 5.4 for process innovation).

Small enterprises are driving the dynamism of Basque SMEs in process innovation

Furthermore, the trend in this gap between 2018 and 2024 provides an important nuance. The gap has narrowed slightly, almost entirely due to progress made by small enterprises. Their innovation rate has risen by 13.3 percentage points over the period (from 35.0% to 48.3%), driven primarily by process innovation (an increase of 10.4 percentage points). This allows us to refine the previous interpretation: the recent dynamism of Basque SMEs in process innovation does not stem from a generalised trend, but is led primarily by small enterprises.

CHART 2-7 Innovative SMEs in the Basque Country by employment bracket and type of innovation



Source: Eustat.

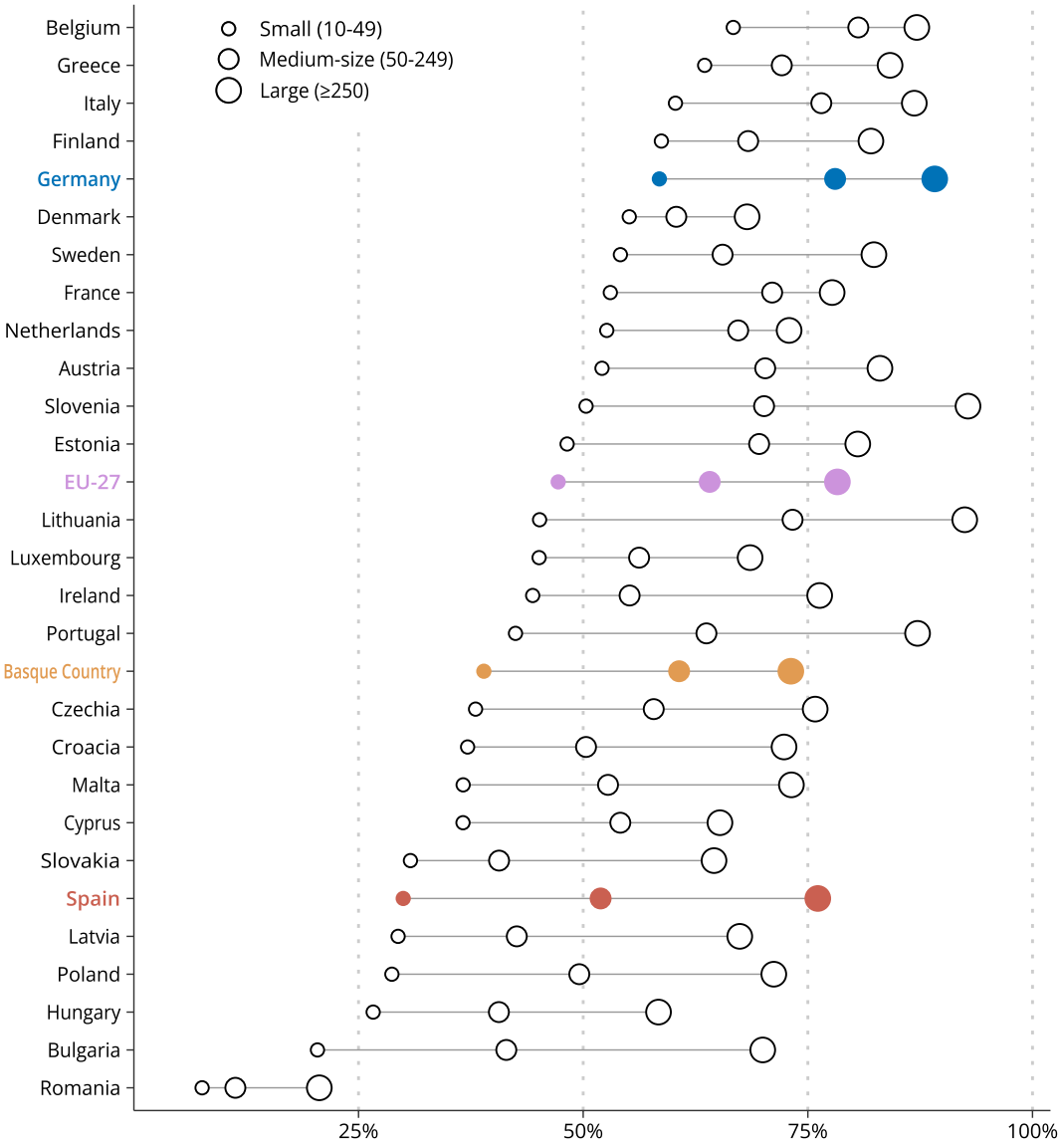
The comparison with other economies reveals a strong correlation between innovation and company size

To assess whether this duality based on size is a distinctive feature of the Basque Country or a pattern shared with other economies, we have taken the EU-27 countries as a benchmark. Furthermore, we broadened our focus on firms to include large ones, which allows us to obtain greater detail on innovation patterns by size. The results in Chart 2-8 show that the underlying pattern is replicated across the EU-27 as a whole. Innovation increases with firm size, and large firms often double or triple the rate of smaller ones. This strong correlation is not only due to greater availability of resources, but also to the fact that a large organisational structure, by its very nature, offers a wider variety of products, processes and areas in which to introduce innovations.

In the comparison, the Basque Country ranks close to the EU-27 average and demonstrates its greatest competitive strength in the medium-sized enterprise segment, whilst its main comparative disadvantage is concentrated in the small enterprise segment. With regard to the gap by firm size in the Basque Country, it is slightly above average. The countries that stand out for having a low gap are Denmark, Greece and

Belgium, and the latter two in particular excel by combining this with very high innovation rates. Conversely, the gap in the Basque Country is considerably smaller than that found in Spain or other territories such as Portugal, Slovenia or Lithuania.

CHART 2-8 Proportion of enterprises engaged in innovative activities by size group (2022)



Source: Eurostat and Eustat.

Service sector enterprises outperform industrial firms in both product and process innovation

The **sector of activity** also accounts for certain differences in the innovation performance of Basque SMEs. In 2024, manufacturing was overtaken by services, with innovation rates of 46.5 per cent compared with 52.6 per cent. This difference stems from the greater progress made in innovative activity within the services sector (+13.7 percentage points since 2018) compared with the more moderate increase in industry (+5.7 points since 2018). By type of innovation, however, no major differences are observed between industry and services, with the services sector maintaining its lead services in both product and process innovation over the last year analysed. These differences are, in any case, much more moderate than those associated with company size.

The analysis of the research, development and innovation landscape presented so far suggests a certain disconnect between the resources allocated to R&D and companies' participation in innovative activities. On the one hand, we find relatively good results in terms of resources allocated to R&D, both in terms of expenditure and staff. These results are, moreover, particularly favourable within the business sector. On the other hand, despite the considerable rise in business innovation, there is still scope to achieve levels similar to those of the leading countries. Furthermore, there is scope for innovation to be distributed more equitably amongst small, medium-sized and large enterprises.

Although considerable resources are devoted to R&D, there is scope for improving innovation

These findings raise a question which the rest of this chapter seeks to address. If the resources allocated to R&D are comparatively abundant and innovation activity is growing steadily, it is worth asking where the obstacle lies that prevents this innovation from being distributed more evenly across the business sector. The evidence gathered so far points to the specific characteristics of smaller enterprises and their reduced capacity to access external knowledge, funding and skilled personnel, which is directly linked to the role that agents within the Basque Network for Science, Technology and Innovation (RVCTI), such as the CCTTs and CICs, can play. The following sections address this issue, first examining the intensity and profile of cooperation in innovation, and then the public instruments that promote it.

2.3 Cooperation in innovative enterprises

This section shifts the analysis towards cooperation in innovation, understood as the channels through which knowledge, capabilities and resources circulate amongst the actors. Such cooperation utilises multiple mechanisms (see Chapter 1), through which an economy optimises the conversion of its scientific and technological resource base into effective business innovation capacity, bringing knowledge closer to the market.

Academic literature has shown that a firm's ability to innovate depends not only on its internal resources, but also on its absorptive capacity —that is, its ability to identify, assimilate and exploit knowledge generated outside its boundaries (Cohen and Levinthal, 1990; Akbari *et al.*, 2026). Cooperation acts as the catalyst for this capacity. It is not enough for external knowledge to exist; it is necessary to create the relational channels and mutual trust required for it to be effectively integrated into the company. Furthermore, for the bulk of the Basque business sector —comprising SMEs that do not reach the critical mass required to sustain R&D activity— cooperation is not merely a complementary route to innovation but the primary means of accessing capabilities, technologies and knowledge that would otherwise remain beyond their reach. Cooperation therefore acts as a multiplier of the collective effort of the public administration, companies, technology centres (CCTT), cooperative research centres (CIC), research centres and higher education institutions, ensuring that the development of knowledge and technology is effectively incorporated into productive activity (Mata *et al.*, 2024).

Cooperation is the main route to capabilities, technology and knowledge for SMEs

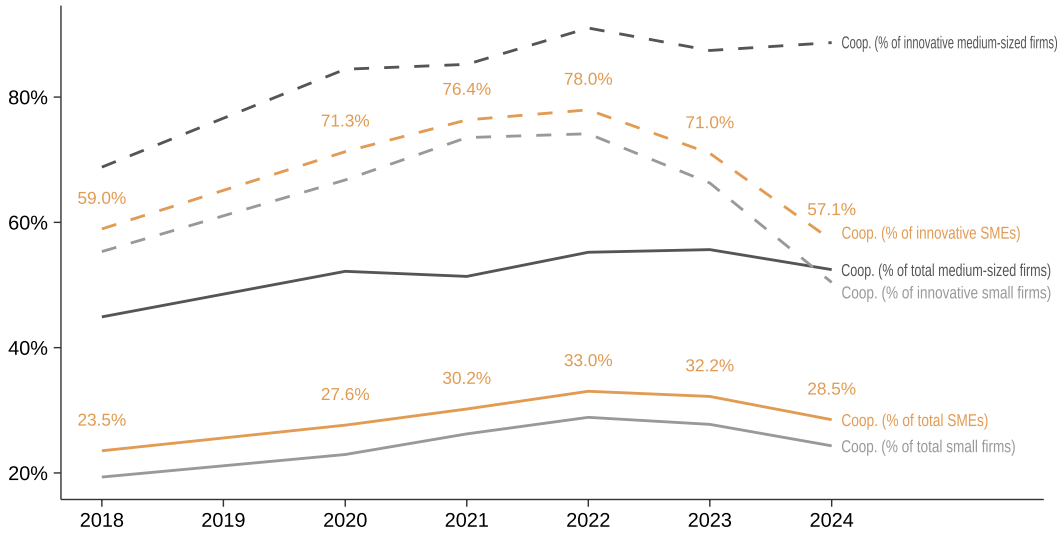
Cooperation mechanisms are shaped by the specific characteristics of each innovation ecosystem: its productive structure, the size of its enterprises, sectoral specialisation, and the institutional design through which the relationship between science,

technology and business is organised (Miguélez and Moreno, 2015; Winickoff *et al.*, 2021). Furthermore, measuring cooperation in innovation poses complex methodological challenges due to the difficulty of observing the specific terms or scope of the collaboration established. Nevertheless, based on the available statistics, we will now analyse the extent of cooperation within the Basque system according to the profile of the enterprises and the type of partner involved.[28]

Cooperation amongst innovative SMEs has fallen by 20 points, up to 57.1 per cent

Chart 2-9 shows that the rate of cooperation with other entities as a proportion of all Basque SMEs[29] has risen from 23.5 per cent in 2018 to 28.5 per cent in 2024. The most recent figure, however, represents a continuation of the downward trend from the peak of 33.0 per cent reached in 2022. When considering only innovative SMEs in the denominator, the results show that more than half of these cooperate with other entities (57.1 per cent), and the trend in this case is worse than that of 2018. Whilst the trend was positive up to 2022 —showing that 78.0 per cent of innovative SMEs were collaborating— by 2024 the indicator shows a marked fall of more than 20 percentage points. Although there are multiple factors behind this result, part of it can be explained by the high number of SMEs that have become innovative in recent years (see Chart 2-6 and Chart 2-7). As we analyse below, this group includes a significant number of small enterprises.

CHART 2-9 Companies that collaborate with other organisations (% of total companies and % of innovative companies)



Source: Eustat.

The smaller the enterprise, the lower the likelihood of innovating and the lower the frequency of cooperation

Chart 2-10 shows how company size is once again a determining factor in cooperation on innovation, to an extent comparable to, or even greater than, that observed

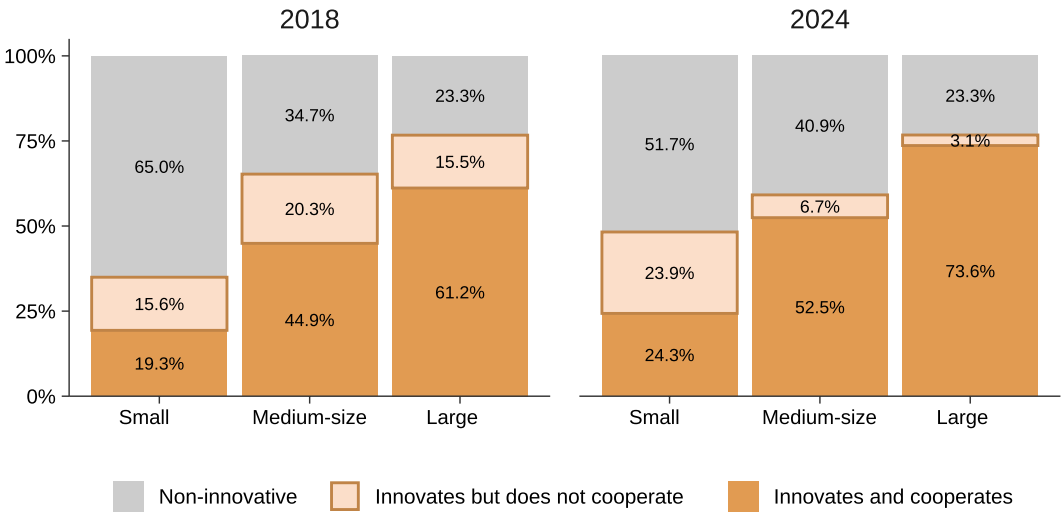
[28] The statistical approach makes it possible to identify participation in joint projects with other companies or institutions. It therefore expressly excludes the mere outsourcing or external procurement of R&D without active involvement, as well as the acquisition of machinery, equipment or knowledge. It should also be noted that these statistics fail to capture aspects such as the specific terms of the collaboration, its intensity, or the flow and stock of knowledge transferred. We also reiterate the methodological distinction outlined in the previous section between the statistics and results from Eustat and Eurostat.

[29] Calculated as the number of cooperating enterprises (numerator) relative to the total number of enterprises (denominator)

in innovative activity itself. In 2024, the proportion of firms engaging in cooperation rises from 24.3 per cent amongst small firms to 52.5 per cent amongst medium-sized firms and 73.6 per cent amongst large firms. This shows that the size gap identified in innovative activity also carries over into cooperation, thereby multiplying its effect. Consequently, the smaller the firm, the less likely it is to innovate; furthermore, when it does innovate, it is less likely to do so in collaboration with other actors.

However, looking at the 2018 results, it is clear that there has been significant progress in this area. On the one hand, the innovation gap has narrowed, mainly thanks to the increased contribution of innovative small businesses. On the other hand, the increase in cooperation has been concentrated amongst large and medium-sized enterprises, whilst progress amongst small enterprises has been modest. This shows that participation in cooperation networks has lagged behind the rapid growth of innovative small enterprises. There is therefore considerable scope for improvement in fostering collaboration within this group, which faces greater obstacles but possesses great potential for development.

CHART 2-10 Enterprises cooperating with other enterprises or organisations by size (% of total enterprises)



Source: Eustat.

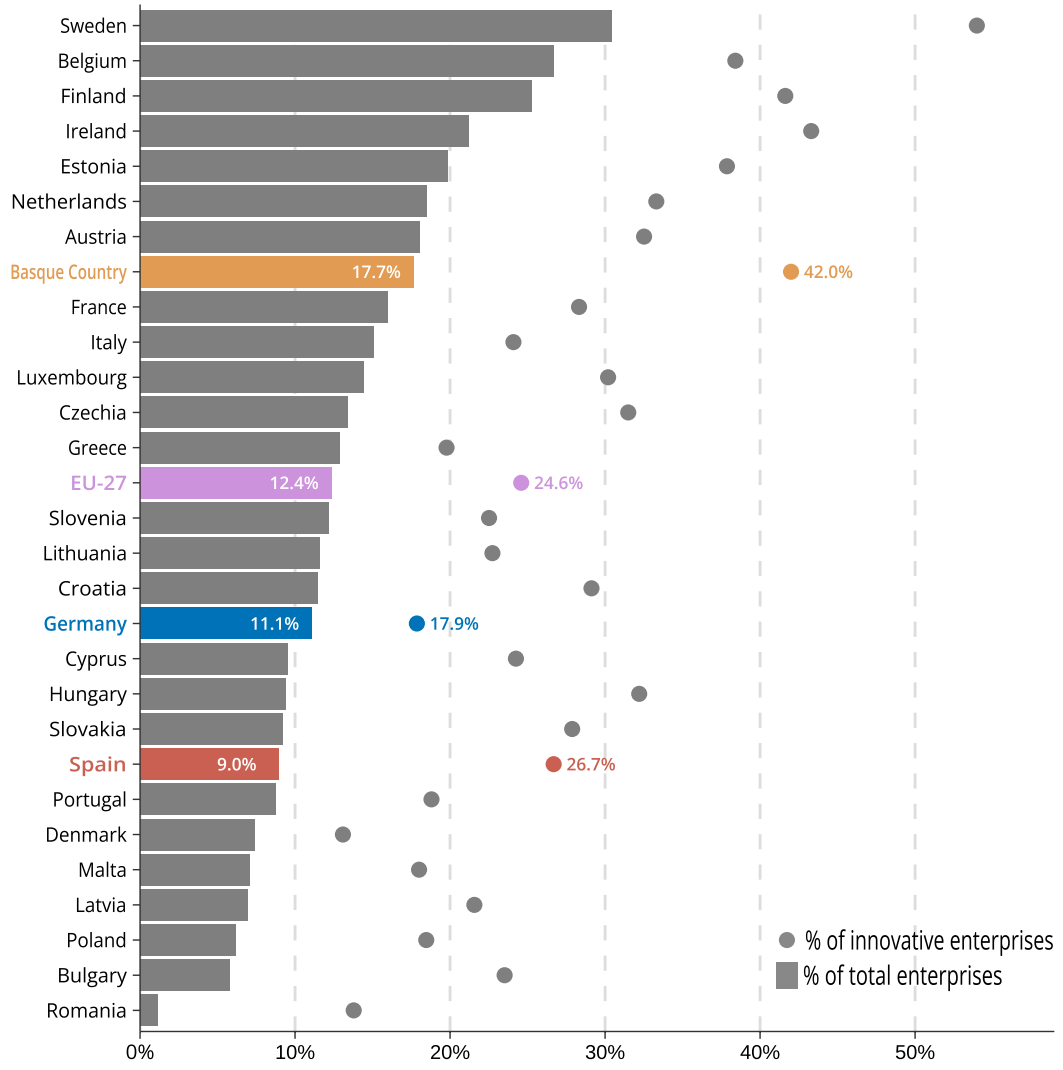
Chart 2-11 puts business innovation cooperation into an international context. It should be noted that the comparison is based on a different data source, the methodological characteristics of which give rise to significant differences for the Basque Country, but which facilitates the comparison. In this case, the rate of cooperation amongst Basque enterprises stands at 17.7 per cent, exceeding the EU-27 average (12.4 per cent) and that of Germany (11.1 per cent), and is surpassed only by eight EU-27 countries.

42 per cent of innovative Basque companies engage in cooperation, compared with 24.6 per cent in Europe and 17.9 per cent in Germany

The above comparison is even more favourable when analysed in terms of innovative enterprises, where 42.0 per cent of Basque enterprises that innovate engage in cooperation with other stakeholders, well above the EU-27 average (24.6 per cent) and, notably, more than double that of Germany (17.9 per cent). This superior perfor-

mance contrasts particularly with the previous analysis of cooperation by company size in the Basque Country, in which we saw that a significant proportion of small companies were innovating but not cooperating. Thus, the Basque Country, ranking third in the comparison with EU regions, demonstrates that it is indeed a benchmark region in terms of the scope of cooperation in innovation.

CHART 2-11 Enterprises cooperating with other entities (2022, % of total enterprises and of innovative enterprises)



Source: Eurostat.

Basque enterprises prioritise cooperation with the STI ecosystem over the value chain

Among the findings regarding cooperation in innovative firms in the Basque Country, the unique nature of their **partner types** also stands out. Table 2-4 reveals a markedly atypical cooperation profile within the European landscape, particularly when compared with those countries with a high level of cooperation (the top positions in the table). The three types of partner organisations most closely linked to the value chain (suppliers, customers or user firms, and competitors) record some of the lowest figures across the entire panel. For example, the Basque Country has the lowest rate of cooperation with suppliers of all the economies analysed (28.7 per cent), the second lowest level of collaboration with client companies (24.7 per cent, ahead of only Spain) and the fourth lowest with competitors (7.3 per cent). This figure is particularly paradoxical when one considers

the strong presence of organisations promoting clusters in the region, whose conceptual framework specifically identifies close cooperation between companies at various stages of the value chain as a key objective for driving innovation.[30]

TABLE 2-4 Breakdown of collaboration by type of organisation with which companies collaborate (2022, % of companies that collaborate)

Region	Consultants	Suppliers	Client companies	Competing companies	Other companies	Universities	Research centres and public administration	Non-profit organisations
Sweden	64.55	70.53	64.62	n.a.	31.51	37.73	23.93	n.a.
Belgium	57.42	54.56	30.07	14.18	22.62	33.53	21.55	6.57
Estonia	41.80	68.41	50.54	17.47	28.23	28.23	12.90	10.08
Basque Country	58.01	28.67	24.71	7.30	41.22	27.66	20.69	14.49
Italy	63.14	63.70	26.76	11.66	47.45	28.56	10.15	6.53
Luxembourg	50.90	53.76	44.80	6.81	22.58	24.37	17.56	8.60
Czech Republic	33.53	55.71	38.10	6.99	13.29	36.70	15.48	4.36
Greece	69.71	86.20	55.97	27.89	54.17	39.83	26.51	14.82
Slovenia	62.56	80.62	57.47	20.69	54.68	46.63	37.27	9.52
Lithuania	45.58	62.70	37.41	14.74	39.34	23.24	16.21	6.46
Croatia	46.00	70.37	39.55	18.40	31.18	34.77	13.86	8.84
Germany	34.01	33.17	26.43	28.60	8.40	66.82	30.32	23.39
Cyprus	73.33	84.76	50.48	21.43	62.86	32.38	22.38	20.00
Hungary	44.50	55.64	35.08	13.86	39.52	32.63	7.89	7.03
Slovakia	50.35	78.52	57.18	38.21	29.43	32.22	13.81	8.51
Spain	49.71	29.34	16.54	4.36	35.93	21.36	13.40	6.40
Portugal	51.63	58.64	42.27	13.75	32.91	41.09	21.94	15.09
Malta	44.44	52.22	34.44	10.00	26.67	21.11	7.78	5.56
Poland	39.30	39.62	26.54	11.06	32.91	31.77	19.23	8.09

Notes: The EU countries Finland, Ireland, the Netherlands, Austria, France, Denmark, Latvia and Romania are not included as they do not have sufficient disaggregation or sample size. The columns for "Companies within the group" and "Public sector customers or suppliers" have been omitted due to their low relevance and for visual reasons. The order of the table reflects the proportion of collaborating companies out of the total number of companies (see Chart 2-11).

Source: Eurostat and INE.

In contrast, the Basque Country stands out in terms of cooperation with external entities that are not part of the value chain. Specifically, Basque companies have the sixth-highest rate of cooperation with consultants (58.0 per cent) and the fifth-highest with non-profit organisations (14.5 per cent) and other companies (41.2 per cent), a category that groups together companies not classifiable under the previous categories. By contrast, cooperation with research centres and the public administration

[30] See Aranguren *et al.* (2009) and/or González *et al.* (2018).

(20.7 per cent) stands in the middle of the distribution, whilst cooperation with universities (27.7 per cent) ranks towards the bottom of the table.

This distinctive pattern is linked to a methodological precision that is not directly reflected in Table 2-4. When broken down, the CCTTs and CICs constitute the second most frequent cooperation partner for the Basque business sector, accounting for 35.3 per cent of cooperating enterprises. Taken as a whole, the results indicate that the significant weight of consultancy firms, non-profit organisations and other enterprises largely accounts for the actual cooperation with these specialised agents.[31] This finding reinforces the role of the CCTTs and CICs, and of the RVCTI as a whole, as the key partner for Basque companies, in line with what was noted in the previous section on R&D resources and funding.

Unlike the traditional cluster model, the Basque ecosystem organises its cooperation through agents within the scientific and technological network

Consequently, the apparent disconnect between cluster policy and the low level of direct cooperation within the value chain can be explained by the institutional architecture of the Basque innovation system itself. This model is characterised by a very high degree of channelling of cooperation and knowledge transfer flows through its scientific and technological network. Unlike traditional cluster models, where firms cooperate directly (both horizontally and vertically) along the supply chain, the Basque ecosystem organises its collaboration in a way that is heavily mediated by these 'frontier agents' – an institutional factor that would explain the results obtained.

2.4 Programmes to promote innovation through collaboration

This section analyses the main public funding and support instruments that act as catalysts for technological cooperation within the Basque business sector. It examines everything from regionally-based programmes to platforms with a European dimension, analysing their capacity to drive the transfer of knowledge from research environments to the market.

The Basque transfer model stands out for its public-private partnership

The Basque model of technology and knowledge transfer is characterised by a public-private partnership orchestrated primarily by the Department of Industry, Energy Transition and Sustainability, through the SPRI Group, but which is also influenced by the policies of other departments such as the Department of Science, Universities and Innovation (see Chapter 1). At this regional level, the provincial councils and other sub-regional bodies also play a role, promoting their own programmes to support innovation, largely aimed at SMEs (Box 2-2). This governance structure results in a diverse set of instruments that cover both the promotion of scientific supply and the stimulation of technological demand from businesses.

This section is organised according to the transfer mechanism triggered by each instrument: stimulating demand for business R&D&I, promoting science and technology supply geared towards transfer, capitalising on existing R&D results, and transfer embedded in individuals. Finally, we examine closely the national and European dimensions, which are of particular relevance given the scale and the cooperation requirements of the projects included in these programmes.

[31] See Appendix 1 for details of the results provided by Eustat and a comparison with those of the INE (where the CCTTs and CICs are categorised within the classification of organisations used).

Driving business demand for R&D&I

The **Hazitek** programme is the core instrument for supporting business and industrial R&D&I in the Basque Country. Restructured under the Euskadi 2030 Industry Plan, it is organised into three distinct strands based on the ambition and timeframe of the project being supported. The Competitive strand is primarily aimed at SMEs and funds smaller-scale projects —whether individual or collaborative— designed to meet market needs. The Strategic and Transformative strands fund larger public-private consortia, led by leading companies, which seek to achieve systemic technological leaps across value chains prioritised for the region.

The programme's focus on technology and knowledge transfer is embedded in its design. Although the direct beneficiary of the funding is the company, the programme requires or encourages, depending on the stream, the subcontracting of RVCTI agents. Public support for business innovation thus simultaneously becomes an effective driver of demand for the region's scientific and technological supply. Transfer is therefore promoted through the very definition of the expenditure funded by the programme.

The Hazitek programme transforms public funding for businesses into effective demand for scientific and technological supply

The results for the 2021–2026 period provide an indication of the scope of this mechanism (Table 2-5).[32] The first key figure to consider is the demand for innovation that the programme manages to generate; across the three strands, 6,092 projects have been submitted, representing a projected investment of 2,345 million euros. Of this total, 4,464 projects —almost three out of every four— have been funded, mobilising an investment of 1,965 million euros; 84 per cent of the total value submitted therefore corresponds to projects that have received public support. On an annualised basis, this investment amounts to some 330 million euros, representing around 0.3 per cent of the Basque Country's GDP and one-seventh of the region's annual domestic expenditure on R&D. The public funding granted totals 638 million euros, accounting for 32.5 per cent of the investment mobilised. The remaining two-thirds are covered by the participating organisations themselves, meaning that every euro of public funding is matched by just over two euros of private investment in R&D&I.

The programme fosters collaboration between businesses and R&D stakeholders

The most significant insight regarding technology and knowledge transfer, however, lies not in the funding amounts, but in the participants and the cooperation fostered by the programme. Projects funded under the Competitive stream involve an average of 2.7 participants, those under the Strategic stream 11.7, and those under the Transformative stream 18.7. In the Competitive stream, where collaboration with the network is not compulsory, RVCTI stakeholders nevertheless participate in 77.1 per cent of the funded projects, whilst in the Strategic and Transformative streams their presence is universal. In the first two streams, they account for around a third of participants, with technology centres being by far the most common partner, and this proportion rises to half in the Transformative stream, where network agents equal companies in number. The composition also diversifies with scale: corporate R&D units gain a stable presence in the two largest streams, while university research structures, are only represented to any signifi-

[32] The data relate to the calls for proposals from 2021 to 2026. The figures for 2026 are provisional, as the call for proposals is still being processed: the projects submitted and their budgets have been recorded, but the decision on which projects will be funded and the funding awarded may be subject to change. Furthermore, the "Transformadora" strand is being launched for the first time in that financial year, so its figures relate to a single year.

cant extent in the "Transformadora" scheme, with 2.3 participants per project compared with 0.4 in the "Estratégica" scheme and 0.1 in the "Competitiva" scheme.

TABLE 2-5 Hazitek's three areas of focus: the RVCTI's activities, funding and involvement (2021-2026)

	Competitive	Strategic	Transformative	Total
Projects submitted	5,790	298	4	6,092
Projects funded [% of those submitted]	4 251 [73.4%]	210 [70.5%]	3 [75.0%]	4 464 [73.3%]
Investment submitted (M€)	1,189.1	1,067.3	88.4	2,344.8
Investment funded (M€) [% of proposed]	1 016.4 [85.5%]	887.4 [83.1%]	61.6 [69.6%]	1 965.3 [83.8%]
Aid granted (M€) [% of funded investment]	280.3 [27.6%]	332.0 [37.4%]	26.0 [42.2%]	638.2 [32.5%]
Average investment per funded project (M€)	0.24	4.23	20.52	0.44
Participants [separate entities]	11 660 [1 662]	2 448 [732]	56 [45]	14 164 [1 872]
Average number of participants per project	2.7	11.7	18.7	3.2
companies	1.7	7.1	8.7	2.0
technology centres	0.6	2.2	5.3	0.7
corporate R&D units	0.2	1.4	2.0	0.3
universities	0.1	0.4	2.3	0.1
CIC and other research centres*	0.0	0.2	—	0.0
Projects involving at least one RVCTI researcher	77.1%	100.0%	100.0%	78.2%

Notes: The average figures for participants are calculated on the basis of funded projects. The 'Transformadora' programme was launched for the first time in 2026, and its figures include only 4 of the 8 projects submitted as at the date of this report. (*) 'Others' include Basic Research and Centres of Excellence and Health Research Centres (CIS). Intermediary bodies, individual entities and health R&D organisations are omitted from the table.

Source: Compiled by the authors based on data from the SPRI Group.

In addition to this core instrument —whilst not constituting a programme in its own right— there is a tax incentive in the form of corporation tax deductions for R&D&I activities. Regional regulations provide for tax deductions for these activities and, in particular, for business expenditure on technological innovation involving universities, public research bodies or centres forming part of the RVC-TI.[33] The Basque tax system thus provides incentives for collaboration with scientific and technological bodies, promoting technology and knowledge transfer.

The promotion of scientific and technological provision geared towards transfer

The Elkartek programme funds collaborative research carried out by the network's stakeholders

The **Elkartek** programme is the counterpart to Hazitek on the supply side. It directly funds collaborative research carried out by RVCTI stakeholders, with particular emphasis on the centres forming part of the BRTA alliance and on universities, in forward-looking technological areas aligned with the Basque strategy. Its focus on technology transfer is enabling and forward-looking, in that it funds the development of patents, assets and specialist knowledge within the centres themselves, so that they subsequently possess capabilities that can be transferred to the market.

[33] See: Tax deductions for R&D&I (BEAZ, Provincial Council of Bizkaia), Corporation Tax —current provincial regulations (Basque Government), Provincial Regulation 11/2013 of Bizkaia (official text), Provincial Regulation 2/2014 of Gipuzkoa (official text), Provincial Regulation 37/2013 of Álava (official text).

In addition to this instrument, there is structural funding from the stakeholders themselves. The **Emaitek Industria Hobea** programme, with a budget of 62.1 million euros in 2026, funds the non-economic activities of the eleven multi-focus technology centres accredited by the RVCTI, based on their performance against a set of key performance indicators.[34] Among these, the "impact on Basque industry" pillar —which includes indicators on technology transfer to SMEs— accounts for 55 per cent of the weighting, compared with 25 per cent for technological leadership and 10 per cent each for technological specialisation and international positioning. After a decade in operation, this results-based funding model is regarded as a best practice for steering the centres' activities towards technology transfer. It is complemented by the new Azpitek programme, dedicated to the acquisition and upgrading of research infrastructure and equipment. These are instruments that do not fund a joint project, but rather the very existence of the organisation that facilitates collaboration. This aligns directly with the finding in the first section of this chapter, in which the CCTTs and CICs funded barely 3 per cent of their internal R&D expenditure from their own resources, whilst 38 per cent came from the public administration. This structure constitutes a model in which the public sector supports a technological offering with the mission of transferring knowledge to the market.

Emaitek and Azpitek fund the technological capabilities that enable cooperation

Outside the RVCTI ecosystem, the **TKgune** network brings together vocational training centres in the Basque Country to carry out applied innovation projects with and for SMEs, under the coordination of Tknika. Its approach is explicitly two-way, with projects simultaneously addressing the centres' own needs for scientific and technological updating and the participating companies' needs for product improvement, process optimisation or market expansion. This programme places particular emphasis on the smallest companies, which face barriers of scale, cost and cultural distance when accessing the RVCTI. The programme for business innovation through vocational training offers specific advantages, such as geographical proximity to the local business community, an existing relationship with companies through work-based learning, and a focus on levels of technological maturity that align closely with the capabilities and needs of the smallest enterprises.

The TKgune network brings applied innovation to SMEs through vocational training

The commercialisation of existing R&D results

The instruments described above focus on knowledge generation. A third group operates at the opposite end of the spectrum, where a technology that has already been developed must be effectively integrated into productive activity. The **Fast Track Innobideak** programme focuses precisely on this final phase: rapid testing, protection and commercialisation of results, and accelerating the adoption of technological solutions. Aimed specifically at SMEs, the programme seeks to bridge the time and financial gap between R&D and its transformation into an innovation and its implementation within the production system. To this end, it offers funding of up to 250,000 euros per project, covering a maximum of 50 per cent of the investment.

Fast Track Innobideak accelerates the adoption and implementation of mature technology in SMEs

Its significance in terms of technology and knowledge transfer lies, in particular, in the composition of eligible expenditure. Eligible items include the subcontracting of RVCTI agents, the costs of patents acquired or obtained under licence from external sources, consultancy and innovation support services provided by external experts, and the costs of shipping in commission of service of highly qualified staff from a re-

[34] The scorecard and the definition of the indicators are set out in Annexes II and III of the programme's regulatory order (BOPV, July 2026)

search organisation. Four of the seven eligible expenditure categories are, by definition, technology and knowledge transfer operations.

There are other programmes for entrepreneurship and open innovation that further promote technology transfer

Furthermore, with a focus on creating new technology-based firms, **Basque Tek Ventures** is the Basque Government's public *venture capital fund*, led by SPRI in conjunction with BRTA, the Basque Country's BIC network and venture capital management body. It identifies and supports disruptive technological assets with high market potential and transferability, originating from BRTA's members —to which universities and BERC centres have subsequently been added— and which address the challenges facing the Basque Country's strategic sectors. It provides up to 250,000 euros per company in the form of equity or a participatory loan. Since its launch in 2023, it has supported more than 30 projects.

With the same aim of fostering business creation, the **Ekintzaile** programme supports the launch of new technology-based industrial enterprises, offering non-repayable grants of up to 30,000 euros. Projects may be initiated by entrepreneurs setting up a technology-based industrial enterprise (line 1) or driven by a company wishing to establish a new entity to diversify its activities through a technology-based project (line 2). The key aspect from a technology transfer perspective is the guidance provided by a BIC in drawing up the business plan and in the technical and commercial validation of the technology.

Finally, following a different approach, the **BIND 4.0** platform promotes open innovation. It connects Basque companies with technology start-ups from around the world, so that large companies set challenges relating to advanced digitalisation and the start-ups provide solutions within their areas of expertise. Here, knowledge transfer takes place between companies, capitalising on the exchange of knowledge and technology arising from their differences in size and working methods.

Knowledge transfer embedded in people

The Bikaintek programme promotes technology transfer from a human perspective and the integration of talent into companies

The **Bikaintek** programme is designed to transfer advanced scientific and technical knowledge through the capabilities inherent in the individuals themselves. Unlike grants aimed at assets or collaborations with the RVCTI or other external bodies, Bikaintek approaches knowledge transfer from a human perspective, enabling knowledge to flow directly from research into the Basque productive sector and to be integrated into the very fabric of organisations.

This approach to knowledge transfer has a twofold impact on the regional R&D ecosystem:

- Permanent integration of R&D capabilities: Recruiting research staff with PhDs enables companies to absorb cutting-edge knowledge in strategic areas, accelerating technology development times and embedding a culture of continuous innovation.
- Establishing long-term links (industrial PhDs): Training PhD students on industrial research projects co-developed with universities forges stable partnerships between academia and industry, ensuring that doctoral theses are applicable to market challenges.

According to the budget for the latest call for proposals submitted in 2026, the programme could facilitate the recruitment of between 59 and 82 PhD graduates em-

ployed by Basque companies, and the completion of between 52 and 95 industrial PhDs by company staff.[35]

BOX 2-2: Regional and local programmes supporting innovation and the transfer of technology and knowledge

The Basque system for supporting innovation is multi-level. In addition to the Basque Government's instruments, there are programmes run by the three provincial councils, as well as initiatives by local councils and local development agencies. The provincial councils combine direct grants to businesses with programmes aimed at stakeholders in the science, technology and innovation (STI) ecosystem. Furthermore, within the framework of the Economic Agreement, they exercise regulatory powers over corporation tax, including the R&D&I tax deductions analysed in this section.

Provincial councils, local councils and local development agencies also support technology and knowledge transfer

Provincial instruments cover different needs and stages of the innovation process, from the incorporation of technology to applied research and its transfer to the market. The following table summarises the main programmes featured in the 2026 calls for proposals.

MAIN REGIONAL AND LOCAL PROGRAMMES

Scope	Main schemes	Focus
Bizkaia	2i and 3i Plans; Basic and Advanced Digitalisation; Green Transition; Technology Transfer	Innovation, investment, digitalisation and the green transition in businesses; R&D in research centres and business units; testing and experimentation facilities.
Álava	Álava Innovates and Decarbonises; Starting a Business in Álava	Innovation, digitalisation, decarbonisation and business start-ups.
Gipuzkoa	BerriTEK+ (Product and Process); Gipuzkoa Sarean+ (Zientzia Erein, Teknologia Indartu, Berrikuntza Abiatu and Azpiegitura Gaitu); Quantum, Smart (Innovation and Pilot Projects), GANTT and Datekin	Development and validation of products and processes; research and pilot projects by RVCTI stakeholders; sector-specific technologies, data and AI.
Local level and intermediation	BeTEK; Technology Vouchers and the EKINN programmes run by the San Sebastián Department of Economic Development	Assessment of technological needs, development of roadmaps, links with centres of expertise, and support for innovative entrepreneurship.

There are three distinct types of intervention. The first focuses on business demand, funding innovation and technology adoption projects: examples include the 2i and 3i schemes in Bizkaia, Álava Innova-Descarboniza in Álava and BerriTEK+ in Gipuzkoa. The latter provides for increases in financial support of up to 15 percentage points in the event of effective collaboration or the wide dissemination of results, in addition to the increases linked to company size. The second programme strengthens the scientific and technological offering: Gipuzkoa Sarean+ supports RVCTI stakeholders in activities ranging from research to pilot projects and infrastructure, whilst Bizkaia's Technology Transfer programme includes funding streams for R&D and experimentation geared towards commercial exploitation.

[35] This range corresponds to the programme's design, whereby —to prioritise the participation of small enterprises— the smaller the organisation, the higher the aid intensity and the maximum amount per contract, which in turn determines the total number of contracts eligible for funding.

The third line of action relates to intermediation. BeTEK, a pilot initiative by the Gipuzkoa Provincial Council launched in Urola Erdia in 2024 and which has since been extended to other regions, has applied a methodology involving awareness-raising, diagnosis and the development of technology roadmaps for SMEs, with the participation of development agencies and organisations such as Innobasque, BRTA and Tknika. This has enabled participating SMEs to begin tackling specific technological developments which they had not previously considered or did not know how to undertake. For their part, the San Sebastián Development Authority's Technology Vouchers facilitate local businesses' access to the services of science and technology centres. Through mechanisms that combine proximity to the business, specialised technological knowledge and coordination between stakeholders, these initiatives seek to reduce the barriers that make it difficult for small businesses to identify their needs, access external knowledge and translate this into product or process improvements.

National Level

At national level, the main driving force behind business R&D&I is the Centre for Technological Development and Innovation (CDTI), a public body that combines grants, subsidised loans with non-repayable tranches and venture capital investment to cover the various stages of technological maturation. Its focus on technology transfer is explicit and market-driven, and takes the form of specific schemes: **Neotec**, centred on the creation of technology-based start-ups and spin-offs; **Science and Innovation Missions**, which brings together business consortia involving research organisations; and the **Cervera** programme, which makes funding conditional on subcontracting to accredited Technology Centres of Excellence within a defined set of priority technologies.

The participation of companies in CDTI projects is significantly higher than that in the RVCTI

Between 2022 and 2025, the Basque Country took part in 431 CDTI projects, accounting for 9.3 per cent of the national total – a figure far higher than its share of the population and consistent with its position in terms of business expenditure on R&D (Table 2-6). The involvement of RVCTI stakeholders in these projects is, however, limited to 8.3 per cent, compared with a business sector involvement of 64.3 per cent.

TABLE 2-6 Basque participation in CDTI projects

Year	Projects in the Basque Country	Proportion of total weight	RVCTI presence	Company presence
2022	145	11.03%	6.21%	70.34%
2023	118	9.09%	0.00%	68.64%
2024	75	7.64%	20.00%	53.33%
2025	93	9.06%	12.90%	58.06%

Source: Compiled by the authors based on data from the CDTI.

The State Research Agency also highlights the grants aimed at fostering knowledge transfer through individuals, via the **Torres Quevedo** and **Industrial PhD programmes**. Between 2014 and 2025, the Basque Country secured 754 Torres Quevedo grants for companies to recruit PhD holders, accounting for 10.4 per cent of the national total, with funding of 45.9 million euros —an average of 61,000 euros per recruitment— representing 11.7 per cent of the national total. In the case of industrial PhDs, however, the Basque Country's share amounts to just 33 theses —4.2 per cent of the total— and 2.1 million euros —4.8 per cent.

European level

At European level, Basque participation is channelled primarily through **Horizon Europe**. Its collaborative projects fund transnational consortia focused on highly complex industrial and social challenges and require planning for the exploitation of results. These are the projects with the highest demands for cooperation within the entire system, as they require forming consortia with partners from other Member States and adhering to international intellectual property standards. It is also worth noting that, in addition to Horizon Europe, Basque participation has been prominent in other programmes such as Digital Europe, EU4Health, LIFE, RFCS and the European Defence Fund (see Innobasque, 2022).

The Basque Country took part in 936 Horizon Europe projects between 2022 and 2025, and its share of total state funding grew steadily from 8.4 per cent to 12.4 per cent (Table 2-7). Whilst in CDTI projects the RVCTI's presence is limited to 8.3 per cent and it is companies that drive Basque participation, in European projects that presence rises to 86.3 per cent.[36]

The Basque Country has participated in 936 Horizon Europe projects between 2022 and 2025

In fact, when compared with the national average, the Basque case stands out as unique, since 69.2 per cent of projects involve technology and research centres,[37] whereas in Spain the participation of universities (44 per cent of projects) compared with centres (55 per cent) is more balanced. As regards the comparison at company level, whilst the presence of Basque companies in European projects is below the national average (31.1% compared with 40%), Basque participation is characterised by its widespread reach (a higher percentage of participation by individual companies), although the challenge lies in consolidating this participation and making it a recurring feature (Table 2-8).

The Basque system's national reach is, therefore, primarily business-oriented, whilst its European reach rests almost entirely on the science and technology ecosystem, confirming the role of RVCTI stakeholders (particularly technology and research centres) as the system's interface with the outside world (see Box 2-3).

The Basque Country's European presence relies primarily on the RVCTI's stakeholders

TABLE 2-7 Basque participation in Horizon Europe projects

	Projects in the Basque Country	Share of total	RVCTI presence	Funding secured
2022	351	7.93%	87.75%	8.44%
2023	267	5.86%	86.52%	9.57%
2024	186	4.28%	81.18%	11.85%
2025	132	3.20%	89.39%	12.36%

Source: Compiled by the authors based on CORDIS.

[36] The decline in the number of projects and their share of the national total in recent years is mainly due to the delay with which the database incorporates approved projects, and should not be interpreted as a loss of standing for the region; the simultaneous growth in funding secured actually points in the opposite direction.

[37] This category also includes corporate R&D units.

TABLE 2-8 Business participation in Horizon Europe projects

	Companies in Spain	% Spain	Enterprises in the Basque Country	% Basque Country
One-off participants (only one entry)	1,385	63.74%	167	69.01%
Occasional (2 to 5 entries)	637	29.31%	68	28.10%
Regular participants (>5 entries)	151	6.95%	7	2.89%
Total companies	2,173	100.00%	242	100.00%

Source: Compiled by the authors based on CORDIS.

BOX 2-3: International links to promote Basque technology and knowledge transfer (prepared in collaboration with Tecnalia)

For a small, open and industrial economy such as the Basque economy, international connectivity is one of the key determinants of its competitiveness. In the technological fields that make the difference today, the minimum scale required to invest in cutting-edge capabilities and infrastructure often exceeds what a single region can sustain. A technology and knowledge transfer system of limited scope compensates for this limitation by connecting internationally on the basis of its own specialisations.

This international engagement must be selective and strategic, not an indiscriminate opening up. The new geopolitical context has heightened the focus on research security and the selection of like-minded partners, and has made reliable dialogue and membership of trusted networks an even more valuable asset. The European Association of Research and Technology Organisations (EARTO) is an example of one such network, acting as the voice of European research and technology organisations (RTOs) vis-à-vis the EU institutions. Founded in 1999 and with a permanent secretariat in Brussels, it has been chaired by Tecnalia since April 2025. It has over 350 members from 32 countries, with a particularly strong presence from the Basque research sector, as Ideko, Vicomtech, Tekniker, Ceit and Cidetec are also members, as are SPRI and BRTA in the associations category.

International connectivity through networks facilitates learning, visibility, the scaling up of solutions and the ability to exert influence

Specifically, four key benefits of the international connectivity of a regional technology and knowledge transfer system are identified, which networks such as EARTO can enhance:

1. **Mutual learning**. They provide access to systematic comparisons with the leading European RTOs, whose funding models, governance structures and relationships with industry can be examined and adapted to the Basque context. Indeed, the degree of international openness of an RTO (the proportion of its international clients, partners and projects) is now considered an indicator of its own performance in technology transfer.

2. **Visibility and the ability to integrate the local business community into global value chains**. A technology and knowledge transfer system operates in stages: it coordinates transfer processes within its own territory and links these to the national level, as well as to the European and international levels. Highlighting the strengths of the Basque system on the international stage helps businesses to integrate into global value chains. The reputation, contacts and dialogue provided by established networks open doors that an isolated player would struggle to reach: new commercial relationships with partners and customers, participation in major consortia and access to new markets. Furthermore, there are sectoral transformations that no single player can undertake alone, and which are only possible when the regional system is woven into broader cooperative structures.

3. **The potential to scale up solutions and combine complementary expertise**. International collaboration provides access to capabilities that complement one's own, to additional sources of funding, and to standardisation processes where the rules of technology markets are defined. For a system such as the Basque one, this means being able to take a locally developed innovation beyond the point at which its own scale is exhausted, combining it with the knowledge, partners and funding necessary for it to reach the market.

4. **Ability to influence the rules of the game**. The European Research Area remains, to a large extent, fragmented, and the conditions under which RTOs operate —from state aid rules to the design of funding programmes— are decided in Brussels. Advocating for these interests individually has limited scope, but doing so through a collective voice that brings together the evidence from hundreds of science and technology centres multiplies their influence and reduces the burden that each actor would bear individually.

Overall, international links are not peripheral to the Basque system of technology and knowledge transfer, but rather one of the factors that determine its performance. Learning from the best, gaining visibility to integrate into global value chains, scaling up one's own innovations and influencing European regulations are four facets of the same concept.

2.5 Publication and patent trends

The previous sections have examined the Basque innovation system, from the resources it mobilises to the instruments through which it operates, covering the innovative activity of businesses and the channels through which knowledge circulates amongst stakeholders. This section examines the final stage of the funnel, which focuses on the translation of efforts and initiatives into scientific and technological outcomes, as reflected in publication and patent indicators.

Publications and patents reflect open science and commercial protection

The indicators analysed in this section are complementary and of a different nature. Scientific publications provide insight into open knowledge and the science–business interface through co-authorship. Meanwhile, patents provide insight into knowledge deemed valuable enough to warrant commercial protection, and the interface through joint ownership of the application. Both are imperfect measures of transfer, since a significant proportion of it is not codified in either an article or a patent; however, analysing them is useful for identifying details of the resulting technology and knowledge transfer, such as the region's comparative position in these areas, as well as the distribution across fields of knowledge, impact and alignment with productive needs.

Scientific publications with Basque authorship

Basque scientific output has grown by 36 per cent over the last decade

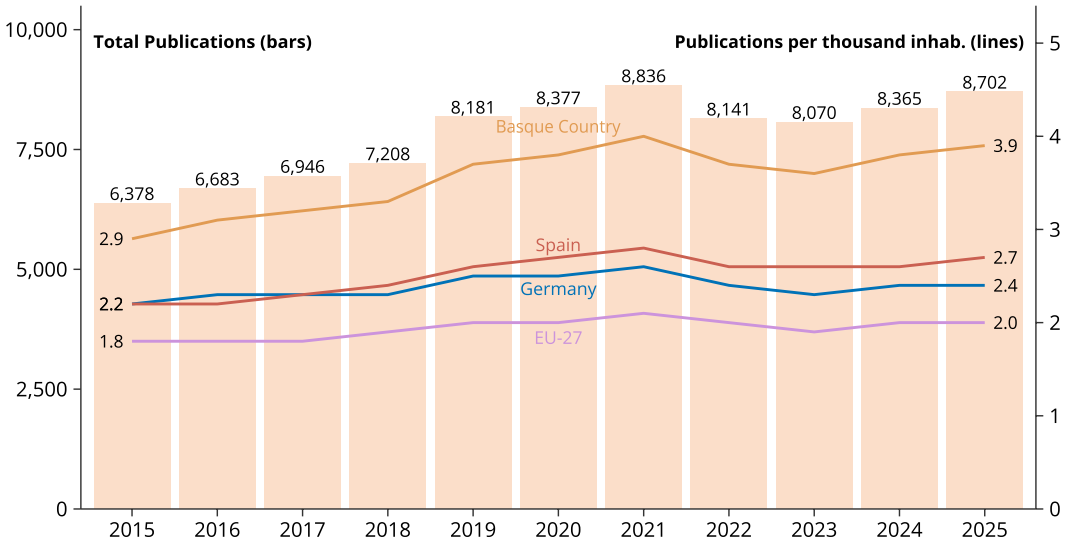
Basque scientific output has grown steadily over the last decade, rising from 6,378 publications in 2015 to 8,702 in 2025, an increase of 36 per cent (Chart 2-12). The time series shows strong growth between 2019 and 2021, reaching an all-time high in the latter year with 8,836 publications. This temporary spike was followed by a decline and subsequent recovery over the last two years, bringing the region back to figures close to the series' peak.

In terms of scientific output per capita, the Basque system is clearly more productive than its peers: with 3.9 publications per thousand inhabitants, the Basque

With 3.9 publications per thousand inhabitants, the Basque Country publishes almost twice as many as the EU-27 average

Country publishes almost twice as many as the EU-27 average, partly due to the slight increase in the European indicator since 2015. Compared with the other countries in the analysis, Basque academia also stands out against Spain's 2.7 publications per thousand inhabitants and Germany's 2.4. This is partly due to the Basque Country's improvement in recent years, in contrast to the moderate progress seen elsewhere.

CHART 2-12 Scientific output in the Basque Country (total publications and publications per 1,000 inhabitants)

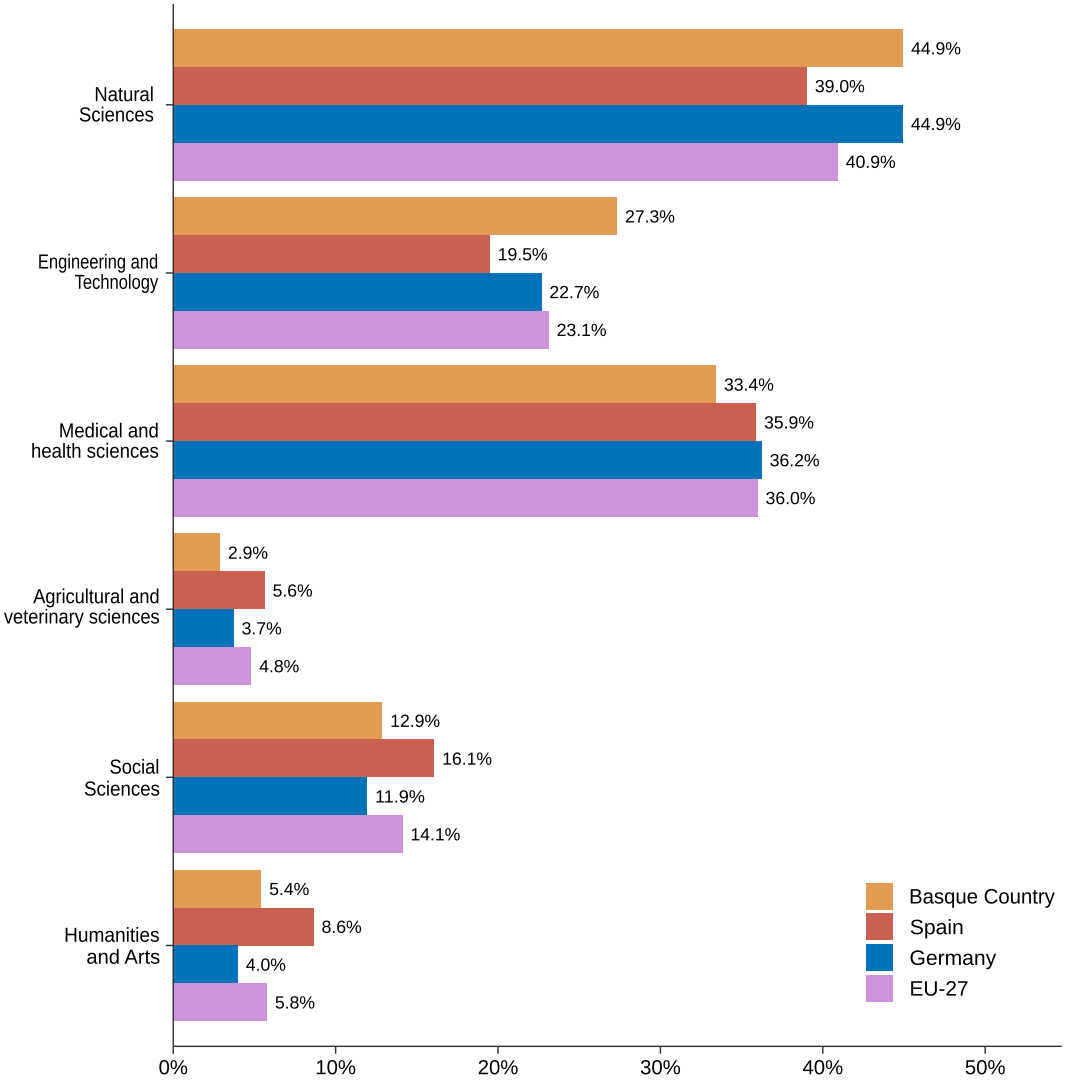


Source: Compiled by the authors based on InCites (Clarivate).

The composition of this output is in line with what one would expect from a region with a high degree of industrial specialisation (Chart 2-13). Taking the average for the period 2021-2025[38], the natural sciences account for 44.9 per cent of Basque publications, medicine and health sciences for 33.4 per cent, and engineering and technology for 27.3 per cent. This distribution becomes particularly telling when analysed comparatively with other regions. The share of engineering and technology in the Basque Country is the highest of the four regions considered, ahead of the EU-27 (23.1 per cent), Germany (22.7 per cent) and Spain (19.5 per cent). In the natural sciences, the region is on a par with Germany (44.9 per cent) and outperforms both the EU-27 (40.9 per cent) and Spain (39.0 per cent). The counterpoint is provided by medicine, which has the lowest share of the four, and the social sciences, the humanities and agricultural sciences, all of which are below the European average.

[38] The publication data are taken from Clarivate's InCites database, with fields of knowledge defined according to the OECD classification. To mitigate annual fluctuations, the specialisation and impact indicators are calculated over two five-year periods, 2016–2020 and 2021–2025, which allow for an observation of the system's recent evolution.

CHART 2-13 Distribution of scientific publications by field of knowledge (% of total publications, average 2021-2025)



Notes: Classification of fields according to the OECD's nomenclature of research and development fields. A single publication may be assigned to more than one field of knowledge, which is why the percentages do not add up to one hundred.

Source: Compiled by the authors based on InCites (Clarivate).

The specialisation index relative to the EU-27 confirms and refines this picture (Table 2-9).[39] Engineering and technology achieved a value of 1.18 over the last five years and are, furthermore, the only field to show a significant improvement compared with the previous period, when the figure stood at 1.11. The natural sciences also show a clear specialisation of the Basque Country compared with the European structure and have remained stable over time, with an index of 1.10. At the opposite end of the spectrum are agricultural and veterinary sciences, followed by health sciences, social sciences and the humanities. The latter two have also declined compared with the previous five-year period.

Specialisation in engineering is growing, whilst the social sciences and the humanities are in decline

[39] The index is calculated as the ratio of the weight that a given field represents in Basque output to the weight that the same field represents in EU-27 output. A value greater than 1 indicates that the Basque Country publishes more in that field than would correspond to the European structure.

The Basque region excels in nanotechnology and materials, but lags behind in mechanical engineering and computer science

It is in the breakdown of the sub-areas of Natural Sciences and Engineering and Technology that the Basque profile emerges most clearly. Nanotechnology achieves an index of 2.88, which is nearly three times the weight that this discipline carries in European output, and has also grown compared with the previous five-year period. Industrial biotechnology has shown the greatest progress across the entire panel, reaching an index of 2.01 in the latest period. The other fields showing a higher level of specialisation compared with the EU average are materials engineering (2.00), chemical sciences (1.66), physical sciences (1.41) and chemical engineering (1.37), which are closely aligned with the focus of the Basque CICs and BERC. However, the Basque Country is less specialised in fields closely aligned with the needs of the Basque industrial sector and the strategic sectors of the Euskadi 2030 Industry Plan, such as mechanical engineering (0.89), electronic and electrical engineering (0.85) and computer and information sciences (0.83). In any case, this cluster of strengths forms a coherent set of disciplines centred on materials and chemistry, and all of them —with the exception of chemical sciences— have strengthened their position over the last five years.

TABLE 2-9 Specialisation index (LQ) for publications relative to the EU-27, by fields and sub-fields of knowledge

Field of knowledge	2016-2020	2021-2025		Sub-field of knowledge (breakdown of fields 1 and 2)	2016-2020	2021-2025
1. Natural sciences	1.10	1.10	→	1.1. Mathematics	0.73	0.87
2. Engineering and technology	1.11	1.18	→	1.2. Computer Science and Information Technology	0.85	0.83
3. Medical sciences and health	0.92	0.93		1.3. Physical sciences	1.30	1.41
4. Agricultural and Veterinary Sciences	0.61	0.60		1.4. Chemical Sciences	1.74	1.66
5. Social sciences	0.99	0.91		1.5. Earth sciences	0.92	0.93
6. Humanities and Arts	1.04	0.94		1.6. Biological sciences	0.96	0.86
				1.7. Other natural sciences	1.01	1.09
				2.1. Civil engineering	0.71	0.80
				2.2. Electrical and Electronic Engineering	0.79	0.85
				2.3. Mechanical Engineering	0.74	0.89
				2.4. Chemical Engineering	1.19	1.37
				2.5. Materials Engineering	1.97	2.00
				2.6. Medical Engineering	1.02	1.07
				2.7. Environmental engineering	1.12	1.14
				2.8. Environmental Biotechnology	0.82	0.74
				2.9. Industrial Biotechnology	1.51	2.01
				2.10. Nanotechnology	2.60	2.88
				2.11. Other engineering disciplines	1.16	1.07

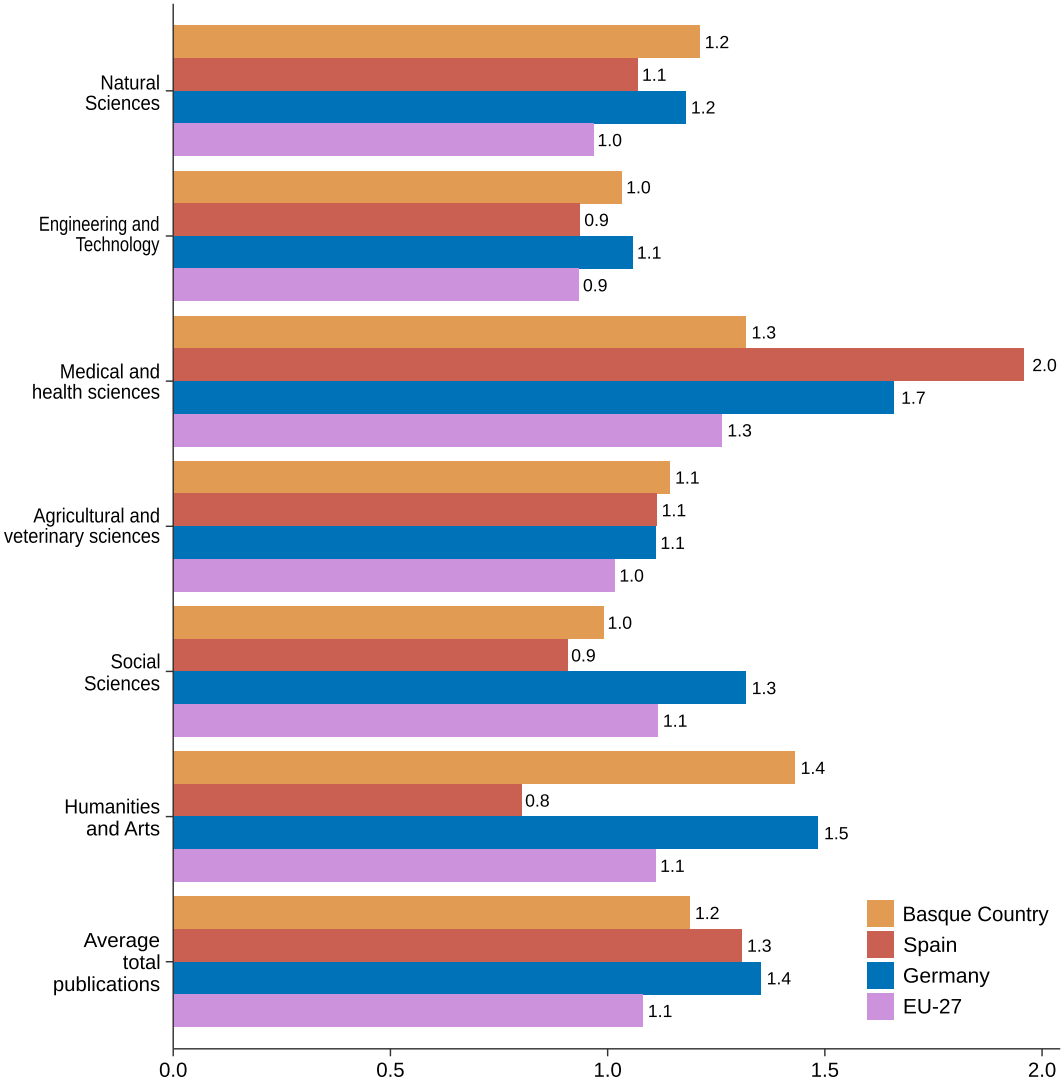
Notes: A value greater than 1 indicates the region's relative specialisation. The breakdown by sub-area is limited to the fields of Natural Sciences and Engineering and Technology, as these carry the greatest weight and represent the highest level of specialisation in the Basque Country.

Source: Compiled by the authors based on InCites (Clarivate).

The quality of this output, as measured by the CNCI, places Basque publications as a whole at 1.2, indicating that they exceed the global average for impact publication rate.[40] When comparing this figure with the reference territories, the Basque Country also exceeds the EU-27 average (1.1), although it remains below that of Spain (1.3) and Germany (1.4). By field, the Basque Country performs best in the humanities (1.4) and health sciences (1.3), although in the latter case it lags significantly behind Spain (2.0) and Germany (1.7). The natural sciences and engineering and technology —the fields in which the Basque Country specialises most in terms of publications— score 1.2 and 1.0 respectively; whilst not standing out at a global level, they are slightly above the EU-27 average and very much in line with the results achieved by German publications.

Basque publications exceed the global average impact

CHART 2-14 Impact of scientific publications by field of knowledge (CNCI, average 2021-2025)



Notes: The CNCI (Category Normalised Citation Impact) normalises citation impact by field of knowledge, year and document type. A value of 1 is equivalent to the global average for the field.

Source: Compiled by the authors based on InCites (Clarivate).

[40] The CNCI (Category Normalised Citation Impact) measures the citation impact of a publication, normalised by field of knowledge, year and document type. This corrects for some of the potential bias in citations arising from different academic disciplines. A value of 1 corresponds to the global average for the field of knowledge.

The social sciences are the only discipline whose impact falls below the European benchmark

Normalised against the EU-27, the impact index for Basque output as a whole stands at 1.10, above the European benchmark, but slightly down on the 1.14 recorded in the previous five-year period. As shown in Table 2-10, this decline is not uniform. The natural sciences have improved their position slightly (1.25), whilst engineering, medicine and, to a greater extent, the humanities have lost some of their advantage in terms of publication impact. The social sciences are the only discipline to fall below the European benchmark, at 0.89, and are also showing a downward trend.

When breaking down the figures by sub-fields within the natural sciences, engineering and technology, we see that nanotechnology has the highest impact factor, at 1.82, followed by the other natural sciences (1.53), chemical sciences (1.47), chemical engineering (1.43), materials engineering (1.39) and physical sciences (1.35). Of particular note is the case of medical engineering, which rises from 0.91 to 1.19 and joins the group of disciplines with an impact higher than the European average. Conversely, mathematics fell from 0.58 to 0.42 —the lowest figure across the entire panel— whilst electrical and electronic engineering declined from 0.86 to 0.76.

TABLE 2-10 Impact index of publications relative to the EU-27, by fields and sub-fields of knowledge (CNCI)

Field of knowledge	2016-2020	2021-2025	Sub-area of knowledge (breakdown of areas 1 and 2)	2016-2020	2021-2025
1. Natural sciences	1.24	1.25	Mathematics	0.58	0.42
2. Engineering and technology	1.16	1.11	Computer Science and Information Technology	1.16	1.09
3. Medical sciences and health	1.14	1.04	Physical sciences	1.17	1.35
4. Agricultural and Veterinary Sciences	1.22	1.12	Chemical sciences	1.40	1.47
5. Social Sciences	0.91	0.89	Earth sciences	1.24	1.10
6. Humanities and Arts	1.60	1.29	Biological sciences	1.30	1.17
			Other natural sciences	1.23	1.53
			Civil engineering	0.88	0.97
			Electrical and electronic engineering	0.86	0.76
			Mechanical engineering	0.82	0.78
			Chemical engineering	1.68	1.43
			Materials engineering	1.44	1.39
			Medical engineering	0.91	1.19
			Environmental engineering	1.48	1.26
			Environmental biotechnology	1.06	0.91
			Industrial Biotechnology	1.25	1.19
			Nanotechnology	1.90	1.82
			Other engineering disciplines	0.90	0.82

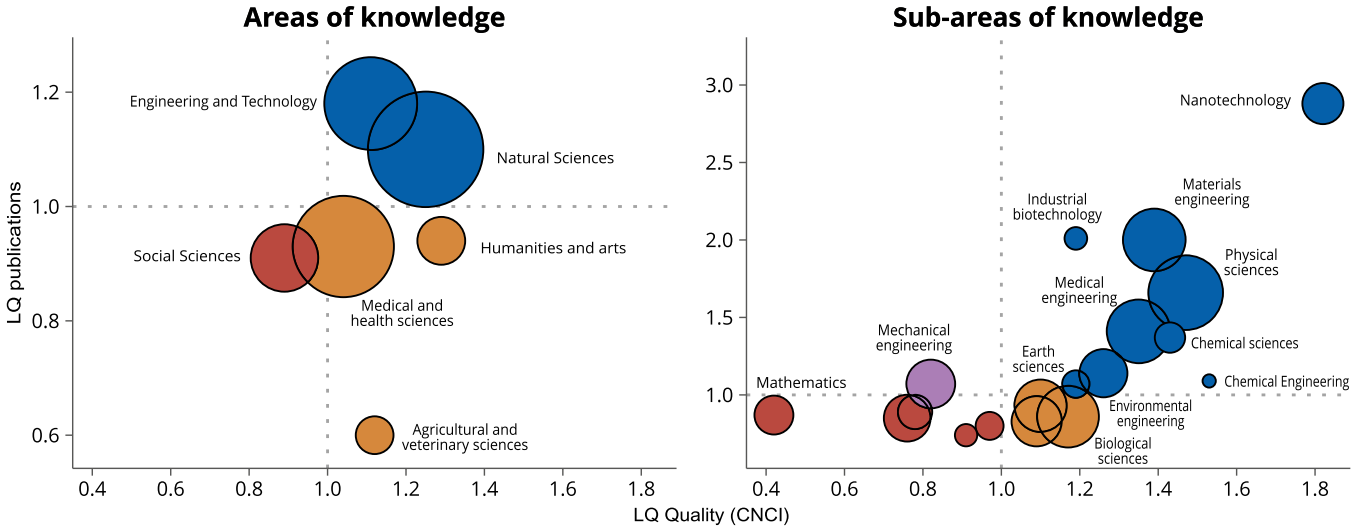
Note: A value greater than 1 indicates that Basque publications in that field have a greater impact than their European counterparts.

Source: Compiled by the authors based on InCites (Clarivate).

These results show that, in most cases, quality goes hand in hand with specialisation (in terms of the number of publications). Chart 2-15 illustrates this using a scatter plot. The natural sciences, engineering and technology are simultaneously above the European average in both output and quality. Medicine, the humanities and agricultural sciences have a higher impact than the European average but lower output, whilst the social sciences fall short in both respects. Looking at the sub-areas, the favourable quadrant is occupied by nanotechnology, materials engineering, industrial biotechnology, chemical sciences, chemical engineering, physical sciences, medical engineering, environmental engineering and other natural sciences. This is a small but coherent group, and it is this group that defines the region's scientific identity.

The areas with the highest level of specialisation in terms of publications also exhibit higher quality

CHART 2-15 The Basque Country's position relative to the EU-27 in terms of output and the impact of publications, by field and sub-field of knowledge (average 2021-2025)



Notes: The size of each circle is proportional to the number of publications in the field, and the colour distinguishes those that exceed the European benchmark in both dimensions, in one dimension, or in neither. The left-hand panel shows the six branches of knowledge, and the right-hand panel shows the sub-areas of Natural Sciences and Engineering and Technology.

Source: Compiled by the authors based on InCites (Clarivate).

The science–business interface as seen through the authorship of scientific articles

Publications authored wholly or partly by companies provide the most direct insight into collaboration between the scientific system and the business sector.[41] Measured per capita, Basque business publications reached 0.11 per thousand inhabitants in 2025, slightly ahead of Spain (0.10) and higher than the EU-27 average (0.07) (Chart 2-16). A comparison with Germany shows that the latter is significantly ahead, with 0.15 corporate scientific publications per thousand inhabitants. The trend for the Basque Country is favourable, having started at 0.08 in 2015, and it has grown in line with Spain whilst the European average has fallen slightly.

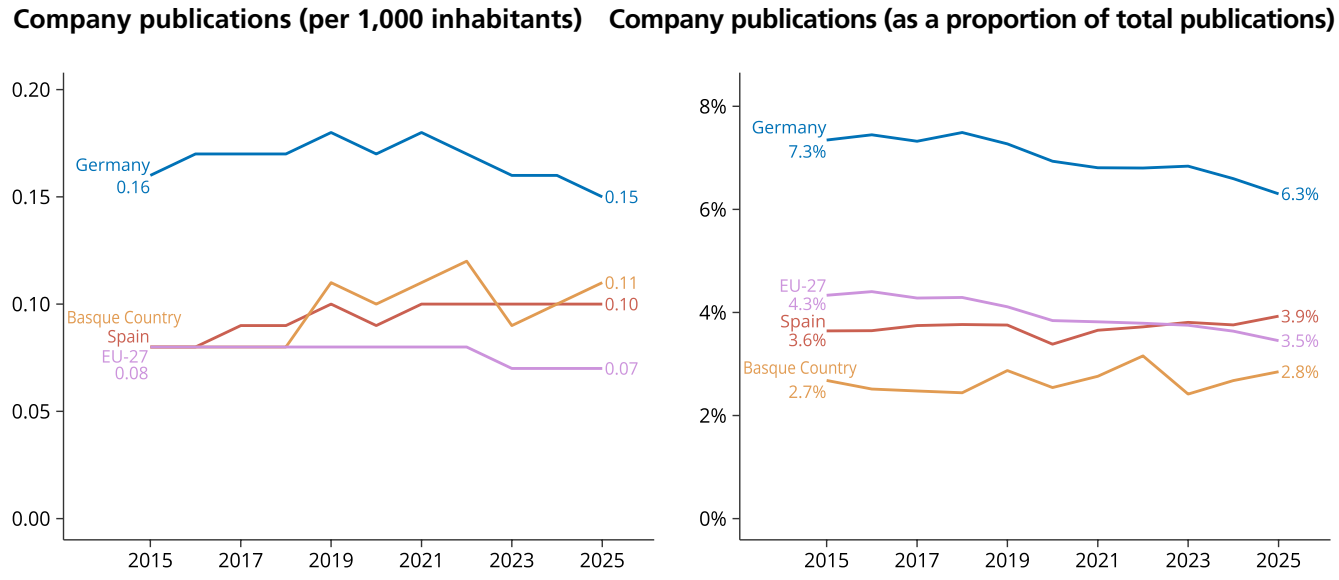
The Basque Country outperforms the EU in terms of business publications per inhabitant, but continues to lag behind Germany

[41] Publications with full or partial corporate authorship are used as a proxy for collaboration with industry, given that the database does not allow the quality indicator for publications in collaboration with industry to be obtained directly.

The low proportion of industry-sponsored publications (2.8 per cent) is explained by the high overall scientific output in the Basque Country

Measured as a proportion of total scientific output, however, the result suggests a different interpretation. Thus, corporate publications account for 2.8 per cent in the Basque Country, the lowest proportion of the four territories, behind Spain (3.9 per cent), the EU-27 (3.5 per cent) and, most notably, Germany (6.3 per cent). The apparent contradiction between these two interpretations is explained by the high and growing total scientific output in the Basque Country (see Chart 2-12 above). Thus, the volume of corporate publications per capita is comparatively high, but its share within a scientific output that is more abundant than in comparable territories is small. It should be noted, however, that the share of corporate publications declined over the period both in Germany (from 7.3 per cent to 6.3 per cent) and in the EU-27 as a whole (from 4.3 per cent to 3.5 per cent), so that the modest Basque increase, from 2.7 per cent to 2.8 per cent, occurred against a European backdrop of a slight decline in scientific publications involving business.

CHART 2-16 Scientific publications with business involvement (publications per thousand inhabitants and % of total)



Source: Compiled by the authors based on InCites (Clarivate).

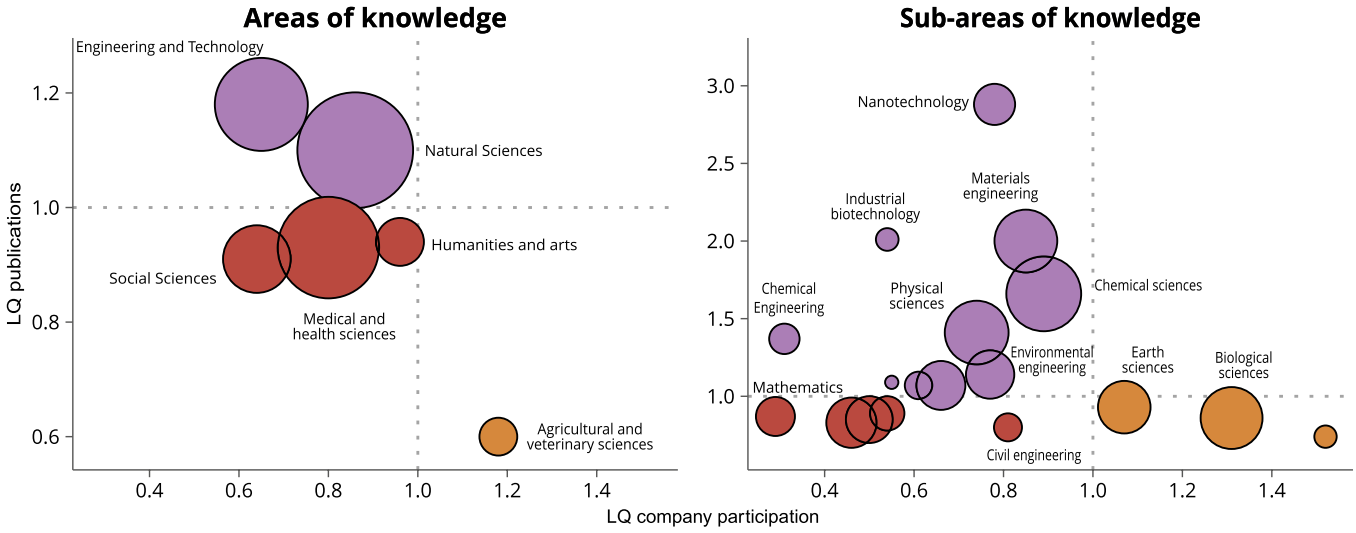
The most significant finding in this section emerges when the output index is cross-referenced with the index of collaboration with industry (see Chart 2-17), both normalised relative to the EU-27.[42] The first observation is that the Basque Country falls below the European benchmark for collaboration in all fields of knowledge, with the sole exception of agricultural and veterinary sciences, which achieve an index of 1.21 but account for barely 2.9 per cent of the region's publications.

The second observation is that the two sectors in which the Basque Country is most specialised in terms of production —engineering and technology, and the natural sciences— have collaboration indices of 0.65 and 0.86 respectively, both of which are below the European benchmark. A breakdown by sub-area shows that the disci-

[42] The collaboration index is constructed in a similar way to the production index, as the ratio of the proportion of publications produced in collaboration with industry in the Basque Country to that of the EU-27 in the same field.

plines The fields that epitomise Basque scientific excellence rank above the average for their respective disciplines, with nanotechnology at 0.78 compared with a publication index of 2.88, materials engineering at 0.85 compared with 2.00, and chemical sciences at 0.89 compared with 1.66. The overall result, however, remains consistent. Not even in those areas where the region excels in terms of publications does it reach the level of co-authorship with industry achieved by its European counterparts.

CHART 2-17 The Basque Country's position compared with the EU-27 in terms of output and collaboration with industry, by knowledge areas and sub-areas (average 2021-2025)



Notes: The size of each circle is proportional to the number of publications in the field, and the colour distinguishes those that exceed the European benchmark in both dimensions, in one dimension, or in neither. The left-hand panel shows the six branches of knowledge, and the right-hand panel shows the sub-fields of Natural Sciences and Engineering and Technology.

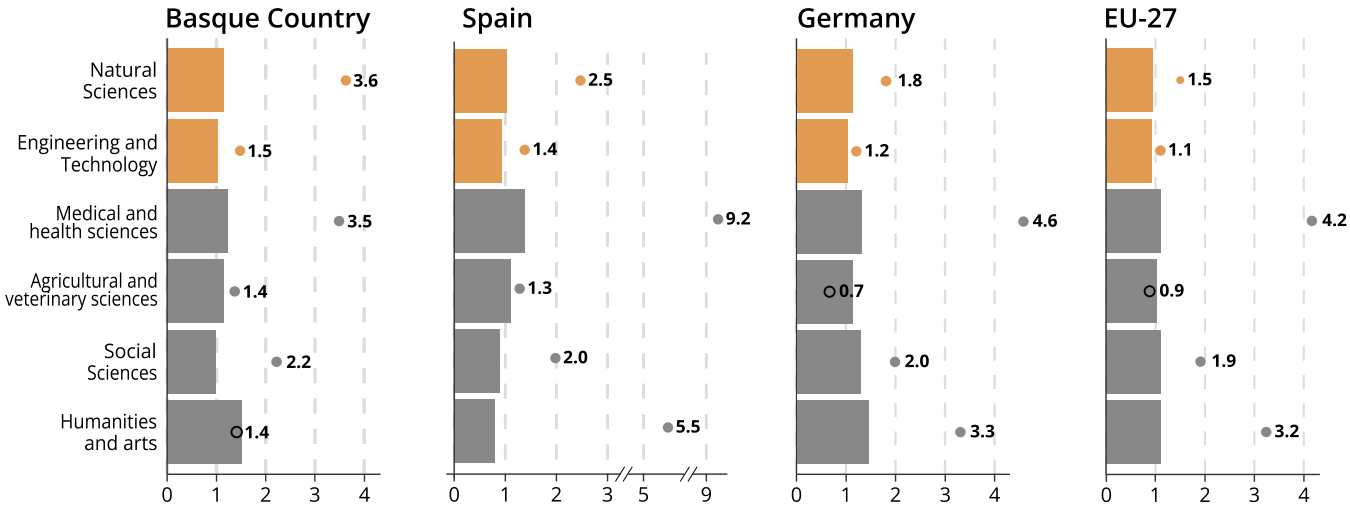
Source: Compiled by the authors based on InCites (Clarivate).

The quality of publications involving business participation, however, stands out compared with scientific output as a whole, as shown in Chart 2-18. Taking the CNCI as a reference once again and breaking down the data by broad subject areas, there is a clear trend for corporate publications to have a greater impact than that of the total number of publications in the region. The result varies by field of knowledge, and in the Basque Country there is a notable increase in the natural sciences, where the impact of corporate publications (3.6) is three times that of the overall average (1.2). Something similar, albeit to a lesser extent, occurs in medicine and health sciences. These are followed by the social sciences and engineering and technology. The only exception is the humanities, where corporate publications have a lower impact than the overall average.

The international comparison adds a further nuance. The Basque Country has the greatest impact of the four territories in corporate publications in the natural sciences, and also in engineering and technology. In other words, the Basque Country leads in the quality of collaboration precisely in the two fields aligned with its productive base. In medicine, however, it ranks last.

Higher quality of publications in collaboration with industry in the sectors most closely aligned with the productive base

CHART 2-18 Impact of publications involving business participation compared with scientific output as a whole, by field of knowledge (CNCI, 2021-2025 average)



Source: Compiled by the authors based on InCites (Clarivate).

The picture painted by these publications can therefore be summarised in four points:

- The Basque Country has a substantial scientific base, with per capita output exceeding that of Spain, Germany and the European average, and showing sustained growth.
- This output is clearly specialised in the fields of science, technology and engineering (materials, chemistry, nanotechnology, etc.), reflecting the capabilities and needs of its industry, and this specialisation has been further strengthened over the last five years.
- The quality and impact of Basque publications also stand out, particularly in those areas with high output, although there remains a persistent weakness in mechanical and electrical-electronic engineering, fields particularly closely linked to the region's manufacturing sector.
- Its formal interaction with industry is limited in volume across all fields of knowledge, though outstanding in quality.

Patents applied for by organisations and agents in the Basque Country

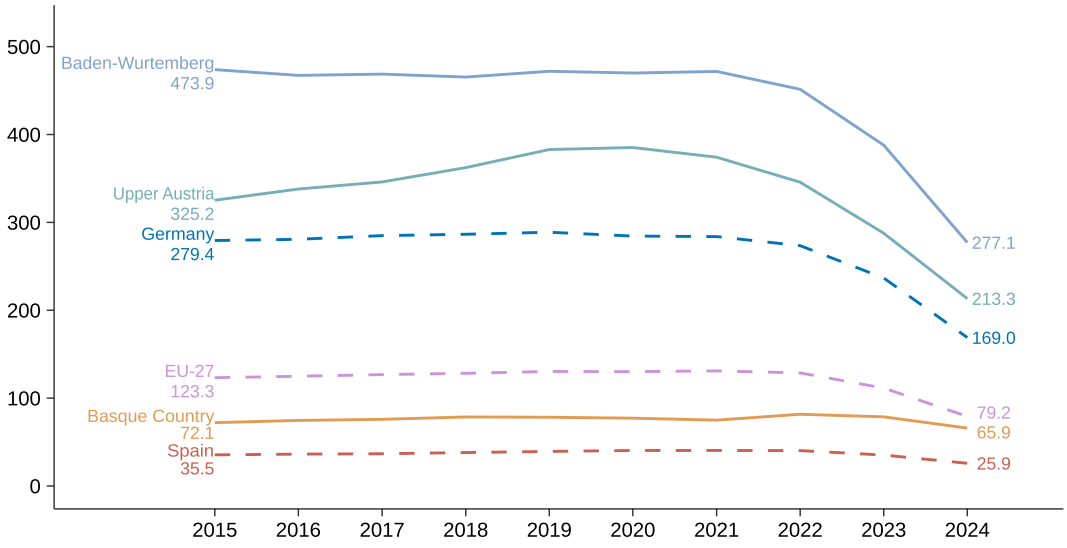
The shift from publications to patents represents a change in the nature of the subject under consideration —from open knowledge to knowledge deemed valuable enough to warrant commercial protection— and also brings about a significant change in the picture of the system.

In the Basque Country, the number of patents per inhabitant is below the European average

Between 2014 and 2024, 1,832 patents were registered with the European Patent Office (EPO) by Basque applicants. The number of patents per inhabitant remains below the European average, with a three-year average of 65.9 patents per million inhabitants compared with 79.2 in the EU-27, although the trend is towards convergence (Chart 2-19). It should be borne in mind that the decline in the number of pat-

ents in recent years is due to the registration and publication process, so the figures will vary in the future, although the trends and differences are likely to persist.

CHART 2-19 Trend in the number of patents (per million inhabitants)

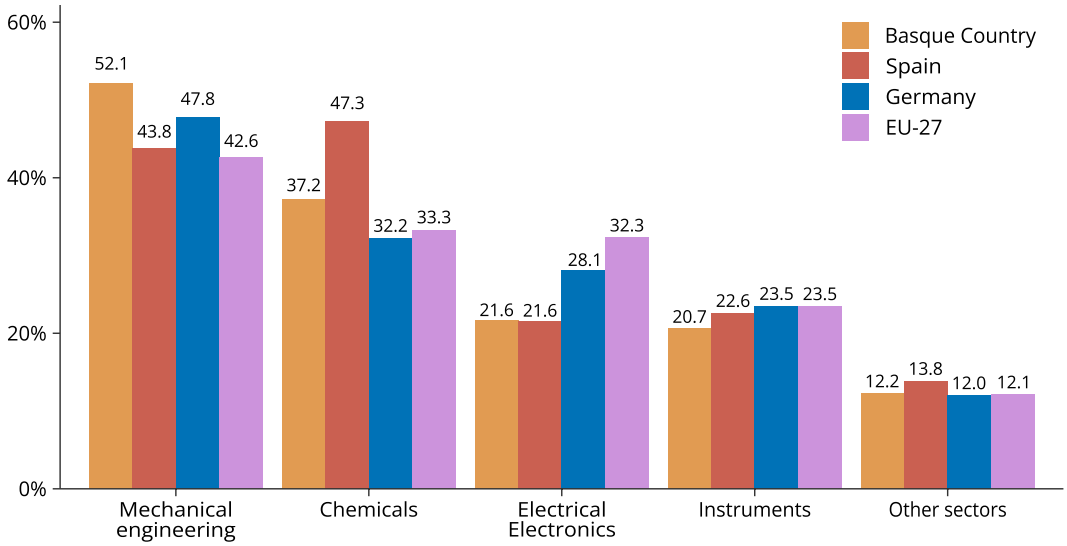


Source: Compiled by the authors based on OECD/REGPAT and Eurostat

By technology sector, mechanical engineering is the leading field for patents in the Basque Country, accounting for 52.1 per cent of its applications (Chart 2-20). Chemistry is the second most important field (37.2 per cent), whilst in the fields of electrical and electronic engineering and instruments, the Basque Country accounts for just over 20 per cent in both cases.

Mechanical engineering is the leading field for patents in the Basque Country

CHART 2-20 Share of patent applications by sector

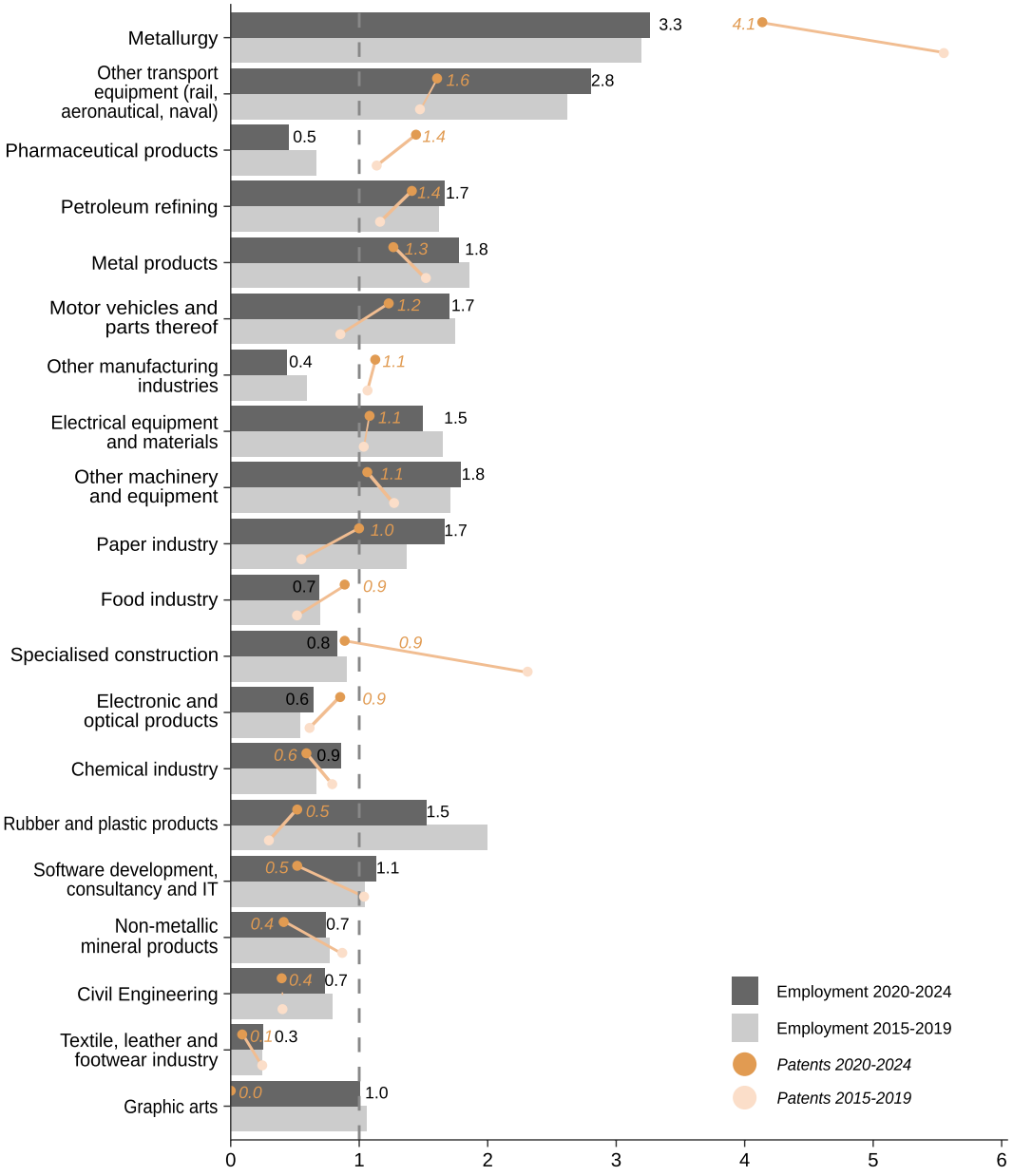


Source: Compiled by the authors based on OECD-REGPAT.

The Basque Country's specialisation in patenting is linked to the metal industry

Looking in detail at the economic sector that files these applications, we compare the Basque Country's patenting activity with its sectoral specialisation. Chart 2-21 shows the specialisation index relative to the EU-27 average in terms of employment and patents, such that a value greater than 1 indicates relative specialisation. The first notable feature is the central role of the metal industry. Among the sectors showing specialisation in patenting (greater than 1) are metallurgy, other transport equipment, oil refining, metal products and motor vehicles, all of which also exhibit a high degree of specialisation in terms of employment. Alongside these, with relatively high levels of patenting, are pharmaceuticals and other manufacturing industries; however, these contrast with a level of employment below the EU-27 average.

CHART 2-21 Sectoral specialisation in number of patents and employment (LQ 1=EU-27, 2015-2019-2020-2024)



Source: Compiled by the authors based on data from OECD-REGPAT, EUROSTAT-LFS and EUSTAT.

As regards the sectors with the lowest incidence of patenting, we see a similar pattern, with most of these sectors also failing to stand out in terms of job creation within the region. Only two sectors break this pattern: rubber and plastic products, which have an employment specialisation index of 1.5 (compared with 0.5 for patents), and IT programming and consultancy, with an employment index of 1.1 (compared with 0.4 for patents).

A comparison across five-year periods shows that the structure of employment has changed very little, whilst the distribution of patents has narrowed. The extreme values are declining, with metallurgy falling from 5.5 to 4.1 and specialised construction from 2.3 to 0.9, whilst sectors that previously patented little are advancing, such as the paper industry (from 0.6 to 1.0), the food industry (from 0.5 to 0.9), motor vehicles (from 0.9 to 1.2) and rubber and plastics (from 0.3 to 0.5). This leads to an improvement in the alignment between economic specialisation and patenting activity (correlation), driven primarily by the spread of patenting into sectors that were previously excluded from it.

Looking at the type of patent applicant (Table 2-11), the majority —70.9 per cent— are filed solely by companies; 26.3 per cent solely by agents from the Basque Network for Science, Technology and Innovation; and the remaining 2.9 per cent —53 patents— are applications in which both types of applicant are listed jointly. The presence of RVCTI agents (acting alone) in patenting activity has gained ground, rising from 23.5 per cent of patents in 2014-2019 to nearly 30 per cent in 2020–2024.[43] Starting from a very low base, jointly filed patents are also growing, from 2.4 per cent to 3.6 per cent.

TABLE 2-11 Patents with Basque applicants by type of applicant (2014-2024)

Type of applicant	Patents	% of total	2014-2019	2020-2024
Companies only	1 298	70.9%	74.1%	66.7%
RVCTI agents only	481	26.3%	23.5%	29.7%
Company and RVCTI joint application	53	2.9%	2.4%	3.6%
Total	1 832	100.0%	100.0%	100.0%

Source: Compiled by the authors based on OECD-REGPAT and the RVCTI list of agents.

Patents in electrical and electronics, whilst mechanical engineering mechanical engineering loses relative weight

The distribution of these patents by technological field closely reflects the region's productive structure. The six fields with the highest concentration are transport (201 patents, 11.0 per cent of the total), electronic devices and electrical energy (195, 10.6 per cent), machine tools (195, 10.6 per cent), materials handling (155, 8.5 per cent), materials and metallurgy (154, 8.4 per cent) and measuring instruments (144, 7.9 per cent). Trends between sub-periods show that the share of mechanical engineering has declined from around 37 per cent of patents in 2014–2019 to around 33 per cent in 2020-2024, whilst that of electrical and electronic engineering has risen significantly, from around 13 per cent to approximately 21 per cent. Chemistry remains stable at around 23 per cent and instruments at around 15 per cent.

[43] RVCTI members currently receive funding based on the achievement of or alignment with certain targets, including the acquisition of patents, which may lead them to adjust their behaviour to optimise this metric and, consequently, may explain part of the recent increase observed in patent applications.

Companies lead the way in mechanical engineering patents, whilst the RVCTI focuses its activities on chemistry

The picture of the distribution by technology sector changes substantially when broken down by the institution involved in the patent application. In patents applied for exclusively by companies, mechanical engineering accounts for 51.6 per cent of patents, well ahead of chemistry (20.4 per cent), electrical and electronic engineering (19.6 per cent) and instruments (15.9 per cent). In patents where the RVCTI is involved, the order is almost completely reversed. Chemistry now tops the list, accounting for 47.6 per cent of patents applied for solely by agents and 49.1 per cent of those co-filed, followed by instruments, with 27.7 per cent and 32.1 per cent respectively, whilst mechanical engineering falls to 24.9 per cent and 18.9 per cent.

TABLE 2-12 Sectoral distribution of patents by type of collaboration in the application (2014-2024, % of each group's sectoral allocations)

Technology sector	Company only	RVCTI only	Joint application
Mechanical engineering	51.6%	24.9%	18.9%
Chemistry	20.4%	47.6%	49.1%
Electrical and Electronic Engineering	19.6%	21.4%	13.2%
Instruments	15.9%	27.7%	32.1%
Other sectors	13.1%	5.0%	9.4%
Patents	1 298	481	53

Note: A single patent may be assigned to more than one sector, so the sum of the sectoral shares may exceed 100 per cent.

Source: Compiled by the authors based on OECD-REGPAT (202602).

The breakdown by type of organisation shows that, of all patents in which the RVCTI is involved, multi-disciplinary technology centres account for 61.4 per cent of patents, followed by university research structures with 24.9 per cent, cooperative research centres with 18.7 per cent, and basic research and centres of excellence with 5.1 per cent. However, when the analysis is restricted to patents filed in collaboration with companies, the order differs. University research units account for 43.4 per cent of patents, overtaking multi-disciplinary technology centres, whose share falls to around 34.0 per cent.

TABLE 2-13 Share of RVCTI agent types in patenting activity (2014-2024)

Type of RVCTI agent	Total	RVCTI only	Joint applications
Multi-focus technology centres	61.4%	64.4%	34.0%
University research organisations	24.9%	22.9%	43.4%
Cooperative research centres (CIC)	18.7%	18.5%	20.8%
Basic research and centres of excellence	5.1%	5.0%	5.7%
Other technology centres and unique organisations	2,2%	2,3%	1,9%

Note: A single patent may be assigned to more than one category, so the sum of the shares may exceed 100 per cent.

Source: Compiled by the authors based on REGPAT (202602).

The fields in which the 53 co-owned patents are concentrated are spread across nine technological fields. The top three fields —biotechnology, pharmaceuticals and biological materials analysis— account for almost half of all co-ownership for the period. These are followed by measuring instruments, materials and metallurgy.

TABLE 2-14 Technological fields of patents co-filed by companies and RVCTI (2014-2024)

Sector	Technological field	Patents	% of 53
Chemistry	Biotechnology	9	17.0%
Chemistry	Pharmaceuticals	9	17.0%
Instruments	Analysis of biological materials	8	15.1%
Instruments	Measurement	7	13.2%
Chemistry	Materials, metallurgy	6	11.3%
Electrical and Electronic engineering	Information technology	4	7.5%
Mechanical engineering	Machine tools	4	7.5%
Mechanical engineering	Other specialised machinery	4	7.5%
Instruments	Medical technology	4	7.5%

Notes: The nine fields with the highest number of patents out of the 53 registered as joint applications are listed; a single patent may be assigned to more than one field.

Source: Compiled by the authors based on REGPAT (202602).

The low number of jointly owned patents (2.9 per cent) reflects a transfer model based on subcontracting

The 53 jointly-owned patents applied for over eleven years —representing 2.9 per cent of Basque patenting activity— stand in stark contrast to the analysis presented in the section on business R&D&I, where 42 per cent of innovative Basque companies reported cooperating with other stakeholders. However, part of the explanation can be found in the institutional model described in the previous section. The Basque technology transfer framework focuses largely on companies outsourcing to the scientific and technological network —as is the case with the Hazitek programme— whilst retaining ownership of the codified results upon completion of the projects. This does not, however, detract from the fact that some of the companies' patents are underpinned by the knowledge and efforts of both the company itself and other scientific and technological stakeholders.

2.6 Summary

The Basque Country has a **resource base for R&D** comparable to the European average in terms of expenditure and clearly superior in terms of research staff, predominantly driven by a business sector in which public research centres and cooperative research centres occupy a unique position. On this basis, **business innovation** has grown steadily to approach European levels, although its distribution remains characterised by a duality of scale which cooperation does not correct, but rather amplifies. **Knowledge flows** between actors are intense, but they run through a very specific channel, heavily mediated by actors within the science and technology network, and that channel is largely the re- This is the foreseeable outcome of a framework of public policy instruments that has deliberately promoted it for decades.

This effort translates into a wealth of specialised **scientific output** with an impact exceeding the European benchmark, and into **patenting activity** closely aligned with the region's industrial capabilities. The knowledge that the Basque Country generates and protects reflects, in effect, what the Basque Country is good at. However, the results also reveal that the formal interface between science and business is closer than the actual intensity of the relationship would suggest, and that the system's scientific strength and its patenting strength do not fully coincide in the same areas.

3
Impacts of technology transfer on the business fabric of the Basque Country

This chapter analyses the impact of technology transfer on business competitiveness

The previous chapter has characterised the Basque system of technology and knowledge transfer from within: the resources it mobilises, the innovative activity it supports, the channels through which knowledge flows between actors, the public instruments that coordinate them, and the codified outcomes in which all of this is realised. It remains to be seen, however, what effect this knowledge and its transfer have on the companies at the heart of the process and on the productive fabric as a whole. A mature, adequately funded innovation system that generates cutting-edge knowledge may, even so, have only a limited impact on the region's competitiveness if that knowledge reaches few firms or if those that receive it fail to transform it into market outcomes. This chapter addresses this issue from four complementary angles, ranging from the specific to the aggregate and combining statistical and qualitative evidence.

- Firstly, we examine how cooperation impacts the innovation outcomes of Basque firms, analysing both the rate at which firms introduce innovations, the degree of novelty of these innovations, and the turnover generated by them.
- ESecondly, we incorporate the companies' perspective through the example of Basque "Hidden Champions" – a group of companies that are leaders in their niche markets, enabling us to explore how a significant part of the industrial fabric experiences technology transfer from within.
- Thirdly, we broaden our focus to include external projection, analysing the evolution and composition of Basque exports of medium- and high-technology products, which provides an aggregate and indirect measure of the competitive outcome of technology transfer.
- Finally, we shift the focus from existing firms to start-ups, examining, on the one hand, the creation of spin-offs by scientific and technological organisations and the creation of technology-based firms in general, and, on the other, the resources and constraints they face in driving their growth and making an impact on the market.

3.1 Cooperation as a driver of business competitiveness

The impact of cooperation on innovation is assessed in terms of its realisation, degree of novelty and turnover

Section 2.3 of this report showed that Basque firms cooperate on innovation to a remarkable extent within the European context and that this cooperation is channelled primarily through actors within the STI ecosystem. It remains to be determined what impact this cooperation has on those who engage in it. Data from the innovation survey (obtained from Eurostat and the INE's microdata) enable us to answer this question by comparing two groups of innovative firms —those that report cooperating with other actors and those that innovate independently— across three dimensions that go beyond the mere fact of being active in innovation: (i) the introduction of innovations; (ii) the degree of novelty of the innovations introduced; and (iii) the proportion of turnover accounted for by these innovations.

The first dimension assesses whether the innovation effort yields results through the introduction of at least one innovation within the firm. The second distinguishes between innovations that are new only to the firm adopting them and those that are new to the market. This distinction separates the adoption of existing technology from the generation of genuine competitive advantage. The third dimension translates innovation into economic terms, measuring what proportion of revenue comes from products or services resulting from innovation. Taken together, these dimensions make it possible to assess not only whether companies innovate, but also the scale of their ambition and the impact on competitiveness.

The extent to which cooperating firms introduce innovation into their products or processes

The first question is whether cooperation helps a company that sets out to innovate to ultimately succeed in doing so. The distinction is not trivial, because a company active in innovation is not yet an innovative company. The first category includes both those that have actually introduced a new development and those that are continuing with ongoing activities, have abandoned them, or have introduced innovations developed entirely by others. Measuring the proportion of these firms that see the process through to completion provides an initial direct insight into the role that cooperation plays in boosting the industry's innovative capabilities.

Cooperation increases the proportion of companies that succeed in introducing product or process innovations

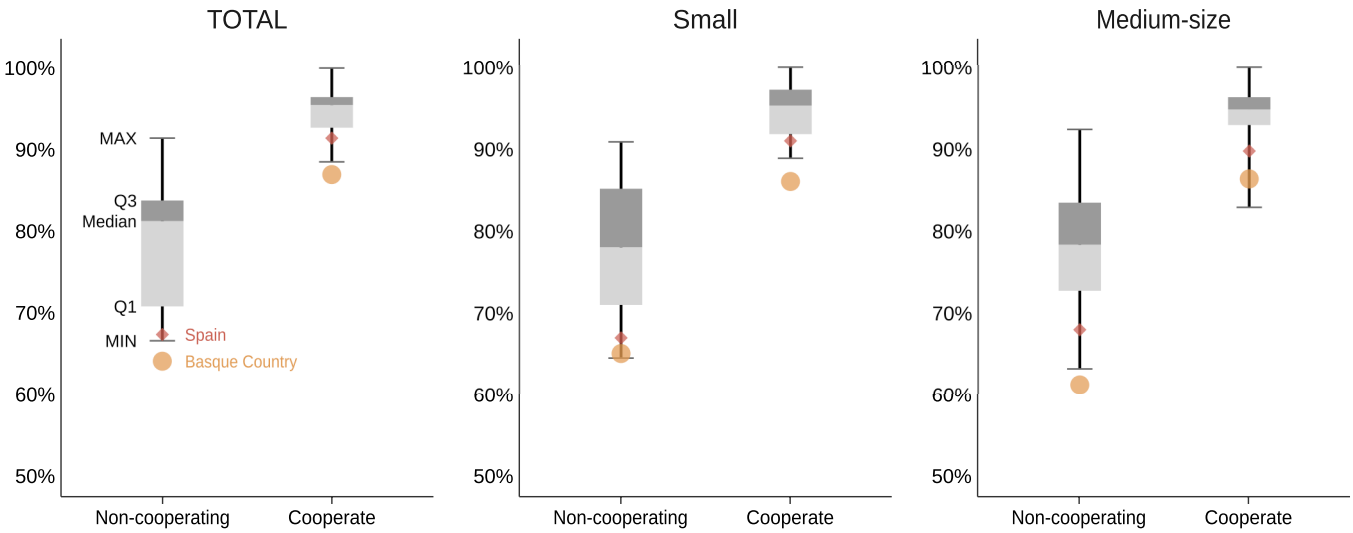
Chart 3-1 compares this conversion rate between cooperating and non-cooperating firms, placing the Basque result within the distribution of the EU-27 territories analysed.[44] Among those that cooperate, there is a marked increase in the proportion of firms that succeed in introducing innovations into their products or processes, compared with those that do not, with a clear distinction between the two distributions. Among the countries analysed, the median ratio of firms that succeed in introducing innovations stands at 81.2 per cent amongst innovation-active firms that do not cooperate, rising to 95.4 per cent amongst those that do cooperate.

The Basque Country follows this pattern to a similar extent. Among innovation-active firms that do not cooperate, 64.1 per cent succeed in introducing an innovation, compared with 86.9 per cent of those that do cooperate, a difference of more than 22 percentage points (greater than that of the EU-27 median of 14 points). However, it is worth noting that both figures lie at the lower end of the EU-27 distribution, in-

[44] This includes EU-27 countries for which data is available in Eurostat for the series and variables shown.

dicating that, although Basque enterprises are active in innovation, their ability to introduce innovations lags behind European levels.

CHART 3-1 Companies active in innovation that succeed in introducing a product or process innovation (2022, % of companies active in innovation)



Note: Based on EU-27 countries for which data is available (Belgium, Bulgaria, the Czech Republic, Estonia, Greece, Spain, Croatia, Italy, Lithuania, Luxembourg, Malta, Austria, Poland, Portugal, Romania, Slovenia, Slovakia and Sweden).

Source: Compiled by the authors based on Eurostat and INE microdata.

The pattern is consistently replicated across the different size categories, both in the EU-27 countries analysed and in the Basque Country. The smallest firms (with fewer than 50 employees) do not show a significantly greater improvement in cooperation outcomes compared with larger firms, as might perhaps be expected given their more limited resources and capacity to absorb such initiatives. Cooperation does not, therefore, appear to be a resource resorted to due to a lack of in-house resources, but rather a practice that enhances innovative performance regardless of the firm's scale. In the case of the Basque Country, the advantage of cooperating is 21 points for small firms and 25 points for medium-sized firms, and in both size categories the rates are at the lower end of the distribution across the countries analysed.

The results presented so far provide an initial indication of how the Basque Country's efforts in knowledge generation and innovation reach the market. Although an increasing number of Basque firms are undertaking innovation activities, as seen in section 2.2, the effective introduction of innovations is not keeping pace to the same extent. Basque firms complete their innovation projects less frequently than their European counterparts, whether or not they collaborate.

Basque companies introduce fewer innovations to the market than their European counterparts, even when cooperating

The degree of novelty of the innovations

Companies can introduce innovations that already exist in their market (innovation for the company), or they can introduce new developments that go beyond what already exists in the market (innovation for the market). Both are relevant to com-

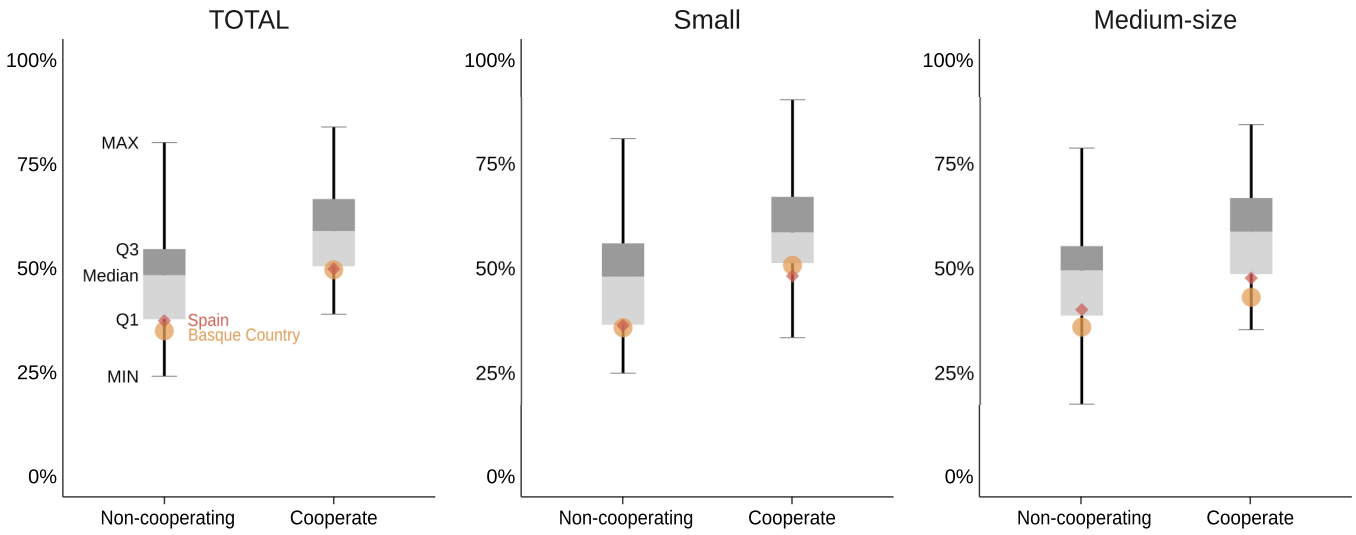
petitiveness, but it is the latter that have the potential to generate a greater impact through competitive advantage itself. Achieving that higher degree of novelty, however, requires a greater scientific and technological effort, and this is where knowledge transfer and cooperation can make a decisive difference.

The analysis shown in Chart 3-2 helps us to test this hypothesis. In the countries analysed, amongst firms that innovate in terms of products, the proportion that achieves a market novelty has a median of 48.3 per cent for firms that do not cooperate and 57.8 per cent for those that do. This advantage of cooperation is also evident when comparing the quartile values (Q1 and Q3) or the minimum and maximum values across the countries analysed. Once again, the result remains virtually unchanged across firm sizes.

Although cooperation increases the novelty of innovations, Basque industry continues to lag behind the rest of Europe

The Basque Country once again demonstrates the same advantage associated with cooperation. 35.0 per cent of firms innovating in products without cooperating achieve a market novelty, compared with 49.8 per cent of those that do cooperate —a difference of more than 14 percentage points, which is greater than the increase observed in the median across the countries compared (9.5 percentage points). By size, in this case a better result is indeed observed when small firms collaborate, increasing the market reach of innovations by 15 points, compared with when medium-sized firms do so, where the increase is 8 points. However, in all cases, the levels achieved remain below the first quartile of the distribution. This position reveals that, regardless of the impetus provided by collaboration, Basque industry is lagging behind in the generation of novel innovations for the market.

CHART 3-2 Product innovations that were new to the market (2022, % of total product innovations)



Note: Based on the EU-27 countries for which data is available (Belgium, Bulgaria, the Czech Republic, Denmark, Germany, Estonia, Ireland, Greece, Spain, Croatia, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, Malta, Austria, the Netherlands, Poland, Portugal, Romania, Slovenia, Slovakia, Finland and Sweden).

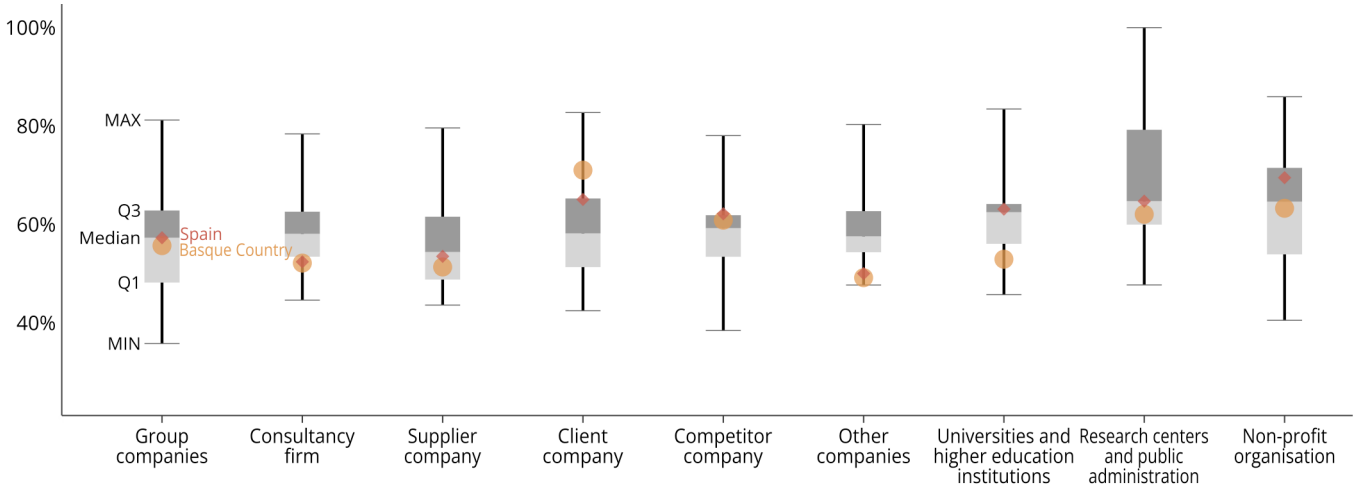
Source: Compiled by the authors based on Eurostat data and INE microdata.

Chart 3-3 below breaks down this result by the type of partner with whom the firm cooperates. In the distribution across the EU-27 countries analysed, partner entities belonging to the firm's value chain (suppliers, customers and competitors), as well as collaboration with group companies, consultancy firms or other firms, are closely aligned, with medians ranging between 55 per cent and 60 per cent. This level represents, in any case, a higher proportion of market-new innovations than that of companies that did not cooperate (48.3 per cent; see Chart 3-2). The distribution, however, rises significantly for those companies that cooperate with partners closer to the science and technology system: cooperation with universities and other higher education institutions places the median at 62.5 per cent, cooperation with non-profit organisations at 64.7 per cent, and cooperation with public or private research centres also at 64.7 per cent.

Collaborating with the science and technology system increases the proportion of market-novel innovations

The Basque case presents a distinct profile. The entity associated with the highest proportion of market innovations is the client company (71.0 per cent), which is above the European median. This is followed by non-profit organisations (63.3 per cent) and research centres (62.1 per cent), with figures close to the European median, whilst cooperation with universities (53.1 per cent) lags behind the European profile. As seen in section 2.3, part of the cooperation with STCs is spread across several categories, making it difficult to isolate its effect. With this caveat in mind, the results suggest that in the Basque Country, market novelty —and therefore the greater impact of innovations on industrial competitiveness— is associated not only with cooperation with the science and technology system, as in the EU-27, but also with cooperation with client companies.

CHART 3-3 Product innovations that were new to the market, by type of partner with whom collaboration takes place (2022, % of total product innovations)



Note: Based on EU-27 countries with available data (Belgium, the Czech Republic, Estonia, Greece, Spain, Croatia, Italy, Cyprus, Luxembourg, Hungary, Malta, Poland, Portugal, Romania, Slovenia, Slovakia and Sweden).

Source: Compiled by the authors based on Eurostat and INE microdata.

The evidence presented so far indicates that cooperation not only helps innovation to materialise but also enables it to gain a deeper foothold in the market in which the firm competes, and that the type of partner with whom the firm cooperates also makes a significant difference. The differences shown so far are, however, descriptive, and could be due to differences in sectoral, geographical or size composition between the two groups being compared. To rule this out, models have been estimated using available data from the EU-27 countries, which isolate the difference associated with cooperation once these three dimensions have been controlled for. The models are described in Appendix 2. The results, set out in Table 3-1, confirm the pattern at all levels and allow it to be quantified.

TABLE 3-1 Cooperation and the probability that a product innovation is new to the market, and the effect by type of partner with whom collaboration takes place (EU-27, 2022)

Dependent variable: market novelty	Result	Dependent variable: market novelty (ref.: firms in the group)	Result	Effect Marginal (pp)
Coopera	0.519*** (0.079)	Public or private research centres— Non-profit organisations and public administration	0.324** (0.138)	7.3
Industry (ref.: services)	0.124 *(0.104)*	Non-profit organisations	0.313** (0.139)	7.0
10 to 49 employees (ref.: 250 or more)	–0.380** *(0.153)*	Public sector client	0.260*** (0.091)	5.9
50 to 249 employees (ref.: 250 or more)	–0.401** *(0.176)*	Universities and higher education institutions	0.221*** (0.082)	5.0
Average marginal "cooperative" effect (pp)	11.9	Client firm	0.142* (0.075)	3.2
"Cooperates" odds ratio	1.68	Consultancy firm	0.032 (0.096)	0.7
Remarks	295	Competing firm	0.013 (0.079)	0.3
		Other firms	–0.027 (0.093)	–0.6
		Supplier	–0.029 (0.073)	–0.7
		Remarks	635	

Notes: The specification includes fixed effects for territory, sector and size bracket. Standard errors grouped by territory are shown in brackets. *** p < 0.01; ** p < 0.05; * p < 0.10. For further details, see Appendix 2.

Source: Compiled by the authors based on Eurostat (CIS2022).

Once differences by region, sector and size have been taken into account, the results show that companies that collaborate achieve market novelty with a probability 11.9 percentage points higher than those that innovate on their own. The con-

trol analyses also show that both firms with 10 to 49 employees and those with 50 to 249 employees achieve market novelty less frequently than those with 250 or more employees; the sector, however, has no significant effect. With regard to the interactions between cooperation and firm size or sector, none are significant, indicating that the advantage of cooperating is not concentrated in a specific type of firm, but rather operates independently of its scale and sector (see details in Appendix 2).

Cooperation increases the probability of launching market innovations by 11.9 percentage points

In the breakdown by type of stakeholder, taking cooperation with companies within the same group as a benchmark, stakeholders in the science and technology system are the only ones that stand out clearly. Cooperating with research centres is associated with 7.3 percentage points more market innovation, with non-profit organisations at 7.0 and with universities at 5.0. Added to these are public-sector clients, at 5.9 points, and client companies, at 3.2 points. Actors in the value chain, consultancy firms and other companies, by contrast, do not show a significant additional impact compared with collaboration within the group itself.

The economic return on innovation

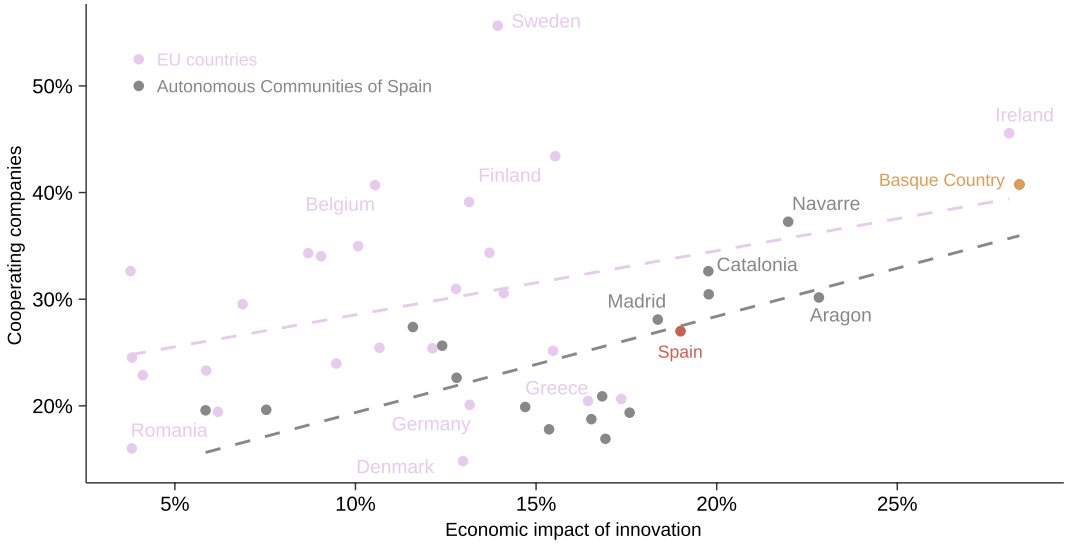
It remains to examine the increase in competitiveness in economic terms, which we estimate using the proportion of turnover derived from products in which firms have introduced innovations during the reference period. Chart 3-4 plots this indicator against the extent of cooperation in each territory, including both the EU-27 countries and the Spanish autonomous communities. The positive correlation shows that the territories where a larger proportion of firms cooperate on innovation are also, generally speaking, those in which innovation accounts for a larger share of turnover.

The Basque Country occupies a prominent position on this map, at the top right-hand corner of the scatter plot. Combined with a high rate of cooperation within the comparative context, innovation has an economic impact of around 28 per cent of turnover. This combination places it in the top right-hand corner, above the trend line for the Autonomous Communities (CCAA) and practically on the trend line for the countries.

Basque innovation focuses on improvements that directly benefit client companies and on key products

At an aggregate level, therefore, cooperation and achieving greater economic returns from innovation appear to be linked. Although this correlation between regions does not allow us to establish a causal relationship or extend the conclusion to individual firms, the association suggests that cooperation provides access to knowledge and capabilities that enhance the return on innovation —characteristics which, moreover, correspond to common factors such as the maturity of the innovation system or the productive structure of each region. In the case of the Basque Country, the result becomes particularly interesting when contrasted with the previous groups. Basque firms bring their innovations to fruition and achieve market novelty less frequently than their European counterparts, but innovation accounts for a very high proportion of their turnover. A coherent interpretation of both results is that Basque innovation is geared towards improvements closely linked to the client firm and towards products that account for a significant share of sales.

CHART 3-4 Relationship between cooperation and the economic impact of innovation for businesses (2022)



Note: Trend lines are included for observations from EU-27 countries (in blue) and Spanish autonomous communities (in grey).

Source: Compiled by the authors based on data from Eurostat and INE.

In summary, cooperating firms introduce innovations more frequently and, when they innovate in terms of products, they do so with greater ambition —that is, with innovations for the market and not just for the firm itself; at the European level, this ambition is all the greater the closer the chosen partner is to the science and technology system. Furthermore, at the aggregate level, the regions where cooperation is most widespread are also those in which innovation accounts for a larger share of turnover. The Basque Country confirms this pattern, with an even greater benefit from cooperation than is seen in Europe as a whole, albeit with its own distinct profile. Basque industry brings its innovations to fruition and achieves a degree of novelty for the market less frequently, but these innovations account for a larger share of its turnover and their novelty is also underpinned by cooperation with customers. What these data do not reveal is how these relationships come about: what triggers the collaboration, what obstacles it encounters and how it transforms the company at the centre of it. We devote the following section to this question.

3.2 The example of Basque "Hidden Champions": ways of innovating and the impact of collaboration

Basque "Hidden Champions" are leaders in their niche markets on an international scale

The statistical analysis in the previous section allows us to establish relationships and highlight general effects for the aggregate of companies, without being able to assess individual cases and their specific characteristics. To overcome this limitation, it is necessary to move from the aggregate to the individual case. This section does so using the example of the Basque "Hidden Champions", a group of small, medium-sized and large companies (mostly medium-sized) that are leaders in their market niches on an international scale.

The concept of "Hidden Champions" originated in Germany to explain export performance underpinned by medium-sized, specialised and highly internationalised firms (Simon, 1996). These are companies that occupy one of the leading positions in their niche on the international market; most are industrial firms, and they produce high value-added components, products or services that serve as intermediate inputs for other companies within global value chains. As they do not target the end consumer, their success often goes unnoticed by the general public, hence their name.

Hidden Champions base their export success on specialisation, industrial niche and added value

Orkestra has been studying these companies for over a decade and, together with the BBK Banking Foundation, is currently promoting the Basque "Hidden Champions" community, a forum where these companies can meet and collaborate with one another. The analysis in this section is based on interactions with this community to explore their approaches to innovation and their experiences of collaboration with scientific and technological stakeholders.

When analysing how knowledge reaches the market, the case of the "Hidden Champions" is particularly interesting for two reasons. On the one hand, they are highly representative of the Basque industrial fabric, combining small or medium size with industrial activity. On the other hand, they have transformed knowledge into positions of international leadership. To remain at the cutting edge of their niche, they must constantly decide what to develop in-house and what to pursue with external support, and that decision defines the role played by collaboration with the scientific, technological and research ecosystem in their operations.

Ways of innovating

To characterise how these companies relate to scientific and technological actors, it is useful to take as a basis the spectrum of modes of innovation illustrated in Figure 3-1 (Jensen *et al.*, 2007; Parrilli and Elola, 2012; Kamp, 2016; Najda-Janoszka, 2025). At one end of the spectrum lies the mode based on practical and tacit knowledge arising from production and relationships with customers and suppliers, known as DUI (Doing, Using and Interacting). This primarily gives rise to applied innovations that are close to the market. At the other end of the spectrum is the approach centred on the production and use of codified scientific and technical knowledge, known as STI (Science, Technology and Investigation), which relies on formal R&D departments and finds its natural partners in universities and public research organisations.

Companies do not fall into one camp or the other, but rather combine both approaches to varying degrees. Even in their initial formulation, Jensen *et al.* (2007) highlighted the value of combining both approaches to improve innovation outcomes, and subsequent research has confirmed that firms integrate STI and DUI practices and benefit from doing so (Parrilli *et al.*, 2020; Hervas-Oliver *et al.*, 2021; Najda-Janoszka, 2025). A firm's position on this continuum determines what it seeks from scientific and technological agents: partners with whom to explore new technologies, at the STI end, or concrete support to solve applied problems, at the DUI end. No position is superior to another, as each corresponds to a different way of competing.

The combination of the STI and DUI modes optimises innovation according to each company's competitive strategy

We shall use this spectrum as the central theme of this section, and Box 3-1 provides European and international context, showing that leading niche firms do not engage with the science and technology system in the same way everywhere. It can be seen that European "Hidden Champions" and Chinese "Unique Champions" combine features of both modes of innovation, but lean towards different ends of the spectrum.

FIGURE 3-1 Modes of innovation and collaboration with scientific and technological agents: spectrum DUI-STI



Source: Compiled by the authors based on Jensen et al. (2007), Parrilli and Elola (2012), Kamp (2016) and Najda-Janoszka (2025).

BOX 3-1: Europe's Hidden Champions and China's Unique Champions: two ways of engaging with the science and technology system

European Hidden Champions

They typically allocate around 6 per cent of their turnover to R&D —more than double the average for medium-sized manufacturing firms— and carry out nearly 80 per cent of that expenditure in-house. Their advantage lies in the tacit knowledge accumulated by stable engineering teams, which is difficult to codify and imitate (Rammer and Spielkamp, 2019). For this reason, they prioritise trade secrets and the complexity of their processes over patents.

They practise a sophisticated form of incrementalism, applying cutting-edge advances to refine their product within the niche in which they already compete, rather than to explore new technologies (Lampe *et al.*, 2024). They do not usually fund exploratory research, and to keep abreast of new trends they rely on external technology watch agencies.

European Hidden Champions apply cutting-edge advances to refine their products within the niche in which they compete

External collaboration accounts for up to 20 per cent of their R&D budget. They turn to prestigious applied research centres such as Fraunhofer (in Germany) or CEA (in France) only for specific needs that require capital or advanced infrastructure. They tend to be poorly integrated into their regional innovation systems, as local actors rarely possess expertise in such specialised technologies; consequently, they turn to partners with the specific knowledge required, regardless of distance (Rietmann, 2021, 2024). Around two-thirds are family-owned firms that are protective of their technological control. They therefore prefer bilateral agreements which they lead themselves and in which they retain ownership of the results (Schenkenhofer, 2022; Lehmann *et al.*, 2026).

China's Unique Champions

Inspired by the European model, the Chinese Government is promoting, as part of the "Made in China" plan, a programme designed to enable young SMEs —typically those less than ten years old— to occupy critical positions in strategic value chains. Those selected receive investment and support for around five years, with this support either continuing or ending as they consolidate their position.

Their R&D responds to state-mandated technological priorities rather than customer demands. They carry out between 60 per cent and 70 per cent of their work in-house and devote between 30 per cent and 40 per cent to collaborative projects. They prioritise codified scientific knowledge and patent on a massive scale, with incentives in the form of grants, tax breaks and criteria for listing on the stock exchange. Their projects range from pre-commercial research to large-scale commercialisation, with the aim of replacing imports.

They collaborate in broad consortia with the Academy of Sciences, universities and large state-owned enterprises, which act as both co-investors and clients. These consortia are centred on state-orchestrated national clusters, with contracts that set out the distribution of intellectual property.

China's Unique Champions collaborate in consortia with the Academy of Sciences, universities and state-owned enterprises

CHARACTERISATION OF THEIR RELATIONSHIP WITH THE SCIENTIFIC AND TECHNOLOGICAL SYSTEM

	European Hidden Champions	Unique Chinese market leaders
R&D effort	≈6% of turnover; ≈80% carried out within the company	60-70 per cent domestic and 30-40 per cent in cooperative projects
Knowledge base	Tacit, protected by trade secrets and process complexity	Codified scientific approach, with incentives for mass patenting
Type of innovation	Incremental and high TRL, to dominate the niche	From pre-commercial R&D to industrial scale-up
Relationship with the S&T sector and universities	Selective, for specific tasks that require capital or global infrastructure	Central, en consorcios amplios
Geographical scope	Global, with weak regional integration	National, in state-led clusters
Governance and pro-intellectual property	Bilateral agreements led by company	Public-private consortia with codified rules
Position in the model	Hybrid, leaning towards the DUI	Hybrid, leaning towards the STI mode

The comparison shows that the role of scientific and technological actors depends on the how companies innovate: one-off partners in one case, central components of a managed system in the other.

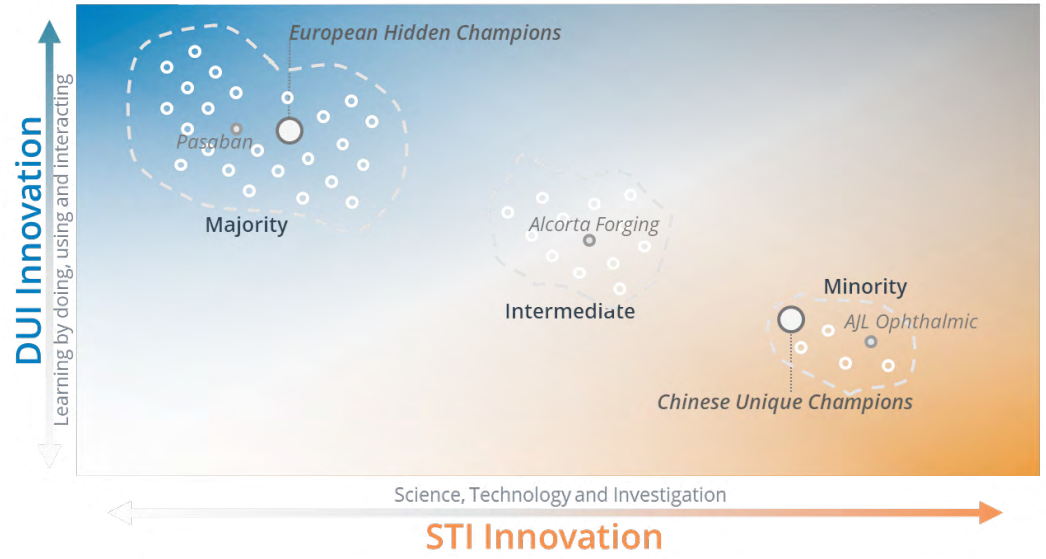
Basque Hidden Champions and collaboration for innovation

The evidence for analysing how Basque "Hidden Champions" interact with the Basque science and technology ecosystem comes from three distinct activities. The first was a survey on their experience of collaborating with science and technology centres and institutions (STCIs), to which 30 companies responded – representing almost 60 per cent of all "Hidden Champions" in the Basque Country (Gaztañaga *et al.*, 2026). The second was a workshop on technology transfer and other forms of collaboration with the science and technology ecosystem, held on 7 September 2026, attended by around 40 company representatives. The third was a follow-up consultation on how collaboration with the ecosystem could yield greater returns for them.

The Basque Hidden Champions fall into the DUI model, sharing a profile with their European counterparts

The companies operate in diverse sectors, are at different stages of development and compete with technologies at varying levels of maturity; consequently, a single profile cannot be expected. Even so, the group as a whole is clearly situated on the DUI side of the spectrum, in a position similar to that of European Hidden Champions, with a minority closer to the STI mode and an intermediate group combining both (Figure 3-2).

FIGURE 3-2 Illustrative position of the Basque Hidden Champions on the DUI–STI spectrum



Notes: The ranking assigned to the Basque "Hidden Champions" is illustrative and based on information gathered from the survey, the workshop and consultation with the community of Basque Hidden Champions (2026), as well as on previous work and research carried out in the field of 'Hidden Champions'. The three examples of companies included in the figure are analysed in Box 3-2.

Source: Compiled by the authors.

How they innovate

Innovation amongst the Basque Hidden Champions prioritises applied development, proximity to client companies and firsts in niche markets rather than formal R&D

The vast majority have an R&D&I department or a person in charge of R&D&I, and their average investment stands at around 5 per cent of turnover, although a large group remains below 3 per cent and even below 1 per cent.[45] Although these figures appear low, their innovation is usually cross-functional: it involves engineering, production and customer relations. They value learning through practice, which means that innovation efforts are not explicitly reflected in the budget of an R&D&I department, and that many interactions relevant to learning are not reported as formal collaboration on innovation. This reflects a culture that is more focused on engineering and applied development than on basic research.

Most of them file few patents, and their R&D expenditure bears no relation to the number of patents. Their competitiveness relies more on trade secrets, proximity to customers and speed of execution. Above all, they pursue applied innovations with a high TRL (7 to 9), aimed at improving and customising their solutions in the short and medium term. These are solutions ready to be integrated into capital goods and to solve specific problems faced by customers. Even so, these innovations are often world-firsts in terms of products or processes, which establish them as pioneers in their niche markets.

A minority fit a different profile. They allocate 10 per cent or more of their turnover to R&D, in some cases even employing a higher proportion of their workforce in this area, and carry out a larger proportion of their R&D in collaboration with others. In

[45] Findings derived from the Observatory of Basque Hidden Champions and prior research (see Kamp and Murciego, 2021; Gaztañaga *et al.*, 2026).

some companies, external expenditures outweigh internal ones. These companies file more patents and use intellectual property to demonstrate the cutting-edge nature of their research and to manage their knowledge. Others combine a focus on the immediate market with longer-term lines of research aimed at diversifying their business.

With whom and where do they collaborate?

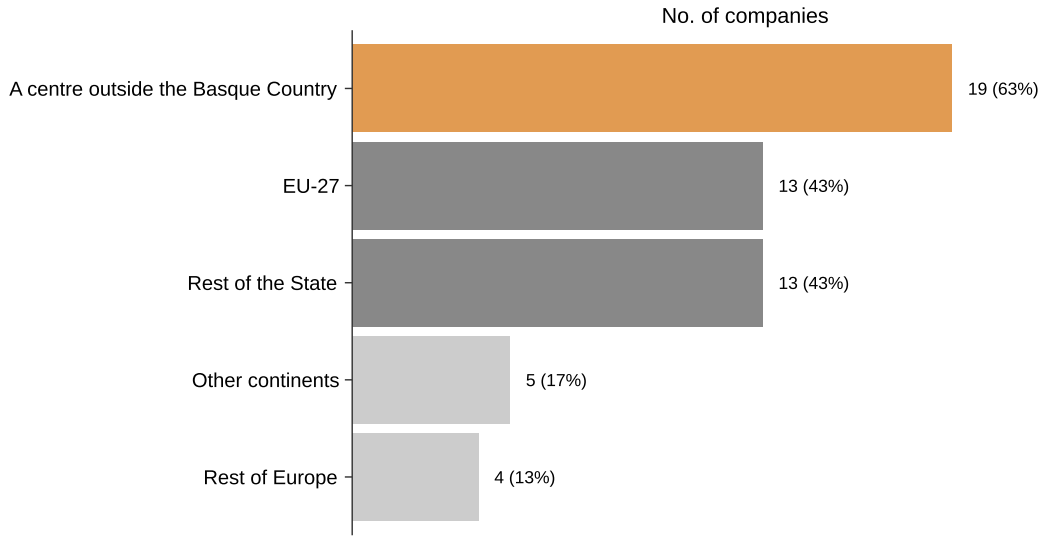
All "Hidden Champions" have collaborated with Basque public research organisations, but most place greater importance on partners within their value chain, with particular emphasis on customers. This is even the case in sectors such as healthcare or biotechnology, where competitiveness is demonstrated through practical viability and regulatory validation. With public research organisations, this group maintains a primarily transactional relationship, for specific bespoke engineering or closed-design commissions.

The more mature Basque Hidden Champions turn to international collaboration in search of capabilities not available within the regional environment

Among the Hidden Champions, only a minority regard research and technology centres, alongside universities and clinical stakeholders, as permanent strategic partners whose scientific results underpin their competitive edge. Between these two profiles, an intermediate group combines, or aspires to combine, both types of collaboration.

Many also extend beyond the regional ecosystem. As shown in Chart 3-5, almost two-thirds of the companies (63 per cent) have collaborated with public research centres outside the Basque Country, almost half (43 per cent) with centres in other EU Member States, and one-sixth (17 per cent) with centres outside Europe. In particular, those working with more mature technologies turn to international collaboration because they do not always find the supporting technological capabilities they require locally.

CHART 3-5 Geographical scope of collaboration with technology centres



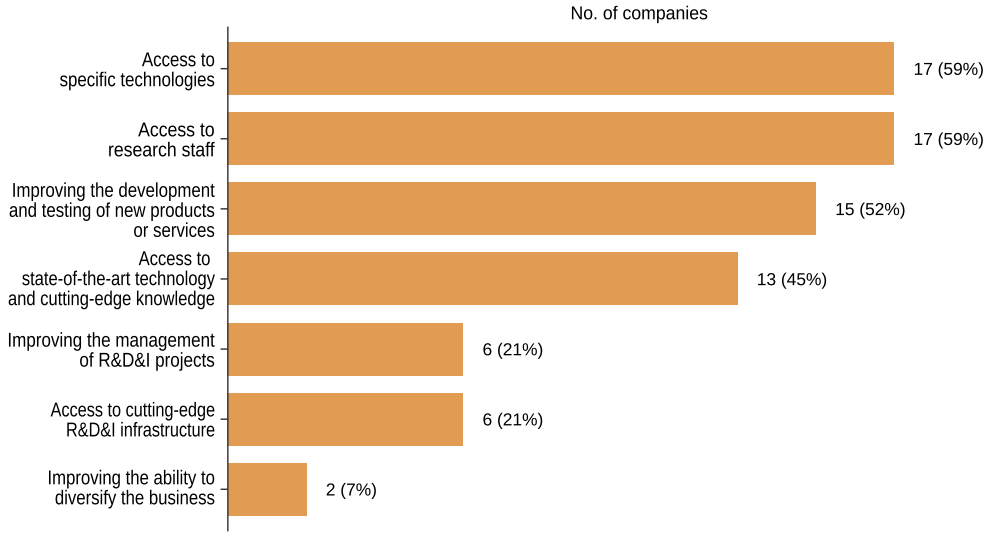
Source: Compiled by the authors based on the survey of the Basque "Hidden Champions" community (2026).

What they gain

The most frequently cited benefits are access to specific technologies and research staff (59 per cent in both cases), improved capacity to develop and test new products (52 per cent) and access to cutting-edge knowledge (45 per cent) (Chart 3-6). Access

to advanced R&D infrastructure is mentioned considerably less frequently (21 per cent), which is partly because these companies often have their own highly specialised laboratories and equipment, or because they turn to specialist centres or regulatory agencies elsewhere for this purpose.

CHART 3-6 Benefits of collaboration with technology centres

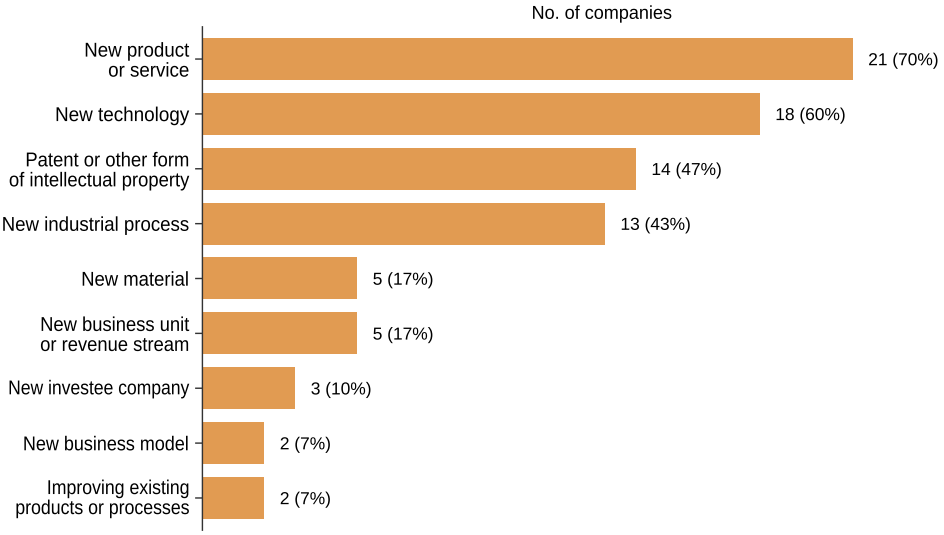


Source: Compiled by the authors based on the survey of the Basque "Hidden Champions" community (2026).

In terms of results, the collaboration has primarily led to new products or services (70 per cent) and new technologies (60 per cent), and to a lesser extent to patents or other intellectual property (47 per cent) and new processes (43 per cent). Only 17% cite new business units or revenue streams, and 10% cite new joint ventures (Chart 3-7). Its main contribution is, therefore, to improve product performance and optimise processes.

The main benefit of the collaboration is improved product performance and optimisation of processes

CHART 3-7 Results of collaboration with technology centres



Source: Compiled by the authors based on the survey of the Basque Hidden Champions community (2026).

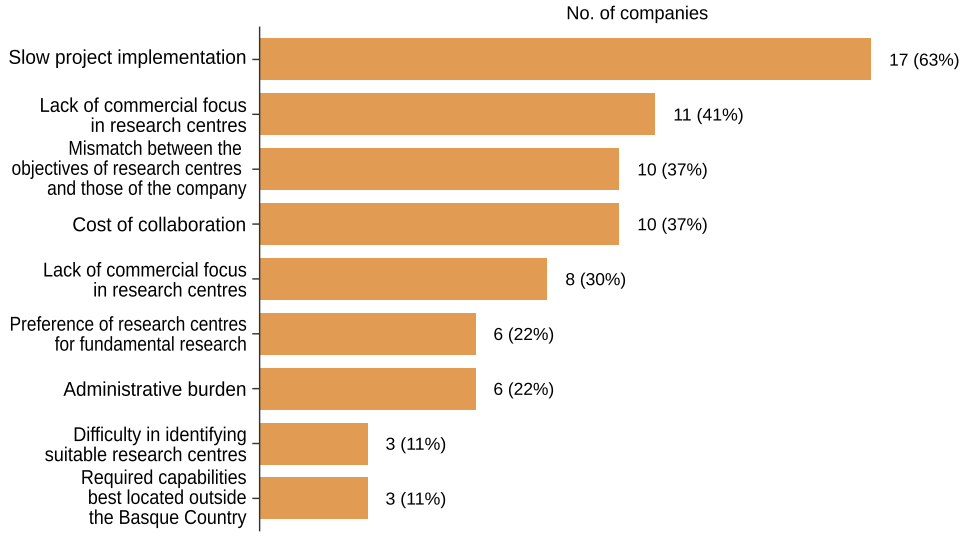
How they manage collaboration

Most prefer to lead the projects they initiate with the CCTTs, which guarantees them ownership and direct application of the results, and opt for bilateral contracts rather than consortia. A smaller group is open to collaborating on an equal footing and values the CCTT taking the initiative or sharing decision-making, particularly when neither the problem nor the solution is clear. This approach favours joint agendas and participation in consortia.

Areas for improvement in collaborative relationships

Companies also highlight areas for improvement (Chart 3-8). The most frequently cited are the slow pace of project implementation and structuring, often organised around milestones that are out of step with the market; the lack of alignment between the time horizons of both parties; the disconnect between the mission of the CCTTs and the commercial focus of the companies; and, according to some, the high cost of collaboration.

CHART 3-8 Areas for improvement in collaboration with technology centres



Source: Compiled by the authors based on the survey of the Basque Hidden Champions community (2026).

Companies and technology centres prioritise co-creation over the linear approach to technology transfer

Companies and public research organisations also agree that they do not feel comfortable describing their relationship as "technology transfer". Public research organisations consider that they rarely transfer technology directly, that the term overlooks the co-creation that should underpin the collaboration, and that they do not wish to be treated as a catalogue of solutions. Companies, for their part, see it as unrealistic to expect technologies directly applicable to their niche, and find it more useful for public research organisations to contribute technologies and practices that have been tried and tested in other sectors. They also believe that turning to public research organisations for conventional solutions undermines their role, which should be more strategic.

The areas for improvement identified vary depending on the innovation model and relate more to the phases preceding or following collaboration than to the collaborative relationship itself. Companies that are closest to the DUI model perceive that public research organisations have moved away from mature industries to focus on emerging technologies and that they are unaware of the materials and regulations specific to their sectors. They also point out that their results often remain confined

to the laboratory, making them difficult to implement on the production floor, and that they do not always provide adequate training for company staff, which creates a dependency. Those closest to the STI model argue the opposite and call for ongoing collaborative frameworks with shared roadmaps; they want public research organisations to assume part of the risk, to anticipate technological trends, and to help incorporate technologies from demanding sectors such as aeronautics, defence or energy. Box 3-2 explores this in more detail through three company case studies.

Companies closest to the STI model call for ongoing collaborative frameworks with shared roadmaps

BOX 3-2: Three companies, three ways of engaging with the Basque technology and knowledge transfer system

Pasaban, Alcorta Forging Group and AJL Ophthalmic are part of the Hidden Champions community and collaborate with the Basque CCTTs, but they do so for very different reasons, in very different ways and with very different results:

- **Pasaban** designs and manufactures high-precision cutting and winding machinery for the paper industry, with bespoke engineering for each client.
- **Alcorta Forging Group** manufactures forged and cast components, primarily for the automotive industry.
- **AJL Ophthalmic** develops medical devices for ophthalmology, such as corneal intrastromal rings, iris expanders and valves to relieve eye pressure.

What drives them to collaborate?

The starting point is different in each case. Pasaban was recently presented with a specific commercial opportunity: to enter the niche market for A4 paper-cutting machines with a client demanding unprecedented productivity. The technical challenge was to control vibrations during high-speed cross-cutting. At Alcorta, the mission is to bridge the gap between research and industrialisation and to draw on public research centres to develop new products, materials and markets, as part of a diversification strategy. At AJL, processes usually begin with an unresolved clinical need, which the company aims to turn into an effective application in the operating theatre.

How does this collaboration work?

Pasaban commissioned Tekniker to carry out a specific task: to simulate the dynamic behaviour of the blade holder and to calculate the mass and stiffness required to dampen vibrations. Using these calculations, its own technical department designed the device, which was validated through testing and adjustments at its Tolosa plant. The CCTT contributed the simulation and calculations, drawing on its advanced expertise, whilst the company took charge of the design and manufacture.

Alcorta combines projects under its own management with participation in consortia. One example is Effort 4.0, a project under the Hazitek programme which it leads alongside around ten companies and more than five CCTTs to apply artificial intelligence and advanced sensor technology to the manufacture of forged and cast components in extreme industrial environments. In addition to commissions and collaborations, he expects the public research centres to anticipate emerging technologies and bring in knowledge from other sectors relating to materials, simulation or manufacturing.

AJL tends to work in a networked manner from the outset. It develops its solutions in collaboration with healthcare professionals, hospitals, universities, public research centres and other companies, and allocates more of its budget to collaborative R&D than to in-house R&D. It selects its partners based on the expertise required for each project, both within and outside the Basque Country, and, when it comes to public research centres, it places particular value on specialist knowledge, technical capabilities and testing facilities.

What do they gain?

The results show clear differences. Pasaban entered a new niche and attracted a new client with a machine that sets a new standard in the market. Alcorta has attracted new OEM and Tier 1 clients in the automotive sector thanks to this and other projects, but its main achievement has been to establish highly efficient production processes. At AJL, several national and international projects have enabled the company to open up new lines of work, thereby expanding its potential to create new medical devices that successfully reach the market, reduce technical risk prior to industrial-scale manufacturing, and strengthen its ability to attract research talent.

What do they have in common?

Pasaban co-funded its development with Hazitek and the CDTI; Alcorta has taken part in projects run by Hazitek, Gaitek, Etorgai and the CDTI; and AJL carries out a significant proportion of its R&D through co-funded national and international projects. Furthermore, in none of these cases does the relationship with the CCTT involve the purchase of a proprietary technology; rather, the result stems from combining the CCTT's expertise with that of the company.

Taken together, the three cases show that the Basque system responds to very different needs: a specific technical service to resolve a product issue, a consortium to modernise processes, and a co-development network to create new products. In each case, what the company seeks from the CCTTs is linked to its approach to innovation.

Implications

The analysis shows that there is no single way of engaging with the science and technology system. Most Basque Hidden Champions innovate through practical experience and collaborate with science and technology centres on an ad hoc basis, whilst a minority regard them as strategic partners. An effective system needs to cater for both types, and each places different demands on the science and technology centres and on the companies themselves.

Suggestions for technology centres

For companies most closely aligned with the DUI model, the priority is to offer agile, short-term and practical formats: proof-of-concept studies, low-cost industrial pilot schemes and rapid diagnostics that enable technologies to be validated on-site before committing to major investments. These companies particularly value lateral transfer —that is, adapting and industrialising solutions that have already been tested in other sectors. Technology transfer centres can move towards advanced technology consultancy and solution validation, train company staff to avoid dependencies, and ensure that technologies and materials from mature sectors are not neglected.

Public research centres should adapt their services by offering agile solutions in R&D and forming strategic alliances in STI

For companies operating closest to the STI model, the demand is for more stable relationships. They are calling for strategic agreements with shared technology roadmaps —which do not depend on each round of funding calls— and risk-sharing models, such as joint investment, at-risk projects or participation in venture capital funds. They also expect public research centres to act as a technological beacon, anticipating trends before the need becomes apparent, and to promote consortia between companies from different sectors facing common challenges.

Suggestions for companies

Companies should strengthen their capacity for absorption capacity through bridge organisations in R&D and established units in STI

Companies with the most common profile can derive greater benefit from public research centres if they strengthen their absorption capacity, because without a minimum level of in-house technical capability they cannot capitalise on external knowledge. It helps them to have a liaison figure who transfers that knowledge within the company, to professionalise the management of intellectual property, and to move from one-off commissions to long-term relationships with shared objectives.

Companies closer to the STI model can consolidate R&D units that absorb external knowledge and rapidly link it to senior management and business lines. They would do well to seek out partners of excellence wherever they may be, without ruling out collaboration with clients and suppliers, and to combine long-term exploratory projects with rapid industrialisation pilots that ensure a financial return.

Suggestions for public policy

Public policy should diversify its instruments by facilitating access to applied projects and co-financing risks in times of uncertainty

The diversity of profiles suggests that the portfolio of instruments should include different formats, tailored to the rationale of public intervention, which is justified where market failures exist and whose intensity is limited by state aid rules depending on the level of technological maturity. In short-term, applied projects that are close to market, development is the responsibility of the companies themselves, and the public sector's role lies more in facilitating their access to the science and technology system —through assessments, technology vouchers or intermediation— than in financing the development. Multi-annual frameworks and risk-sharing schemes between companies and public research organisations, on the other hand, are more justified in phases of greater technological uncertainty, where private investment alone proves insufficient.

Finally, companies and public research organisations agree that their relationship is best understood as co-creation rather than transfer. Adopting this approach involves designing collaboration as a joint process, rather than the delivery of off-the-shelf solutions.

Although the Hidden Champions are a unique group, their experience also offers insights for Basque SMEs, which innovate primarily in terms of processes and can be expected to position themselves even further towards the DUI end of the spectrum. Their innovation is underpinned by female customers and suppliers, and in the Basque Country, cooperation with female customers is most closely associated with market innovations. However, the previous chapter (section 2.3) revealed that Basque companies cooperate little with their value chain, despite the strong presence of clusters. Cluster-promoting organisations can play a key role here, facilitating vertical collaboration between companies and linking it to the services offered by public research centres, so that SMEs combine both modes of innovation. For those with lower absorption capacity, this combination also requires local intermediation mechanisms.

3.3 External outreach: exports of medium- and high-technology products

The two previous sections have examined the direct effect of technology transfer on companies' internal results and processes. This section broadens the perspective to

the arena where these results ultimately prove their worth —the international market— and, to this end, examines the capacity of the Basque productive sector to compete abroad with products of high technological content.

Export capacity reflects the productivity and competitiveness of the business sector. However, beyond the volume exported, technological sophistication has come to play an essential role in these indicators. The technological composition of international exports of goods has become an established measure of regional competitiveness —specifically, of its capacity to translate knowledge into market positioning.[46]

Investment in R&D&I drives technology exports through absorption capacity and specialisation

In this regard, the literature documents a positive and robust relationship between R&D&I expenditure and the export of high-tech products (Navarro Zapata *et al.*, 2024). This relationship operates primarily through two channels. On the one hand, through absorption capacity, which enables firms to assimilate external scientific and technological knowledge and incorporate it into goods that are competitive on international markets. On the other hand, through specialisation, whereby regions tend to export more technology-intensive goods in those fields where they have previously built up a solid scientific and technical advantage.

To operationalise this analysis, we use the index of medium- and high-technology product exports developed by the European Commission in the *European Innovation Scoreboard* (EIS), detailed in Appendix 3. This indicator enables the performance of the Basque productive sector to be assessed and compared in a standardised manner, facilitating an analysis of trends, sectoral breakdowns and comparisons with Spain as a whole, its autonomous communities and the member states of the EU-27.[47]

Trends in medium- and high-technology exports, comparative position and product composition

Basque exports of medium- and high-tech exports accounted for 59.8 per cent of total exports

In 2025, Basque exports of medium- and high-technology products reached 17,843 million euros, accounting for 59.8 per cent of the territory's total exports (Chart 3-9). This is the highest ratio in the entire historical series, which began at 56.3 per cent in 2016. The trend in the relative share has not, however, been linear, and interpreting it requires examining the two components of the indicator separately, as at various points in the series the numerator and denominator have moved in different directions.

Between 2016 and 2019, both figures grew at a very similar rate, with fluctuations along the way, so that the share of technology exports ended the sub-period practically where it had begun (56.7 per cent, 0.4 percentage points above the 2016 figure). The contraction in 2020 affected both components in a similar manner (total exports fell to 21,100 million euros, of which 12,100 million were medium- and high-technology exports) and barely altered that proportion (rising slightly to 57.2 per cent). It is during the post-where the decoupling can be observed. Between 2020 and 2022, total

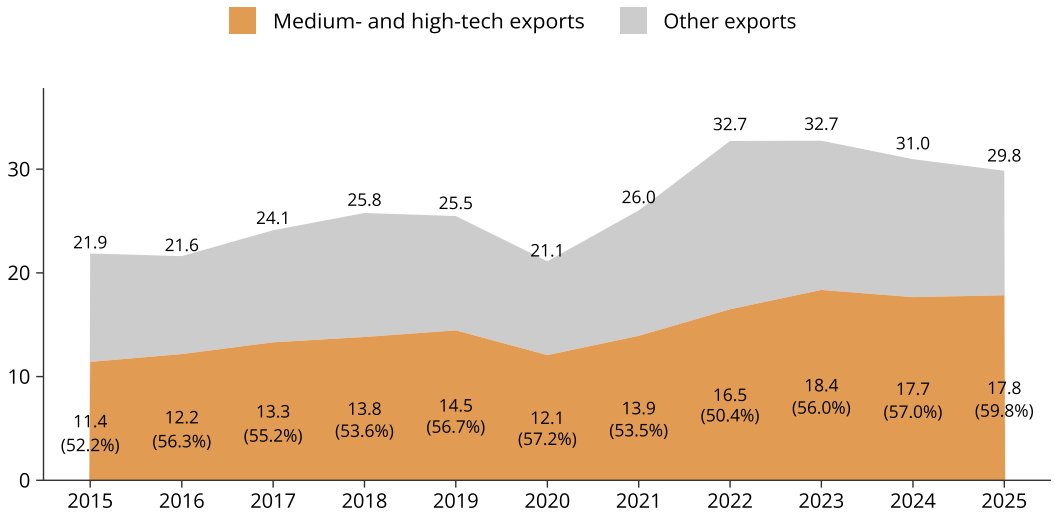
[46] This is reflected in its inclusion as an indicator in the European Commission's *European Innovation Scoreboard* and in UNIDO's *Competitive Industrial Performance Index*.

[47] The indicator corresponds to the definition in the European Innovation Scoreboard, which identifies medium- and high-technology products using a fixed list of headings from the Standard International Trade Classification (SITC Rev. 4). It should not be confused with the OECD classification used by Eustat to distinguish exports from the high- and medium-high-technology manufacturing sectors. Further information can be found in Appendix 3.

Basque exports grew to 32,700 million euros, reaching an all-time high, whilst medium- and high-technology exports, despite growing by 37 per cent to 16,500 million, failed to keep pace and their share fell to 50.4 per cent —the lowest in the entire series. This low figure is largely due to the rising cost of energy and raw materials, which drove up the value of non-technological exports; the data series itself corroborates this, as chemical and metal products —the sectors most exposed to input prices— reached their highest share of the total for the entire period in that same year.

From 2022 onwards, the Basque Country's export position in medium- and high-technology products is strengthened and demonstrates its resilience. In 2023, whilst total exports stagnate, technology exports grow by almost 2,000 million euros, gaining 5.6 percentage points to reach 56.0 per cent. Over the following two years, whilst total exports fall by almost 9 per cent, technology exports barely decline in value, driving their share up to 59.8 per cent of the total by 2025. The growth in the final period is therefore due to the technology sector's ability to hold its ground in an unfavourable international trade environment.

CHART 3-9 Basque medium- and high-technology exports (thousand M€ and share of the total)



Source: Compiled by the authors based on data from Datacomex.

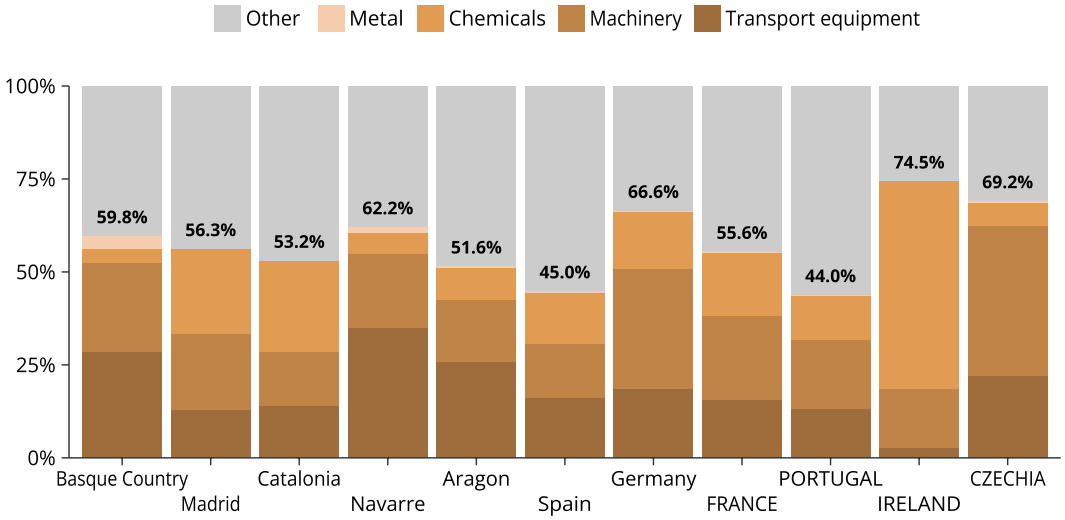
This result becomes clearer when viewed in a comparative context. Chart 3-10 illustrates both dimensions: (i) the share of medium- and high-technology products in each region's total exports; and (ii) their internal breakdown into four major sectors (transport equipment, machinery, chemicals and metals). The Basque Country's result ranks at the top of the comparison (see Appendix 3), almost 15 percentage points above the Spanish average, and amongst the EU-27 countries, it ranks behind Germany —where these products account for 66.6 per cent of its exports— with only five other countries ahead of it (Ireland, Slovakia, Slovenia, the Czech Republic and Hungary; see Appendix 3). Among the Spanish regions, Navarre stands out, with a higher technological weighting than the Basque Country but underpinned by a concentration in transport equipment (particularly motor vehicles) that is far greater than that of the Basque Country and the other territories included in the comparison; consequently, its higher technological weighting is accompanied by a much greater reliance on a single product.

The value of Basque technology exports far exceeds that of the Spanish average and stands out in Europe

The Basque Country stands out for the high combined share of transport equipment and machinery

It is, however, in terms of composition that the Basque Country stands out most clearly. No other region under comparison combines transport equipment and machinery with such high shares that are so closely matched (only the Czech Republic and Slovakia come slightly close to the Basque composition, which accounts for 87.6 per cent of technology exports across these two sectors). Chemical products, by contrast, account for a very small share, particularly when compared with Madrid and Catalonia. Finally, the metallurgical sector, despite its modest share, is a feature that no other region replicates to a comparable extent.

CHART 3-10 Basque medium- and high-technology exports in the comparative context and by product (2025)



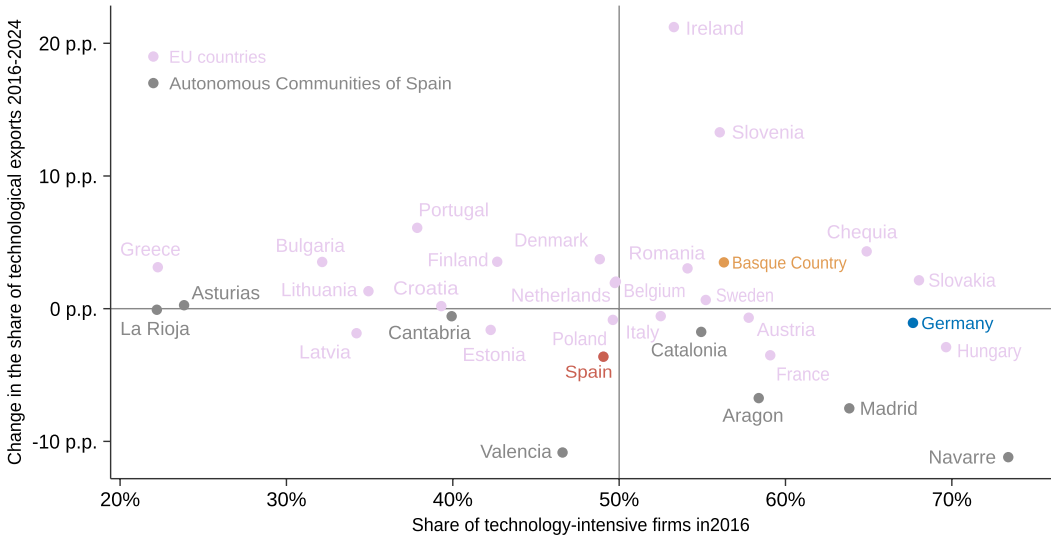
Notes: A selection of Spanish autonomous communities and EU-27 countries is shown. The complete figure, including all EU-27 countries, is provided in Appendix 3.

Source: Compiled by the authors based on data from Datacomex and Eurostat.

Although the regions with the greatest technological weight tend to be losing ground, the Basque Country has increased its share by 3.5 points

Chart 3-11 completes the comparison by incorporating the time dimension, ranking each region according to the share of medium- and high-technology products in its exports in 2016 and according to how much that share has changed by 2025. The dominant pattern is one of convergence. The most significant improvements are concentrated in regions that started from low levels. Portugal, Bulgaria and Greece have gained between three and six percentage points from levels below 40 per cent, whilst those that started with the highest technological shares tend to have declined (Navarre has lost 11.3 percentage points from an initial 73.3 per cent, Madrid 7.6 from 63.9 per cent, and Hungary and Germany have also declined). On this map, the Basque Country represents a minor exception, starting from a weighting of 56.3 per cent —higher than most of the territories compared— and yet it has still increased this by 3.5 points. Among the territories that exceeded 50 per cent in 2016, only four countries have increased this weighting. The most notable of these, Ireland and Slovenia, have experienced atypical growth, explained by the rise in pharmaceutical exports from major corporate groups in these countries. A more illustrative case for the Basque Country is that of the Czech Republic. With a similar industrial structure, heavily reliant on the automotive sector, it started in 2016 with a higher share of technology exports than the Basque Country and has nevertheless managed to increase this by around four additional percentage points.

CHART 3-11 Trends in medium- and high-technology exports in a comparative context

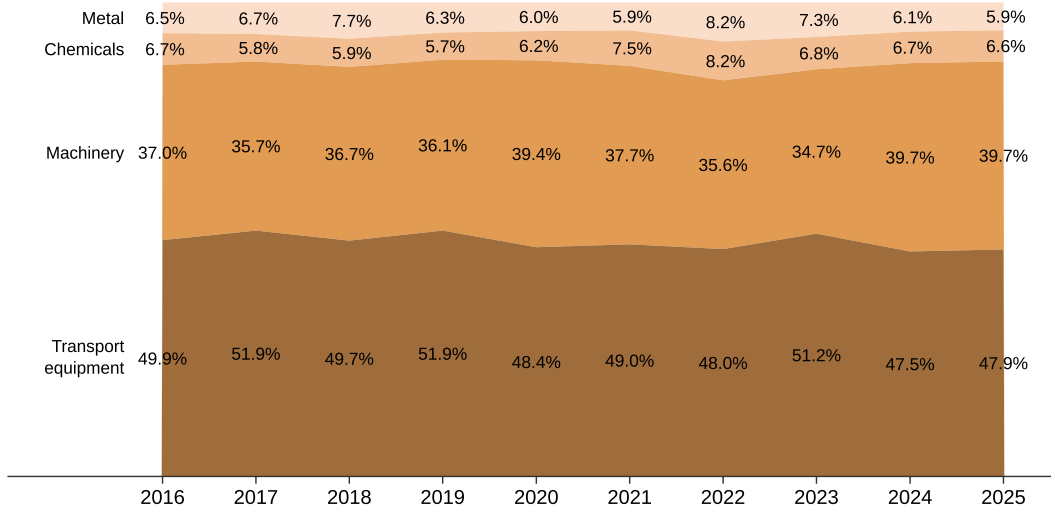


Source: Compiled by the authors based on data from Datacomex and Eurostat.

Having examined its relative position, it is worth focusing on the internal composition of these technology exports, which are organised into four categories of very different sizes (Chart 3-12). Transport equipment accounts for nearly half of total technology exports (47.9% in 2025) and machinery and equipment for almost 40% (39.7%), meaning that these two sectors constitute the two pillars of Basque medium- and high-technology exports. The remaining two sectors, chemicals and metals, each barely exceeded 6 per cent in the most recent financial year (6.6 per cent and 5.9 per cent, respectively) and did not exceed 8.2 per cent in any year of the series. The most striking feature, however, is the stability of this structure, which maintains very similar proportions throughout the entire decade.

Transport and machinery lead Basque technology exports, whilst electrical and specialised equipment are gaining ground

CHART 3-12 Trends in Basque medium- and high-technology exports by product (% of total medium- and high-technology exports)



Source: Compiled by the authors based on data from Datacomex.

A breakdown by product within each category provides further detail on this aggregate stability. Table 3-2 lists the nine products whose share varies most significantly between the averages for 2016-2018 and 2023-2025. None of them exceeds a three-point variation, but for the products with the lowest share, these changes represent significant relative shifts.

TABLE 3-2 Medium- and high-technology products with the greatest variation in exports (% of medium- and high-technology exports)

Products	2016-2018	2023-2025	Change
Machinery and electrical equipment and their components	6.5%	8.2%	1.7pp
Other transport equipment (rail, aviation and marine)	5.8%	7.0%	1.2pp
Chemicals, formulations and prepared mixtures	0.9%	1.5%	0.6pp
Military and defence products (weapons, ammunition, vehicles)	0.7%	1.1%	0.4pp
Primary-form plastics (polymers, resins, silicones)	0.9%	0.6%	–0.3pp
Machine tools for metal moulding	1.3%	0.9%	–0.4pp
General-purpose industrial machinery and equipment and parts thereof	13.8%	13.4%	–0.4pp
Tubes, pipes and hollow sections of iron or steel	6.1%	5.6%	–0.6pp
Road vehicles and their components	44.7%	41.8%	–2.9pp

Source: Compiled by the authors based on data from Datacomex.

The category that has seen the greatest decline is road vehicles and their components, which has fallen by 2.9 points, although it still accounts for 41.8 per cent of the region's total technology exports. Conversely, machinery and electrical equipment and their components gained ground, rising by 1.7 points, as did other transport equipment (railway, aeronautical and naval), which rose by 1.2 points. Showing smaller gains, but of greater significance given their low starting point, are chemical products and prepared mixtures, as well as military and defence products, whilst among the most moderate declines are steel tubes and sections, general-purpose industrial machinery, machine tools for metal forming, and plastics in primary forms.

Those losing ground are products linked to less differentiated or more mature activities; conversely, areas with greater technological content within the same product families are gaining ground. In transport, railway, aeronautical and naval equipment as opposed to the motor vehicle; within machinery, electrical and electronic components as opposed to mechanical ones. This is an emerging diversification, still on a small scale, but consistent with the trend identified in the previous chapter regarding the region's patenting activity, where the share of mechanical engineering was also declining in favour of electrical and electronic engineering. The concentration on the automotive sector remains, in any case, the main factor contributing to the vulnerability of the Basque Country's position as a technology exporter.

Global electrification is opening up opportunities in key Basque sectors such as networks, mobility and energy management

With regard to this emerging diversification, the global acceleration of electrification is opening up new opportunities for industrial sectors in which the Basque Country already possesses significant capabilities, including those specialising in electricity grids, electrical equipment, industrial electronics, energy storage, electric mobility and digital solutions related to energy management. The consolidation of these value

chains can help to diversify the export base and increase the technological content of exports.

3.4 Knowledge transfer in the creation of new businesses

Technology and knowledge transfer do not end with collaboration between businesses and knowledge-based organisations. A significant part of its impact is reflected in the emergence of new companies linked to the STI ecosystem. The best example of this is start-ups founded on the basis of knowledge and innovative activity developed within a scientific or technological institution —commonly referred to as spin-offs— which are geared towards producing goods for the market.

The creation of new technology-based firms more broadly is also an indicator of interest for studying the impact of the technology transfer system. Whilst they do not have a direct link to a scientific or technological actor, these companies are indirectly influenced by "soft" channels of technology transfer: the focus of higher education, a network of cutting-edge science, a culture of open innovation, or public policies offering appropriate incentives, amongst others.

The creation of technology-based firms is an indicator for studying the impact of the technology transfer system

The Global Entrepreneurship Monitor's annual survey of experts once again ranks the Basque Country first in Spain in terms of the conditions provided by R&D transfer for the creation of new businesses (5.2 out of 10, compared with the national average of 4.5). This section examines whether these conditions translate into results, to what extent they do so, and what factors may limit the effective conversion of knowledge into market value (for example, funding).

Spin-offs

Between 2010 and 2025, a total of 129 spin-offs were created in the Basque Country, with an uneven trend but marked by a sharp increase compared with the early years of the period analysed (see Chart 3-13). If we divide this period into three phases:

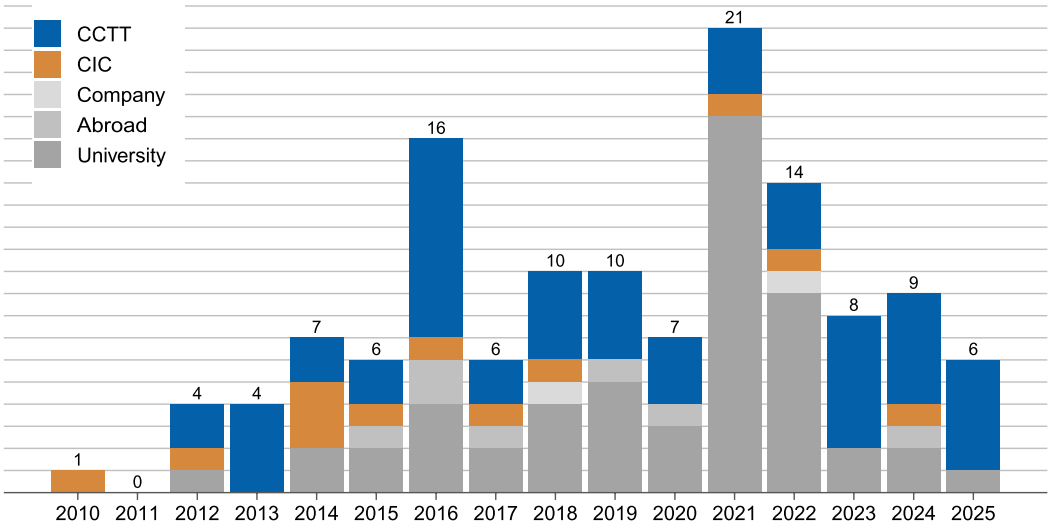
Between 2010 and 2025, a total of 129 spin-offs were established in the Basque Country

- between 2010 and 2015, the rate of spin-off creation was modest, averaging fewer than 4 companies per year;
- from 2016 to 2020, the number of start-ups originating in the university and scientific communities increased to an average of around 10 spin-offs per year; and,
- In 2021, a new, more pronounced upturn was observed, coinciding with the economic recovery following the COVID-19 health crisis. 2021 and 2022 were the two exceptional years in the series, with 21 and 14 cases respectively, whilst in the remaining years the rate stabilised at between 6 and 9 new companies per year.

Chart 3-13 also enables us to characterise the origin of these spin-offs. Just over half of the cases (66 out of 129, or 51 per cent) originate from CCTTs and CICs. CCTTs are the most frequent and stable source throughout the entire period, with activity in every year since 2012 and a minimum of two companies per year. Universities are the second-largest source, with a particularly marked presence in 2021 and 2022.[48]

[48] The most isolated cases correspond to spin-offs from universities outside the Basque Country (from the rest of Spain or other countries) that establish their registered office in the Basque Country, with seven such cases scattered throughout the time series.

CHART 3-13 Creation of spin-offs in the Basque Country by institutional origin, 2010-2025 (no. of companies)

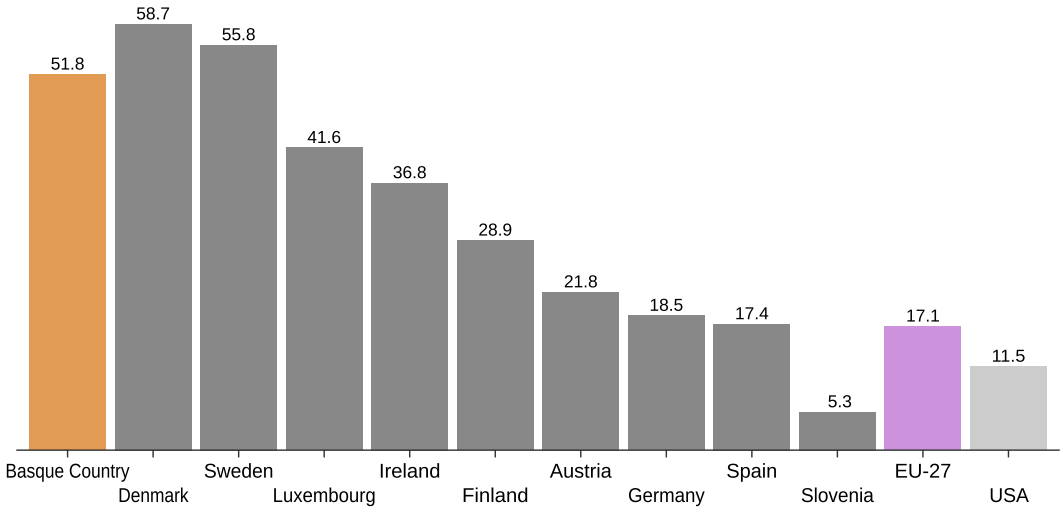


Source: Compiled by the authors based on data from SPRI up!Euskadi and Dealroom.

The Basque Country has 51.8 spin-offs per million inhabitants, coming close to European leadership

The international comparison, shown in Chart 3-14, confirms the strength of the Basque model. Analysing the creation of spin-offs in relation to the region's population, the Basque Country, with a figure of 51.8 spin-offs per million inhabitants, ranks only slightly behind the European leaders, Denmark and Sweden, and ahead of key regions such as Ireland and Finland. Furthermore, it is almost three times higher than the average for Spain (17.4) and the EU-27 (17.1), and more than four times the figure for the United States (11.5).

CHART 3-14 Spin-offs created per million inhabitants (2015-2025)



Note: The ratio is calculated using the average population as at 1 January for the years 2015-2025.

Source: Compiled by the authors based on data from SPRI up!Euskadi and Dealroom.

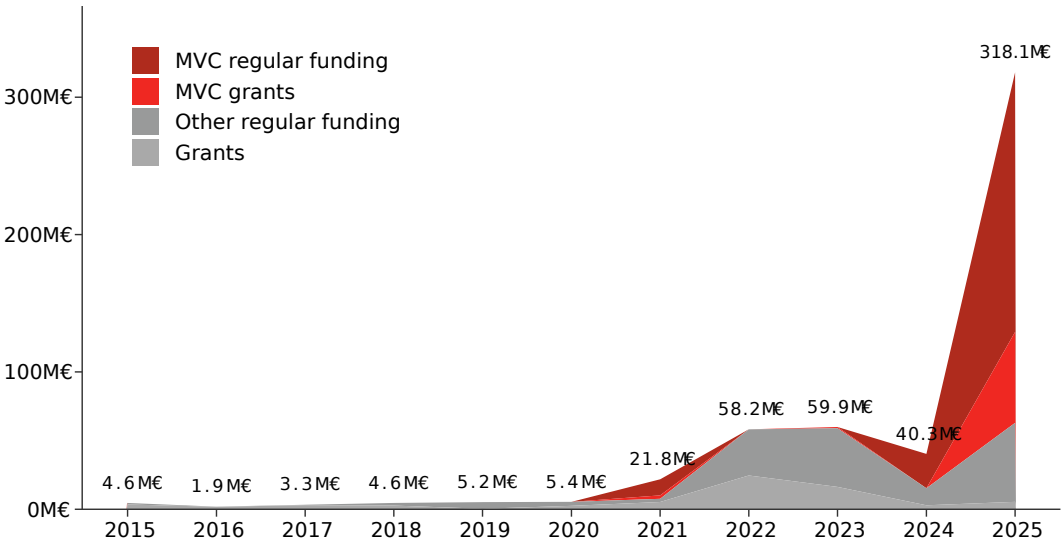
The key distinguishing factor behind this result is, without doubt, the diverse and mature Basque RVCTI, with a structure in which technology centres (CCTT) and co-operative research centres (CIC) play a very significant role. In the two regions that outperform the Basque Country, however, the driving force is fundamentally university-based. In Denmark, these are the University of Aarhus and the Technical University of Denmark; in Sweden, the KTH Royal Institute of Technology. Finland is the case most similar to that of the Basque Country, as it has a state-owned technology centre, the VTT Technical Research Centre, which has fostered a significant number of spin-offs.

Investment in Basque spin-offs rises sharply to €318.2 million

The number of spin-offs is not, however, sufficient to gauge the success of the model. Sectoral focus and, above all, the ability to attract investment for growth are equally necessary factors to analyse. Thus, as shown in Chart 3-15, it can be seen that the investment secured by Basque spin-offs has developed very positively, rising from total figures of 5 million euros or less up to 2020 to between 40 and 60 million euros annually between 2022 and 2024. The year 2025 stands out from the rest of the series by multiplying the investment attracted in the previous year by six, reaching 318.2 million euros, 80 per cent of which was directed that year to the company Multiverse Computing, specialising in AI software and quantum computing.

The positive trend in investment raised has been accompanied by a shift in the source of funding. The proportion of non-repayable institutional grants has declined over time, whilst investment from sources such as venture capital, investment funds and companies has gained in importance. Specifically, grants accounted for an average of 58 per cent between 2015 and 2019, whilst between 2020 and 2025 this figure fell to 25 per cent.

CHART 3-15 Investment raised by Basque spin-offs, 2015-2025 (€ million)



Note: MVC stands for Multiverse Computing. FP stands for non-repayable grant.

Source: Compiled by the authors based on SPRI up!Euskadi and Dealroom.

Business software, energy and transport lead the way in sector-specific funding raised by spin-offs

The sectoral breakdown of this same funding, allocating the amount raised by each company across the sectors to which it belongs,[49]confirms the dominance of business software, driven by spin-offs from quantum computing and AI (Table 3-3). In second place is the energy sector, with a considerable amount linked to sustainability and decarbonisation initiatives (energy storage, hydrogen). Third place goes to transport, also linked to sustainability. Healthcare also occupies a significant position, whilst the food sector ranks somewhat lower, although still above 10 million euros. Below this threshold, between 1 and 10 million euros, lie technology and hardware sectors such as robotics, engineering and manufacturing, semiconductors, security and education. Thus, the allocation of funding is closely aligned with the strategic priorities of the Basque Country (as set out in the Industry Plan – Euskadi 2030) and those of the EU.

TABLE 3-3 Total cumulative funding by company and by sector of activity (2015-2025, M€)

Companies	M€	Sectors	M€
Multiverse Computing	402.71	Enterprise software	408.15
Basquevolt	61.05	Energy	104.89
H2site	57.40	Transport	52.10
Crisalion Mobility	20.40	Health	40.60
Cocoon	17.00	Food	19.85
Biotech Foods	10.39	Robotics	6.86
Irisbond	8.84	Engineering and manufacturing equipment	6.26
Innitius	7.40	Semiconductors	4.28
Graphenea	6.27	Security	3.55
Metal 78	4.73	Education	1.33
Other	52.81	Other (games, cosmetics, fashion, sport, etc.)	1.16

Source: Compiled by the authors based on SPRI up!Euskadi and Dealroom.

The Basque Country leads the way in spin-off creation, but lags behind the EU-27 in terms of average funding

To put these results into perspective, it is necessary to put the investment received into context by analysing it in terms of the average per spin-off and comparing it with the wider context. This reveals that, whilst the Basque Country stands out in terms of spin-off creation —highlighting the capacity of its innovation model to generate new companies— in terms of average funding per spin-off, it falls below the EU-27 average (with an average investment of 4.6 million euros per spin-off between 2015 and 2025, compared with 6.1 million in the EU-27).[50] Finland leads the EU-27, with an average of nearly 20 million euros raised per spin-off, followed by Ireland, the Netherlands, Belgium, Germany and Denmark, all of which are around double the Basque Country's figure (see Chart 3-16). The Basque Country is si- It remains, however,

[49] Some companies belong to more than one sector according to the classification used by the information source; the figure is therefore divided equally amongst the sectors to which they belong.

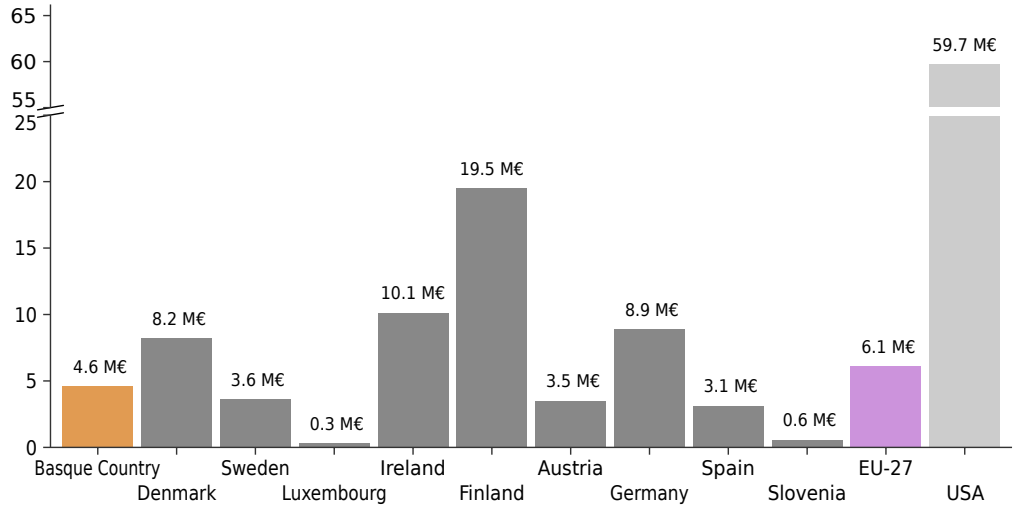
[50] The figure includes Multiverse Computing, which attracted more than 60 per cent of the total investment of all spin-offs between 2015 and 2025. Without this contribution, the overall figure would be significantly lower, which would widen the gap compared with other territories. However, it should be noted that the presence of exceptional companies that account for a large proportion of the funding is a common phenomenon in most regions and countries.

above Sweden and Austria, and in a significantly better position than the Spanish average (3.1 million euros).

Particularly noteworthy is the performance of the United States, which, despite not standing out in terms of spin-off creation per capita, has an average funding level per spin-off (59.7 million euros) that is almost ten times higher than the European average. This illustrates that funding —and not just the creation of companies— is essential for a spin-off arising from a technology transfer process to make the leap to the market and establish itself internationally.

Average funding for spin-offs in the US is ten times that in Europe

CHART 3-16 Average investment raised per spin-off, 2015-2025 (M€)



Source: Compiled by the authors based on data from SPRI up!Euskadi and Dealroom.

Table 3-4 expands on this comparison, incorporating the indicator of the proportion of investment attracted in the form of non-repayable grants. As anticipated at the start of this section (Chart 3-15), grants accounted for 26 per cent of total investment attracted in the Basque Country between 2015 and 2025, well above the EU-27 average (10 per cent). This result can be interpreted in two complementary ways. On the one hand, it highlights the active role played by Basque and national public policy[51] in providing funds to these companies to achieve the levels of investment raised, partly compensating for a private venture capital market that remains less developed than that of its more advanced European counterparts (OECD, 2024; BasqueFIK, 2026). On the other hand, it may indicate that some of these projects are not sufficiently attractive to private capital, due to their scale, their degree of maturity or their growth ambitions.

Public funding accounts for 26 per cent of the financing for Basque spin-offs, supplementing private capital

Public support is not limited to grants. Alongside these, there are public equity, loan and guarantee schemes at regional, provincial and national levels, aimed at technology-based firms at different stages of their development (e.g. Seed Capital Bizkaia, the Deeptek Gipuzkoa Foundation, loan and guarantee schemes from the Basque Institute of Finance and Elkargi, and the investment activities of the CDTI and the SETT), as well as the business start-up support programmes described in section 2.4, such as Basque Tek Ventures or those run by the BIC network.

[51] One of the largest grants was awarded by the Spanish Government to Multiverse Computing in 2025 through the Spanish Society for Technological Transformation (SETT).

TABLE 3-4 International comparison of spin-off creation and funding raised (2015-2025)

Region	Spinoffs per	Investment per spin-off	% Non-repayable grants
United States	11.53	59.71	5%
Finland	28.90	19.49	6%
Ireland	36.80	10.11	9%
Netherlands	25.94	9.33	11%
Belgium	24.71	9.25	5%
Germany	18.54	8.89	11%
Denmark	58.67	8.19	5%
France	23.06	6.68	9%
EU-27	17.06	6.09	10%
Hungary	0.83	5.28	11%
Basque Country	51.76	4.59	26%
Sweden	55.80	3.60	10%
Austria	21.77	3.48	7%
Portugal	22.41	3.31	11%
Lithuania	3.86	3.29	22%
Spain	17.38	3.12	17%
Italy	16.64	1.42	7%
Estonia	30.70	1.05	27%
Czech Republic	4.03	0.84	3%
Slovakia	0.55	0.76	100%
Latvia	6.26	0.59	7%
Slovenia	5.26	0.58	66%
Poland	1.66	0.52	24%
Greece	4.82	0.31	29%

Note: Results for Luxembourg, Romania, Croatia, Malta, Cyprus and Bulgaria are omitted due to a lack of data.

Source: Compiled by the authors based on data from SPRI up!Euskadi and Dealroom.

New technology-based firms

Analysing technology-based firms enables an assessment of the technological content of the new Basque business landscape

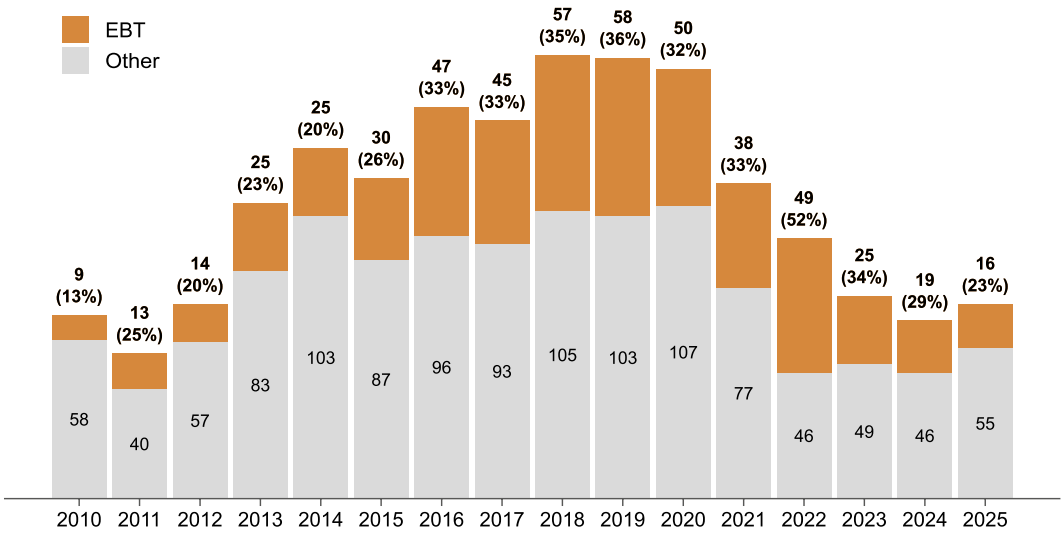
Analysing spin-offs provides a clear but necessarily partial picture of the impact of the technology transfer system on business creation. By their very nature, spin-offs are a phenomenon directly linked to the outcomes of technology transfer; however, limiting the analysis to this group would exclude the indirect effects that technology transfer generates within the region's business landscape.

Much of the impact of the innovation system is channelled through "soft" channels such as technology-oriented higher education, a culture of open innovation, a well-established science and technology network, and public policies supporting em-technological adoption, etc. Analysing the sector as a whole of technology-based

firms (hereinafter EBTs) therefore makes it possible to capture this broader and more diffuse dimension of the impact of technology transfer, in order to assess the extent to which the new Basque business landscape as a whole is imbued with technological content from the outset.

Unlike a spin-off, there is no single, definitive statistical definition of a technology-based company. The literature and various statistical sources employ a range of criteria (R&D intensity, staff qualifications, classification within high- or medium-high-tech sectors, the company's self-assessment, etc.). In this case, the concept is approximated using the Dealroom database, defining an EBT as any start-up which, in the year of its foundation, is classified by Dealroom in at least one of the technology categories in its taxonomy.[52]

CHART 3-17 New technology-based firms (number and percentage of total start-ups created)



Source: Compiled by the authors based on data from SPRI up!Euskadi and Dealroom.

The Basque Country created 520 EBTs between 2010 and 2025

Based on the results obtained and illustrated in Chart 3-17, 520 technology-based firms (EBTs) were established in the Basque Country between 2010 and 2025. The trend shows a marked upward trajectory in the first 10 years of the time series, whilst in recent years it has fallen significantly. The decline in the creation of technology-based firms is partly due to the nature of the data source, as some newly established enterprises may not yet have been registered. The ratio of technology-based firms to the total number of start-ups created in a given year also shows an upward trend over time, though in this case the decline has been less pronounced in the most recent years of the series. Specifically, the proportion of technology-based firms rose from around 20 per cent of start-ups created between 2010 and 2014 to an average of 33.5 per cent (2015–2025), with 2022 standing out as the year in which more than half of the new companies were technology-based.

[52] The taxonomy includes the following technologies: artificial intelligence, deep tech, mobile applications, physical technological components (hardware), big data, machine learning, blockchain, the Internet of Things (IoT), 3D technology, recognition technology, computer vision, virtual reality, autonomous and sensor technology, connected devices, augmented reality, deep learning, nanotechnology, natural language processing and quantum technologies.

TABLE 3-5 Technology-based firms by type of technology (based on EBT)

Technology	total	2010-14	2015-19	2020-25
Artificial intelligence	16.0%	11.9%	13.7%	20.5%
Deep tech	14.3%	18.8%	15.4%	11.0%
Big data	10.9%	10.4%	11.9%	10.0%
Hardware	9.3%	4.5%	9.2%	11.5%
Mobile app	8.4%	6.6%	6.4%	11.7%
Nanotechnology	6.0%	7.1%	8.7%	2.3%
Internet of Things (IoT)	5.9%	3.7%	7.2%	5.2%
3D technology	5.3%	9.1%	5.2%	3.8%
Machine learning	4.8%	7.4%	4.2%	4.5%
Virtual reality	4.2%	3.8%	3.9%	4.9%
Connected device	3.5%	3.3%	4.5%	2.3%
Deep learning	2.2%	3.9%	1.6%	2.2%
Autonomous and sensor technology	2.1%	0.6%	2.6%	2.1%
Blockchain	1.7%	1.6%	1.3%	2.2%
Computer vision	1.4%	1.3%	1.7%	1.0%
Augmented reality	1.2%	3.1%	0.9%	0.8%
Recognition technology	1.1%	1.7%	0.7%	1.2%
Natural language processing	0.9%	1.2%	0.5%	1.2%
Quantum technologies	0.8%	0.0%	0.3%	1.8%

Source: Compiled by the authors based on data from SPRI up!Euskadi and Dealroom.

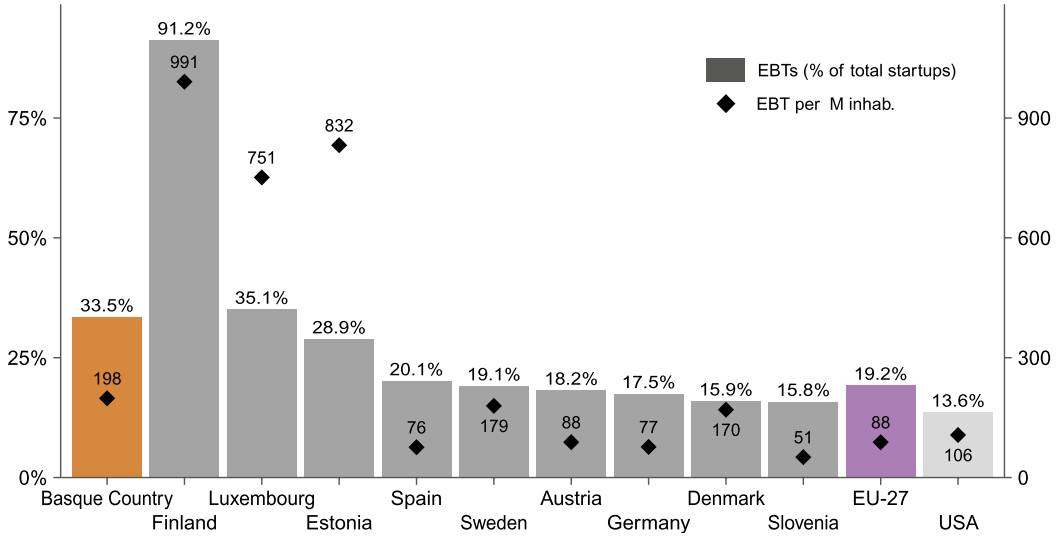
Artificial intelligence is driving growth in Basque EBTs, whilst deep tech is losing ground

The breakdown by technology (Table 3-5) shows how artificial intelligence is the most prevalent category over the entire period (16 per cent of start-ups created) and also the one showing the clearest growth. Deep tech is the second most significant category for the period as a whole, but follows an inverse trajectory, losing relative share (from 19 per cent to 11 per cent). Hardware, mobile applications and big data also feature prominently, with the first two standing out in particular for having gained prominence in the most recent period. The remaining categories maintain more stable and minor shares throughout the entire series, with the exception of 3D technology and nanotechnology, which have become minor categories in the latest period after losing ground amongst newly created EBTs.

The Basque Country almost doubles the rate of EBT creation per capita compared with the EU and the US

In an international comparison (Chart 3-18), the Basque Country stands out, ranking third in terms of the proportion of technology-based firms (EBTs) out of the total number of start-ups created, behind Finland and Luxembourg, although it drops a few places when looking at the figure per million inhabitants. Compared with the EU average or that of the United States, the Basque Country created nearly twice as many technology-based firms per inhabitant between 2015 and 2025; furthermore, these account for a larger share of the total number of enterprises (14.3 percentage points higher than the EU-27 and 19.9 percentage points higher than the United States).

CHART 3-18 International comparison of new technology-based firms (% of total start-ups created and per million inhabitants, 2015–2025)

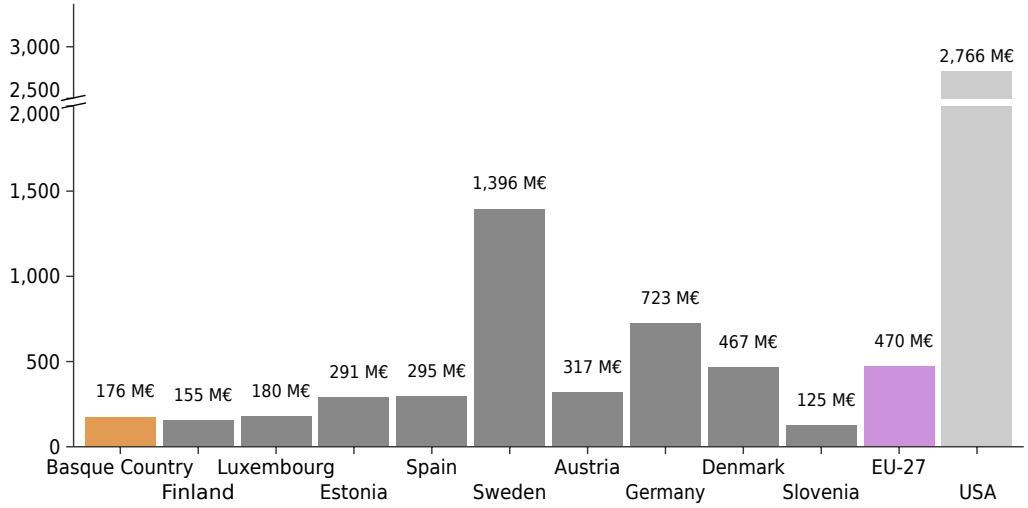


Source: Compiled by the authors based on data from SPRI up!Euskadi and Dealroom.

As with spin-offs, the volume of EBT creation must be complemented by these companies' ability to secure funding. Here, the Basque Country's performance is more modest, with an average investment of 1.8 million euros per EBT between 2015 and 2025, which is significantly lower than the EU average. Indeed, Chart 3-19, showing the average investment figures, highlights that the intensity of EBT creation is not necessarily linked to the funding these companies secure. Thus, the leaders in EBT creation, Finland and Luxembourg, have investment levels per EBT similar to those of the Basque Country, whilst Sweden and Germany stand out in terms of investment. Spain's average is also significantly higher, at 3.0 million euros in average funding per EBT. The clearest example of the disconnect between the rate of EBT creation and the funding obtained can be seen by examining the performance of the United States, which receives an average of 27.7 million euros per EBT —a figure 15 times higher than that of the Basque Country.

The investment attracted by Basque EBTs is significantly below the EU average

CHART 3-19 Average investment raised by technology-based firms (EBTs), 2015-2025 (M€)



Source: Compiled by the authors based on data from SPRI up!Euskadi and Dealroom.

Non-repayable grants account for 26 per cent of investment in Basque EBTs, triple the European average

Table 3-6 illustrates the full contrast with one final additional indicator that allows for an analysis of the type of investment raised and, in particular, the proportion of non-repayable grants. These account for 26 per cent of the investment raised by Basque EBTs, almost three times the EU-27 average (9 per cent) and the third-highest proportion in the comparison. This demonstrates that the findings previously identified for spin-offs extend to EBTs as a whole.

Both the results for spin-offs and the EBT figures paint a very favourable picture in the Basque Country for the creation of such companies, which points to the success of the technology and knowledge transfer system. However, turning knowledge into viable market solutions also requires these companies to be capitalised and scaled up, and the funding they receive does not match the innovative effort that gives rise to them.

The funding gap may be due to supply, demand or the sequence of capital

The immediate interpretation is that there is a financial bottleneck, and the extent of public support appears to confirm this, with public policy stepping in to compensate for a private venture capital market that is less developed than that of more advanced comparators. However, this interpretation is incomplete, as it could be argued that the shortage of funding is not so much the bottleneck as its symptom, because private investment flows to where it perceives a project capable of scaling up. Put this way, the problem would point to factors relating to demand within the Basque entrepreneurial ecosystem, rather than to supply. A third interpretation is also possible, according to which the problem lies not so much in the volume of capital as in its sequencing, with funding —particularly public funding— concentrated in the early stages and scarce during the transition towards initial industrialisation. Distinguishing between these interpretations is important, as each points to a different response from public policy.

The analyses carried out do not allow us to distinguish between these explanations, as they aggregate all investment without distinguishing between the type of funding round or the company's stage of development, and it is most likely that both factors are at play. On the demand side, the Global Entrepreneurship Monitor (GEM) provides some indications, although these relate to the population as a whole: the Basque Country shows a low perception both of entrepreneurship as a good career choice (46.6 per cent, compared with 56.0 per cent in Germany and 61.5 per cent in the EU) and of opportunities for entrepreneurship (32.9 per cent, compared with 42.7 per cent and 47.4 per cent, respectively). Furthermore, motivation linked to wealth creation is present in only 41.1 per cent of the Basque entrepreneurial population, ten percentage points below the EU average (51.4 per cent) and more than twenty points below that of Germany (64.4 per cent). In the case of spin-offs from public research organisations and public research centres, this lower ambition in terms of scale may also be due to structural rather than cultural factors.

TABLE 3-6 International comparison of EBT creation and funding raised

Region	EBT for start-ups	EBT per person	Investment/EBT	% Non-repayable grants
United States	13.6%	106.45	27.66	4%
Sweden	19.1%	179.49	13.96	6%
Germany	17.5%	76.68	7.23	7%
Belgium	16.9%	106.02	7.20	51%
France	18.3%	94.01	6.63	7%
Ireland	20.2%	188.19	5.15	7%
EU-27	19.2%	88.47	4.70	9%
Denmark	15.9%	169.82	4.67	7%
Slovakia	14.3%	19.31	4.20	20%
Netherlands	12.1%	199.69	4.04	5%
Croatia	14.7%	26.71	3.55	49%
Austria	18.2%	88.44	3.17	3%
Spain	20.1%	75.87	2.95	7%
Estonia	28.9%	831.92	2.91	4%
Italy	11.0%	32.41	2.89	13%
Lithuania	26.9%	161.95	2.83	2%
Cyprus	14.8%	213.22	2.78	1%
Malta	15.7%	196.34	2.32	0%
Hungary	19.9%	28.84	1.94	6%
Luxembourg	35.1%	751.29	1.80	6%
Basque Country	33.5%	198.40	1.76	26%
Portugal	18.6%	96.91	1.63	6%
Greece	16.9%	22.31	1.60	13%
Bulgaria	15.3%	30.68	1.57	3%
Finland	91.2%	990.83	1.55	5%
Poland	19.2%	29.23	1.37	12%
Slovenia	15.8%	51.12	1.25	13%
Latvia	24.0%	112.76	1.14	6%
Czech Republic	17.1%	46.34	0.88	5%
Romania	15.2%	16.22	0.88	7%

Source: Compiled by the authors based on data from SPRI up!Euskadi and Dealroom.

3.5 Summary

This chapter has examined whether the knowledge generated and mobilised by the Basque system reaches the market. The answer is that technology and knowledge transfer in the Basque Country is intensive but limited in scope. Where it does occur, it improves companies' performance. The limitation lies in how many companies it reaches and how much those that emerge from it grow.

Cooperation leads to better innovation outcomes. Companies that cooperate bring their innovations to fruition more frequently and bring new products to market more easily, particularly when the partner is part of the STI system. The regions where cooperation is most widespread are also those in which innovation accounts for a larger share of turnover. The Basque Country demonstrates an even greater advantage from cooperation than is seen in Europe as a whole, albeit with its own distinct profile. Basque industry brings its innovations to fruition and introduces market novelties less frequently, but these account for a larger share of its turnover, and their novelty is also underpinned by cooperation with customers. The example of "Hidden Champions" illustrates how this relationship is experienced from the company's perspective. Most innovate through practical experience, but turn to collaboration for specific developments, with public-private research centres playing a prominent role. Their high level of specialisation, however, compels them to step outside the regional innovation system to collaborate on certain strategic developments.

The **external market** confirms that results do eventually reach the market, albeit within a stable range of products. Medium- and high-technology exports have gained ground and shown resilience in the face of the decline in global trade. However, their overall structure has barely changed; although there are emerging product niches with clear potential for development that should be promoted to drive diversification and reduce dependence on the automotive sector, which remains the main vulnerability.

When it **comes to setting up companies** linked to the science and technology sector, the Basque Country stands out in terms of volume. The CCTTs and CICs play a particularly significant role in the creation of spin-offs, and technology-based firms have a notable presence. Funding, however, does not keep pace: these companies attract less investment than their European counterparts and rely more heavily on public funding. It is not possible to determine whether the limiting factor lies in the volume of capital, the phased nature of funding, or a lack of projects with the ambition to scale up; it is likely that all these factors are at play simultaneously.

4
Assessment of competitiveness and well-being in the Basque Country

Having analysed technology transfer flows in previous chapters to understand their impact on the business fabric, we conclude the report with an assessment of the Basque Country's current situation, using the holistic framework (Figure 4-1) developed by Orkestra to understand the determinants of a region's competitiveness and well-being (Orkestra, 2021).

The results, dynamic levers and structural context of the Basque Country are analysed

Firstly, we analyse the Basque Country's recent performance based on the four dimensions of economic and business performance and the seven dimensions of well-being, which are interrelated in a bidirectional manner. We then examine the dynamic levers – those factors that can be influenced by the policies and strategies of stakeholders and governments. The analysis concludes with a review of the Basque Country's structural context, comprising factors such as geo-demographics, the economic and business structure, and the institutional framework.[53]

The analysis of each section is based on distinct sets of up-to-date indicators that show both the trends in the Basque Country and a comparison with the EU-27 average.[54] The choice of indicators is based on two fundamental criteria: (i) their relevance for measuring each dimension of the framework; and (ii) the availability of information that ensures their comparability over time and across countries. The annexes provide an overview of developments over the last decade, enabling an assessment not only of the Basque Country's relative position compared with the European Union (EU-27) average, Spain and European economies and regions with similar characteristics —such as Germany, Baden-Württemberg and Upper Austria— but also of the trajectory followed in recent years.

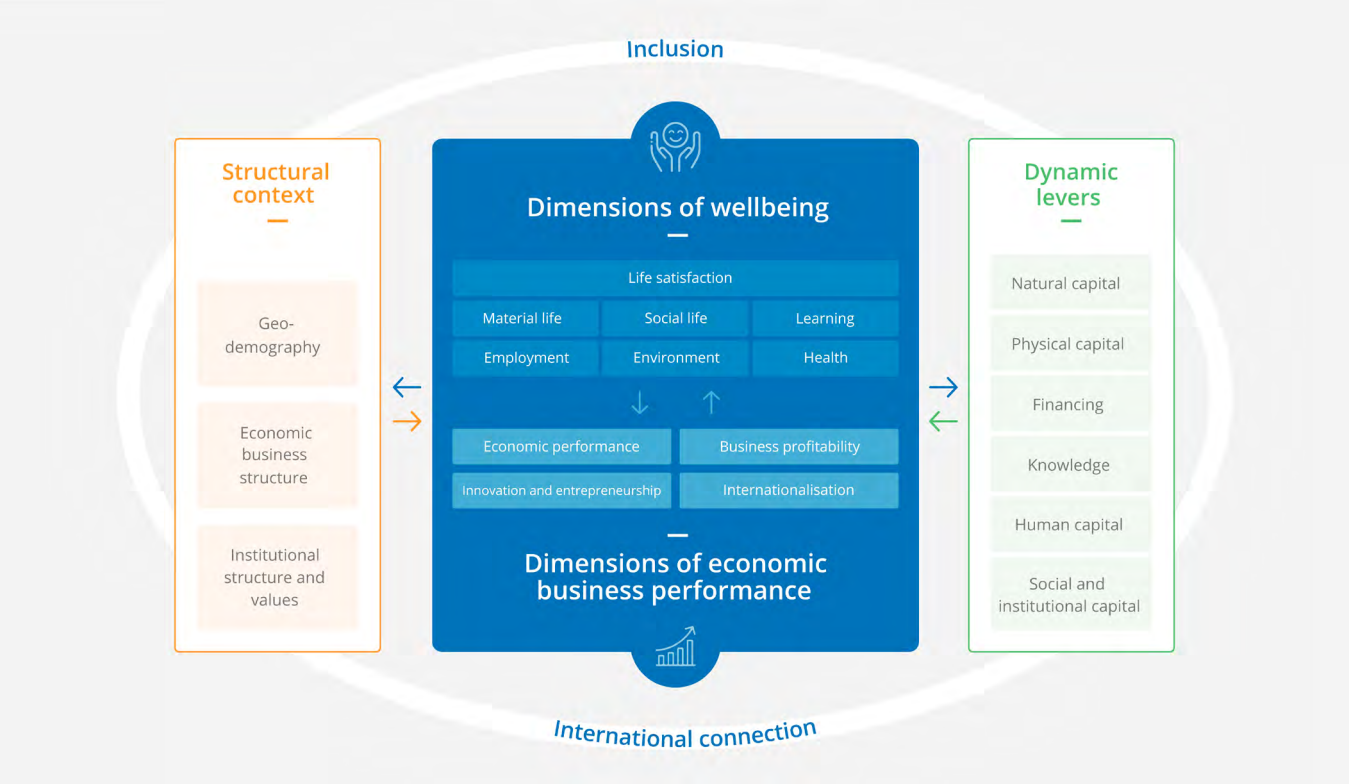
This holistic and comparative analysis not only provides an overview of the current situation regarding competitiveness and well-being, but also enables the identifica-

[53] In addition to these sections, the framework incorporates two cross-cutting dimensions: inclusion and international connectivity. Recent editions of the Basque Country Competitiveness Report have explored both these areas in depth; the 2024 edition focused on inclusion and the 2025 edition on international connectivity.

[54] In the indicator panels presented as tables, the colour green represents an improvement in the indicator and the colour orange denote a deterioration. In the first and second coloured columns, the presence of one symbol indicates that the difference is between 1 per cent and 5 per cent, whilst the presence of two symbols indicates that the difference is greater than 5 per cent. In the third column, a single symbol indicates that the change in the Basque Country differs by between 0.5 and 3 percentage points from the change in the EU-27, whilst two symbols indicate that the difference is greater than 3 percentage points. In all three cases, if the difference is less than the values indicated, this is shown by an equals sign.

tion of those factors that are expected to play a more significant role in strengthening the territory's resilience, competitiveness and prosperity in a context characterised by profound socio-economic, technological, geopolitical and environmental transformations.

FIGURE 4-1 Framework for territorial competitiveness for well-being



Source: Orkestra (2021).

4.1 Competitiveness and well-being results

Results for the economic and business dimension

Table 4-1 presents the economic and business results for the Basque Country across 22 indicators organised into four groups. Each indicator is characterised in terms of its performance over the last year for which data is available and its relative position compared to the European average, both in absolute terms and in terms of its relative performance over the last year. Appendix 4 provides ten-year trend charts for each indicator, for both the Basque Country and the reference territories.

TABLE 4-1 Results of economic and business competitiveness

Indicator	Year	Value	Change (compared to previous year)	Relative ranking within the EU-27	
				Level	Change
Economic and business performance					
GDP per capita (PPP-€)	2025	48,304	→	↑↑	+
Apparent labour productivity per person in employment (k€ per person)	2025	84.9	→	↑↑	–
Apparent labour productivity per hour worked (€/hour)	2024	50.6	→	↑↑	+
Apparent labour productivity per person employed in manufacturing (k€ per person)	2024	88.3	→	↑	=
Apparent labour productivity per hour worked in manufacturing (€/hour)	2024	53.5	→	↑	+
Business profitability					
Unit Labour Cost (ULC) across the economy as a whole (% per person in employment)	2024	58.2	=	↑↑	+
Unit Labour Cost (ULC) in the manufacturing sector (% per person employed)	2024	61.0	←	↓↓	+
Gross operating surplus (% of GDP)	2025	42.9	←	↑	=
Return on assets (ROA) (median; %)	2025	6.8	→→		
Return on equity (ROE) (median; %)	2025	11.7	→		
Innovation and entrepreneurship					
Total number of innovative SMEs (% of CORE establishments)	2024	49.9	→→	↓↓	++
SMEs with product innovation (% of CORE establishments)	2024	27.2	=	↑↑	++
SMEs with process innovation (% of CORE establishments)	2024	41.1	→→	↓↓	++
Sales of new/improved products by innovative SMEs (% of total sales)	2024	11.2	←	↑↑	– –
Total Entrepreneurship Rate (TER) (% of the population aged 18-64)	2025	6.8	→→		
High-growth enterprises (% of enterprises with > 10 employees)	2025	10.8	→→	↑↑	– –
Internationalisation					
International exports of goods (% of GDP)	2025	28.8	←←	↓↓	– –
International trade balance in goods (% of GDP)	2025	3.1	←←	↑↑	– –
International exports of non-energy goods (% of GDP)	2025	27.5	←←	↓↓	– –
International trade balance in non-energy goods (% of GDP)	2025	7.3	←←	↑↑	– –
International exports of goods and services (% of GDP)	2025	34.1	←←	↓↓	– –
International trade balance in goods and services (% of GDP)	2025	2.6	←←	↓↓	– –

Source: Compiled by the authors based on the charts and sources included in Appendix 4.

In terms of **business economic performance**, *GDP per capita in purchasing power parity (PPP)*, shows that the Basque Country is in a favourable relative position within the European context. By 2025, this indicator will rise to 48,304 PPA-€, placing it slightly below the German average (48,622 PPA-€) and 15.8% above the EU-27 av-

The Basque Country exceeds the European average for GDP per capita, standing close to Germany

erage (41,669 PPA-€).[55] According to the 2024 figures —the most recent year available for European regional benchmarks— the gap with Upper Austria (47,500 PPA-€) has narrowed, but Baden-Württemberg (52,500 PPA-€) continues to maintain a significant lead.

GDP per capita is a composite measure of the level of economic activity per inhabitant. To better understand the Basque Country's relative position, it is necessary to analyse the factors underpinning its capacity to generate value added. *Apparent labour productivity* provides an estimate of the value generated per person in employment or per hour worked. A comparison between these two measures is particularly relevant, as productivity per hour worked eliminates the effect of differences in working hours and provides a more accurate indication of the efficiency with which the labour factor is utilised.

The Basque Country has recorded figures that have improved over the past year and which are higher than those for Spain and the EU-27 on both measures, although it remains below Germany and the benchmark regions, particularly in terms of productivity per hour. Thus, in 2025, *productivity per person in employment* stands at 84.9 thousand euros in the Basque Country, compared with 67.6 thousand euros in Spain and 76.7 thousand euros in the EU-27, representing a lead of 25.6 per cent and 10.7 per cent, respectively. However, it remains 5.1 per cent below Germany's figure of 89,500 euros. In 2024, the most recent year for which data is available for the reference regions, Basque productivity stood at 82,600 euros, 10.8 per cent below that of Baden-Württemberg (92,600 euros) and 11.1 per cent below that of Upper Austria (92,900 euros).

Hourly productivity is rising, but the gap with leading European regions is widening

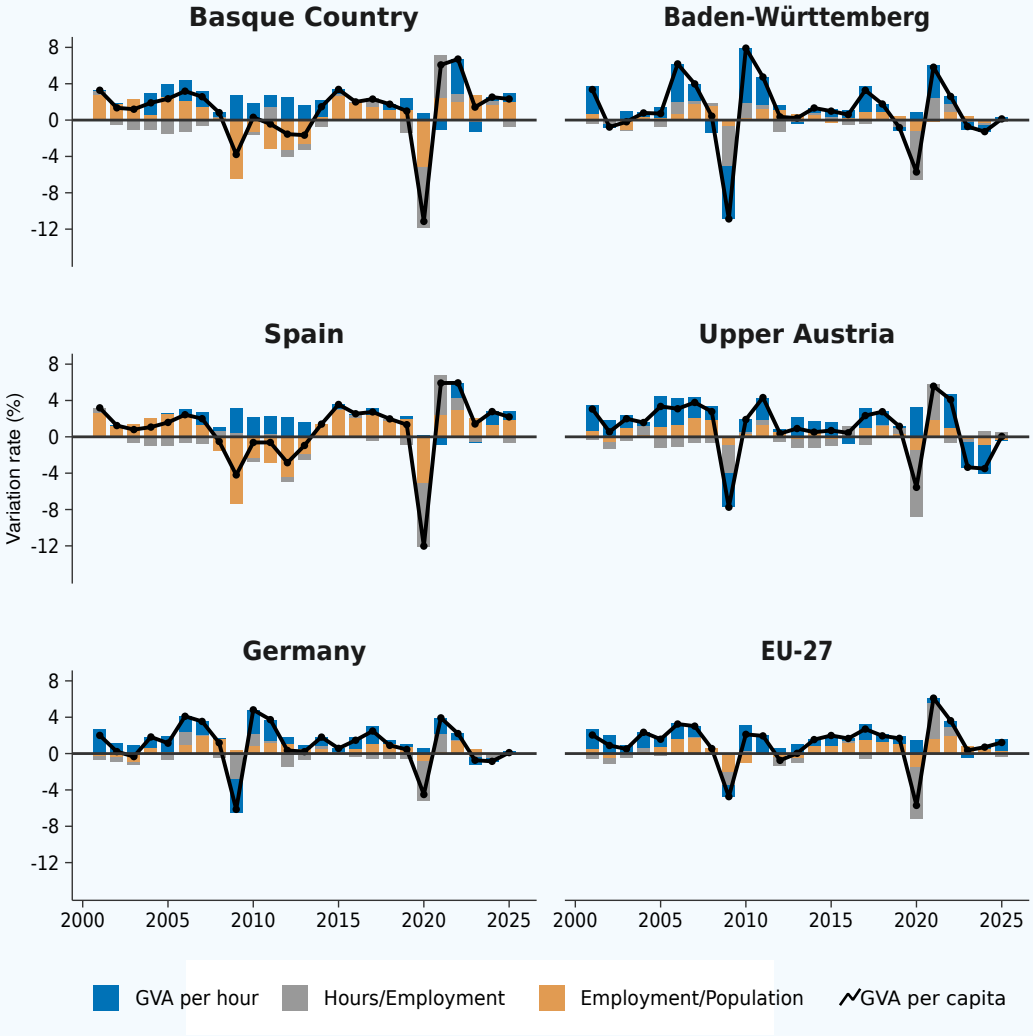
As regards *productivity per hour worked*, in 2024 in the Basque Country it rose to 50.6 euros per hour, 25.9 per cent higher than in Spain (40.2 euros) and 10.2 per cent higher than in the EU-27 (45.9 euros). However, in 2023 —the most recent year for which data is available for both Germany and the reference regions— Basque productivity stood at 48.8 euros per hour, 22.1 per cent below that of Germany (62.7 euros), 18.4 per cent below Upper Austria (59.8 euros) and 28.6 per cent below Baden-Württemberg (68.4 euros). Furthermore, between 2015 and 2023, the relative gap with respect to these three benchmarks widened, whilst the lead over the EU-27 narrowed.

[55] Regional estimates in PPP use national parities and therefore do not adjust for price differences between regions within the same country. In the Basque Country, the parity corresponding to Spain is applied. This limitation must be borne in mind when interpreting the comparisons, particularly where the differences between territories are small. Furthermore, PPP-adjusted GDP per capita does not directly measure the purchasing power of households.

BOX 4-1: Contribution of productivity to value added per capita

The breakdown of GVA per capita growth, compiled using ARDECO data at constant prices, enables an analysis of how hourly productivity, hours worked per person in employment and the employment-to-population ratio contribute to its evolution. In the Basque Country, hourly productivity makes a positive contribution in many years, whilst hours worked per person in employment contribute more irregularly and, at various times, moderate growth.

BREAKDOWN OF PER CAPITA GVA (2000–2025)



Notes: ARDECO estimates certain regional data based on national figures. In the Basque Country, Upper Austria and Baden-Württemberg, GVA and employment figures for 2025 are calculated using this method. For hours worked, this method is used for 2025 in the Basque Country and for 2024-2025 in Upper Austria and Baden-Württemberg.

Source: Compiled by the authors based on ARDECO data.

The decline in 2020 and the subsequent recovery highlight these differences. In 2020, the fall in GVA per capita was driven by negative contributions from hours per person in employment and the employment-to-population ratio. Hourly productivity rises slightly because the total number of hours worked falls more sharply than real GVA. In 2021, the recovery is driven by the rebound in hours per person in employment and in the employment-to-population ratio, whilst hourly productivity makes a negative contribution.

The employment-to-population ratio continues to play a significant role in subsequent years. In 2023, its positive contribution offsets the negative contributions from productivity per hour and hours per person in employment. In 2024, all three components contribute to growth, although employment relative to the population continues to make the largest contribution. Consequently, the recent improvement in GVA per capita is not solely due to productivity gains, but also to increases in the employment rate.

A regional comparison reveals some differences in the sources of growth. In Germany and Baden-Württemberg, the contributions from hourly productivity are particularly notable during several pre-pandemic expansionary phases. In the Basque Country and Spain, the employment-to-population ratio plays a more pronounced role, both during the downturns of the financial crisis and in the subsequent recovery. Upper Austria also shows significant contributions from hourly productivity, although its trajectory is irregular and it has recorded negative contributions in the most recent years covered. The downturn in 2020 reveals a common feature: the reduction in hours per person in employment makes a negative contribution across all regions. However, in the Basque Country and Spain, the fall in employment relative to the population also plays a considerable role. The subsequent recovery combines these components differently in each region; consequently, it cannot be generally attributed to an improvement in productivity.

Manufacturing productivity exceeds that of Spain and is on a par with that of the EU-27, lagging behind Germany

Manufacturing productivity in the Basque Country has also risen over the past year. It stands above the Spanish average and at levels close to those of the EU-27, although it remains considerably below those of Germany, Baden-Württemberg and Upper Austria. Per *person in employment*, in 2024 it stands at 88.3 thousand euros, a level similar to the EU average (86.8 thousand euros), higher than that of Spain (78.5 thousand euros) and lower than that of Germany (107.0 thousand euros). Per *hour worked*, in 2024 it stands at €53.5 per hour, slightly above the EU-27 average (€51.8 per hour) and the €46.8 per hour in Spain, but well below the €76.2 per hour in Germany.

The LCI for the Basque economy as a whole fell in 2024, but the manufacturing LCI rose

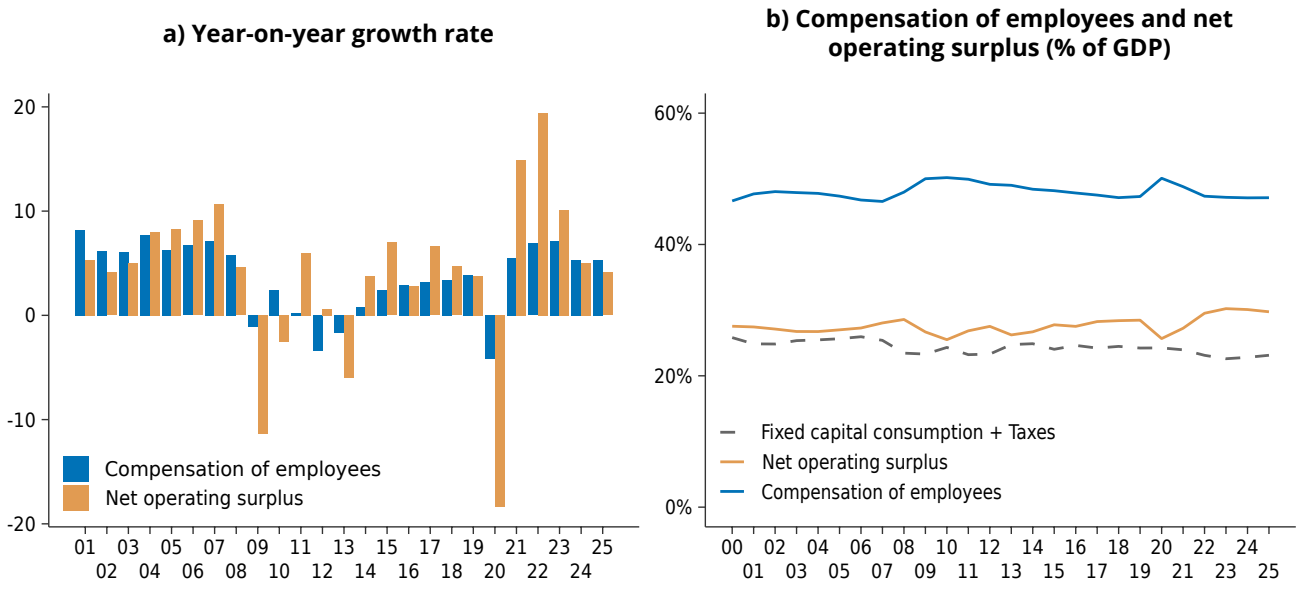
Business profitability depends, amongst other factors, on the relationship between labour costs and productivity. *Unit Labour Cost (ULC)* is a key indicator of competitiveness, as it simultaneously links trends in wages and productivity. In the Basque Country, *the ULC for the economy as a whole* is consistently lower than the EU-27 average and that of the benchmark regions, reflecting the fact that wage levels are offset by productivity. Following the increase recorded during the 2020 health crisis, when the indicator reached 61.9 per cent, the ULC began a very sharp downward trend, falling to 58.2 per cent by 2024. This contrasts favourably with the performance of other economies, which have recently experienced a certain upturn, consistent both with a recovery in wages following the inflationary period of recent years and with the persistence of an international environment characterised by high economic uncertainty. In the *manufacturing sector*, the recent trend in the Basque Country is different. Following the sharp increase in 2020, the Basque CLU fell until 2022 (58.2 per cent), rose in 2023 (60.0 per cent) and rose again in 2024, standing at 61.0 per cent. Thus, the Basque indicator remains well above that of the EU-27 (57 per cent) and

Spain (55.4 per cent), although it remains clearly below that of Germany (66 per cent). The comparison with the benchmark industrial regions should be limited to 2023, the most recent year for which data is available for both: in that year, the Basque Country recorded a CLU lower than that of Upper Austria and similar to that of Baden-Württemberg.

Gross Operating Surplus remains above the EU, Spanish and German averages

Keeping the unit labour cost (ULC) in check through productivity gains means that a smaller proportion of value added is allocated to labour costs, which frees up a larger margin for the generation of *gross operating surplus*, thereby facilitating business investment. The share (% of GDP) of gross operating surplus, although it has fallen over the past year to stand at 42.9 per cent in 2025, remains above the EU average (40.8 per cent), the Spanish average (41.5 per cent) and the German average. Whilst in 2020 the surplus suffered a much sharper decline than employees' remuneration, in subsequent years it showed significantly higher growth, indicating a rapid recovery in business margins following the pandemic (Chart 4-1).

CHART 4-1 Breakdown of the Basque Country's GDP at market prices by type of income, 2001-2025



Source: Compiled by the authors based on Eustat's National Accounts.

The recovery in corporate profitability is accompanied by an improvement in the generation of value added

The distribution of income shows a slight increase in the share of net operating surplus[56] since 2021, accounting for around 30 per cent of the income generated, whilst the share of employees' remuneration remains relatively stable at around 47 per cent. This trend is consistent with the developments observed in the CLU and suggests that the recovery in corporate profitability has been accompanied by an improvement in the capacity to generate added value. Furthermore, the sustainability of this trend will depend on whether the increase in corporate margins is underpinned by gains in productivity and efficiency, rather than by changes in the distribution of income between capital and labour.

[56] Net Operating Surplus comprises corporate profits, property income and mixed income (income from the self-employed). As Tirole (2017) points out, part of the shift in the functional distribution of income towards the capital factor could be explained by the techno-economic paradigm "which fragments employment", transforming former wage labour into self-employment, the remuneration for which is now accounted for within the mixed income of the surplus.

Finally, the return on assets (ROA) and return on equity (ROE) indicators point to a stable pattern of moderate growth: the *economic return on assets* (ROA) rose from 6.5 per cent to 6.8 per cent, and the *financial return on equity* (ROE) from 11.1 per cent to 11.7 per cent. Both indicators continue to point to a healthy business sector with scope for growth.

Innovative and process-oriented SMEs are increasing, while product innovation is stabilizing

In the area of **innovation and entrepreneurship**, the results paint a favourable picture of recent developments in the Basque Country, although some gaps remain compared with the European average. As seen in previous chapters, there has been notable progress in the *proportion of innovative SMEs,* which reached 49.9%, and in the proportion of *SMEs with process innovation* (41.1%), whilst the proportion of *SMEs with product innovation* (27.2%)) has remained fairly stable. However, in terms of both innovative SMEs and process innovation, the Basque Country remains below the European average, and the *proportion of sales of new or improved products by innovative SMEs* fell slightly to 11.2 per cent. Meanwhile, the *entrepreneurial activity rate* rose to 6.8 per cent. Finally, the indicator for *the share of high-growth enterprises* (10.8 per cent) saw a notable increase and now stands above the EU-27 average.

Exports of goods are losing momentum and the trade surplus is shrinking

The final set of economic and business performance indicators reflects the results of **internationalisation** through foreign trade indicators, revealing a challenging and highly complex picture. In 2025, the Basque Country's *international exports of goods* continued their downward trend, falling to 28.8 per cent of GDP (compared with 31.5 per cent in 2024 and 35.1 per cent in 2023). This decline in the relative weight of foreign sales is due to a geo-economic environment characterised by weak international industrial demand and reduced dynamism in traditional European markets. This is a widespread trend that is also observed, albeit to a lesser extent, in the trends for the EU-27, Germany and Spain. Nevertheless, the Basque Country maintains a level of exports higher than the Spanish average (23.4 per cent), although it remains below the EU average (36.1 per cent) and the German average (35.0 per cent).

The impact of the international environment is also reflected in the trade balances for goods, where *the* Basque Country's *international trade balance* fell in 2025 to 3.1 per cent of GDP (compared with 4.0 per cent in 2024 and 6.2 per cent in 2023). Despite this reduction, the Basque Country continues to maintain a structural trade surplus. This situation stands in stark contrast to Spain's structural external deficit (around –3.93 per cent of GDP) and, although the gap is narrowing, it continues to exceed the EU-27 average (1.12 per cent), whilst remaining behind Germany (4.51 per cent). If the analysis is restricted to *non-energy goods*, the trends and comparative results are quite similar, but in this case the Basque Country's balance (7.3 per cent) is even higher than that of Germany (6.0 per cent).

Exports and imports of energy products fall

According to Datacomex,[57] exports of energy products (crude oil and derivatives, and natural gas) as a proportion of the total have fallen in monetary terms from 10.7 per cent in 2018 to 4.3 per cent in 2025. They also fell in physical terms from 38.3 per cent to 22.6 per cent. Imports, meanwhile, fell from 27.9 per cent in 2018 to 21.1 per cent in monetary terms over the same period. Finally, in physical terms, imports fell from 60.4 per cent to 50.4 per cent. This trend in ter-Physical infrastructure is key for facilities such as the Port of Bilbao, where, between 2018 and 2025, traffic in petroleum products fell by 19.4 per cent (Bilbao Port, 2019; 2026).

[57] Data sourced from: https://datacomex.comercio.es/metadata/Comex

When the analysis is broadened to include *exports of services* —driven by sectors such as trade intermediation and tourism— total exports stand at 34.1 per cent of GDP. In this indicator (goods and services), which has also fallen across all regions, the Basque Country's performance has been weaker than in other regions, standing, as is customary, below the EU-27 average (49.6 per cent) and that of Germany (40.1 per cent), but even below the Spanish average (36.6 per cent). The loss of momentum is particularly evident in *the combined trade balance for goods and services*: after leading the comparison in 2023 (at 4.8 per cent of GDP), the Basque Country's balance fell to 3.6 per cent in 2024 and to 2.6 per cent in 2025. This decline places the Basque Country below the EU-27 and Spain (3.5% and 3.8% in 2025) and only slightly above Germany (2.2%).

The trade balance in goods and services has fallen, placing it below Spain and the EU-27

Results for the well-being dimension

Table 4-2 presents the Basque Country's recent performance across 20 well-being indicators, organised into seven groups. As in the previous section, each indicator is analysed in terms of its own trend and in comparison with the EU-27. Appendix 5 provides trend charts for each indicator, both for the Basque Country and for the reference territories.

The first cluster, **life satisfaction**, reflects the population's subjective well-being on a scale of 0 to 10. In 2025, the Basque Country maintains a score of 7.3, showing stability in its recent trend and consolidating a comparatively favourable position relative to the reference group.

In the area of **material living standards**, the overall performance is positive. *Median equivalent household income* has resumed its upward trend, reaching €25,051 in 2024, maintaining a solid position compared with the EU-27 (€21,645) and Spain (€19,307) and very gradually narrowing the gap with German levels (€27,619). The *AROPE rate*, which measures the risk of poverty or social exclusion, stands at 14.7 per cent (2025), a low figure compared with other territories and one that also appears to be returning to its pre-health crisis trajectory, although the challenge of further reducing these figures remains. In terms of income inequality, *the S80/S20 quintile ratio* improves to 4.5 by 2025, reaching a very favourable level. The *proportion of people who cannot afford to keep their homes at an adequate temperature* stands at 8.6 per cent in 2025. Changes in energy prices, amongst other factors, continue to affect the level of energy poverty; whilst the situation has improved in 2025 compared with 2023 and 2024, it has not yet returned to its pre-pandemic trajectory. The trend is similar across all the territories compared, indicating a general deterioration in this area.

The Basque Country exceeds the European average for median income and has a lower risk of poverty

In terms of **employment**, the indicators generally point to a favourable trend. *The unemployment rate* is set to fall to 7.3 per cent by 2025, resuming the downward trend observed over the last decade following the slight upturn recorded the previous year (8.1 per cent). Although this result consolidates a position that is clearly more favourable than the Spanish average (10.5 per cent), unemployment continues to lie above the EU-27 average (6.0 per cent) and remains far from the levels recorded in leading European regions, such as Upper Austria (4.6 per cent), Germany (3.8 per cent) or Baden-Württemberg (3.3 per cent). It should be noted, however, that these economies have shown, since 2022, a slight increase in the unemployment rate compared with the lows reached following the post-pandemic recovery, which partially narrows the relative gap with the Basque Country. *Job satisfaction* stands at 7.5 out of 10 in

Unemployment remains above the European average and well below that of the benchmark regions

2025, reflecting a positive and stable assessment by the working population. *The gender pay gap per hour worked* stands at 4.8 per cent in 2024. Although this represents an increase on the all-time low recorded in 2023 (3.6 per cent), it remains at a reasonably low level, consolidating the trend of sharp reduction seen over the last decade and maintaining a significantly favourable gap compared with the Spanish average (8.0 per cent).

In terms of **social lif**e, the three indicators analysed paint a very positive picture. *Satisfaction with leisure time* stands at 6.8 out of 10 (2025). *Trust in people* remains fairly stable at 6.4 points (2025), reaffirming a favourable trend. *The property crime rate* fell to 862 offences per 100,000 inhabitants in 2024, remaining at levels notably more favourable than those of the reference territories.

Learning combines strengths in continuing education with challenges in the early stages

The **learning** module combines structural strengths in lifelong learning with persistent challenges in the early stages. The *proportion of the population aged 25 to 64 with upper secondary or tertiary education* in the Basque Country is set to reach 79.7 per cent in 2025, having shown a steady upward trend over the last decade (starting from 70 per cent in 2016). Although this figure remains slightly below the EU-27 average (81.2 per cent) and that of benchmark regions such as Baden-Württemberg (85.7 per cent) or Upper Austria (86.8 per cent), the region's educational level is in line with the standards of the most advanced European economies, whilst also marking a gap of almost 15 percentage points compared with the Spanish average (65.4 per cent). In terms of *lifelong learning*, it ranks above the comparison regions, reaching 19.8 per cent in 2025. The trend shows a marked acceleration from 2020 onwards, placing the Basque Country substantially above the European average, the Spanish average and those of the benchmark regions. The area of compulsory education is where the greatest weakness is evident. The results of the latest PISA report indicate that the *average score in mathematics, reading and science* stood at 446 points, a fall of 20 points compared with the figure from five years ago. Although other regions also show a deterioration in this indicator, the decline has been more pronounced in the Basque Country, which now lies well below the average for the EU-27 (468), Spain (462) and Germany (472). Given that compulsory education forms the foundation of people's learning, it is a priority to reflect on the factors that may lie behind these results in order to try to reverse them.

The Basque Country leads the EU-27 in life expectancy at birth, ahead of Spain, Baden-Württemberg and Upper Austria

In the section on **health**, *life expectancy at birth reaches a record high* of 84.6 years in 2024, consolidating a sustained recovery following the pandemic. This figure places the Basque Country in a leading position, not only compared with the EU-27 average (81.5) and Spain (84.0), but also comfortably ahead by more than two years of advanced European regions such as Baden-Württemberg (82.3) and Upper Austria (82.4). Meanwhile, *the perception of health status* as good or very good remains at high levels: 70.8 per cent of the population in 2024, exceeding the average for Spain (70.2 per cent), the EU-27 (68.4 per cent) and Germany (64.7 per cent). As for deaths —Premature deaths *attributable to PM2.5air pollution* stood at 25.6 per 100,000 inhabitants in 2023, below the 2022 figure. This figure places the Basque Country in line with the average for Spain and Germany, below the EU-27 average, although above that of Upper Austria. It would be desirable for this trend to continue over time.

TABLE 4-2 Well-being results

Indicator	Year	Value	Trends (last year)	Relative ranking within the EU-27	
				Level	Change
Life satisfaction					
Life satisfaction (0-10)	2025	7.3	←	↑	–
Material living standards					
Median equivalent annual household income (€)	2024	25,051	→→	↑↑	+
Proportion of people at risk of poverty or social exclusion (AROPE) (%)	2025	14.7	=	↑↑	=
S80/S20 quintile ratio by income (ratio)	2025	4.5	→	↑	++
Proportion of people who cannot afford to keep their home at a suitable temperature (%)	2025	8.6	→→	↑	++
Employment					
Unemployment rate (% of the population aged 15-74)	2025	7.3	→→	↓↓	+
Level of job satisfaction (0-10)	2025	7.5	→	=	=
Gender pay gap per hour worked (%)	2024	4.8	←←		
Social life					
Satisfaction with leisure time (0-10)	2025	6.8	=	↑	+
Trust in people (0-10)	2025	6.4	←	↑↑	–
Property crime rate (per 100,000 inhabitants)	2024	862	→	↑↑	+
Learning					
Population aged 25-64 with upper secondary or tertiary education (% of the population aged 25-64)	2025	79.7	=	↓	–
Lifelong learning (% of the population aged 25-64)	2025	19.8	→→	↑↑	++
Average score in maths, reading and science in PISA (PISA points)	2025	446	←←	↓	– –
Health					
Perceived health status (% of people in good or very good health)	2024	70.8	←	↑	– –
Life expectancy at birth (years)	2024	84.6	=	↑	=
Premature deaths due to air pollution ($PM_{2.5}$) (per 100,000 inhabitants)	2023	25.6	→→	↑↑	+
Environment					
Greenhouse gas emissions (tonnes of CO_2 equivalent per capita)	2024	7.2	→	↓↓	=
Air pollution (annual average concentration of $PM_{2.5}$ particulate matter in µg/m³)	2024	7.7	→→		
Municipal waste recycling rate (%)	2024	41.1	=	↓↓	– –

Source: Compiled by the authors based on the graphs and sources included in Appendix 5.

Although the trend is positive, the environmental indicators have not yet met the reduction targets relative to 2005

Finally, the indicators in the **environment** section show that *per capita greenhouse gas (GHG) emissions* stood at 7.2 tonnes of CO_2 equivalent in 2024. Although they have fallen by 40.3 per cent since 2005, they remain above the European average. Meanwhile, in terms of per capita diffuse emissions —that is, total emissions minus those from sectors covered by the EU Emissions Trading Scheme (EU ETS)— the Basque Country lies below the EU average, as it does for emissions per unit of GDP. All of this indicates that the Basque economy is heavily influenced by the industrial sector covered by the EU ETS. Overall, GHG emissions fell by 23.4 per cent in 2024 compared with 1990 and by 37.6 per cent compared with 2005, meaning that the 30 per cent target set out in the 2021–2024 Energy Transition and Climate Change Plan (Basque Government, 2021). However, this is still far from the 45 per cent reduction compared with 2005 set out in Act 1/2024 of 8 February on Energy Transition and Climate Change. As described in Box 4-2, GHG emissions vary and have been reduced to differing degrees depending on the sector of activity.

Air pollution, in terms of PM2.5concentrations, also showed an improvement in 2024, standing at 7.7 μg/m³, 10.5 per cent lower than in 2023. This level was lower than that of Spain (8.7 μg/m³) and Germany (8.4 μg/m³). As with the previous indicator, although the trend is positive, it has not yet reached the 50 per cent reduction target compared with 2005 set by the Air Quality Plan (Basque Government, 2024), since in 2024, according to the inventory of atmospheric pollutant emissions, the reduction in $PM_{2.5}$ emissions stood at 38.2 per cent. Finally, the *municipal waste recycling rate* in the Basque Country is the lowest amongst the territories analysed. In 2024, this percentage stood at 41.1 per cent, having remained virtually stable since 2021. Trailing behind Spain and far behind Germany's figure of almost 70 per cent, the region is unlikely to meet the 55 per cent target for 2025 set by Directive (EU) 2018/851, which amends Directive 2008/98/EC on waste, and which also sets ambitious targets for 2030 and 2035 (60 per cent and 65 per cent respectively) —targets that Germany is already meeting.

BOX 4-2: Trends in GHG emissions by sector of activity

Reductions in GHG emissions are not occurring at the same rate across different sectors of activity or in different regions. This box aims to show how emissions have evolved in the Basque Country since 1990 and to compare this with the EU-27 average and with the reference regions of Baden-Württemberg and Upper Austria.

At EU level, emissions have fallen significantly over the period 1990–2024 (EEA, 2025). In total, the fall was 36 per cent, with the largest reductions occurring in energy supply (–57 per cent), followed by industry (–48 per cent), the residential and commercial sector (–42 per cent) and waste (–40 per cent). In the transport sector, however, significant increases were recorded (+19 per cent in domestic transport, +138 per cent in international aviation and +27 per cent in international shipping).

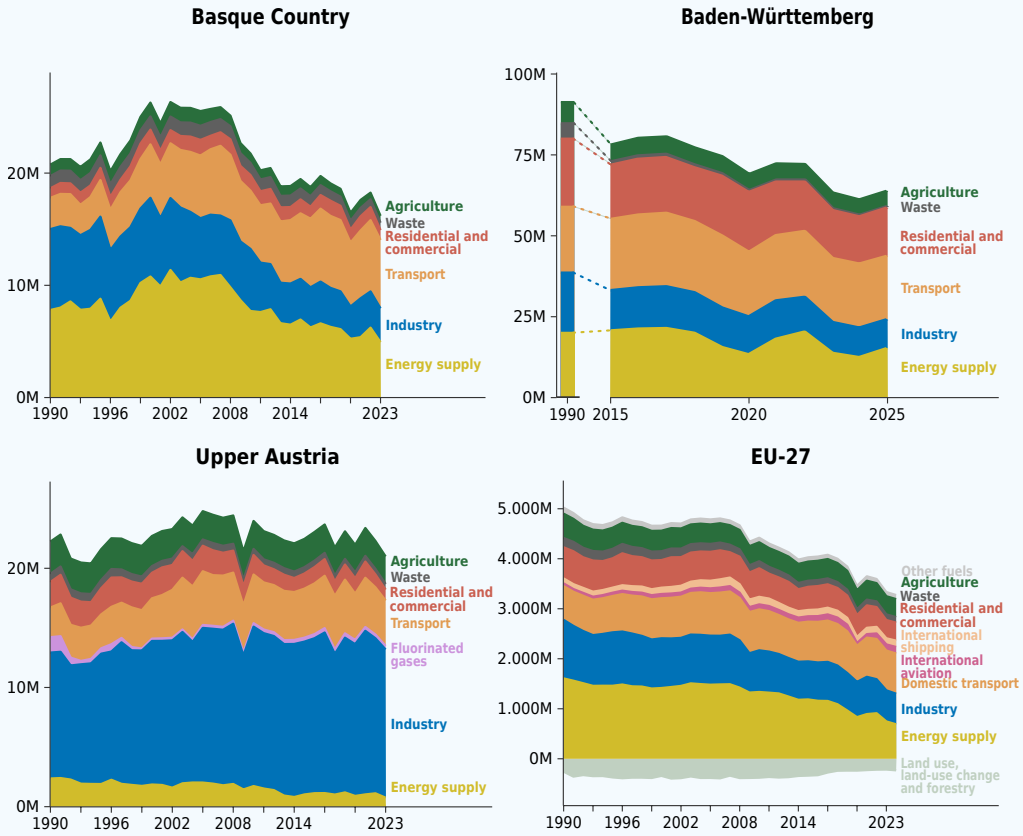
These trends are, in general, the same as those observed in the regions of Baden-Württemberg, Upper Austria and the Basque Country. Overall, this is due to the emphasis placed on transforming the electricity mix towards a decarbonised one, the decline in industrial activity and its shift towards less emission-intensive activities —except in the case of Upper Austria— and the increase mobility in the context of globalisation (with the exception of Baden-Württemberg,

where emissions from domestic transport have fallen). Furthermore, in the case of transport in general, there has been no transformation in the energy mix used, in which fossil fuels (particularly petroleum derivatives) play a predominant role, despite the growing penetration of electric vehicles, which, given the size of the vehicle fleets, remains limited. To give a more detailed picture, in the case of the Basque Country, efforts to reduce emissions have led to a 5 per cent reduction in direct emissions and a 22 per cent reduction when indirect reductions are taken into account (due, primarily, to changes in Spain's electricity mix, from which significant volumes of electricity are sourced and where the reduction amounts to 80 per cent, compared with a 32 per cent increase in emissions associated with the energy supply generated in the Basque Country).

It is also worth noting the fall in emissions from the residential sector and the rise in those from the commercial sector. The ongoing transformation of Basque industry has led to a 58 per cent fall in GHG emissions and a 39 per cent improvement resulting from better waste management.

In the case of Upper Austria, the overall reduction has also been small (–6 per cent), as in the Basque Country. In this instance, it is worth noting not only the rise in transport emissions (+53 per cent), but also those from industry (+18 per cent). In fact, it is the only region among those analysed where industrial emissions have risen since 1990. By comparison, it is worth highlighting the case of Baden-Württemberg, where total emissions have fallen by 30 per cent, with a decline across all sectors analysed.

TRENDS IN GHG EMISSIONS (CO_2 e)



Source: Compiled by the authors based on data from EEA (2025), Klimadashboard.at (2026), Baden-Württemberg (2026) and the Basque Government (2025).

4.2 The dynamic drivers of competitiveness and well-being

Having analysed the most recent findings on competitiveness and well-being in the Basque Country, in this section we examine the key indicators for each of the six dynamic levers on which the policies and strategies of stakeholders and governments can have an impact. The data for the indicators are presented in Table 4-3 and the trend charts in Appendix 6.

The first lever is **Natural Capital**. The competitiveness of a region and its businesses can be improved through greater efficiency in the use of materials, energy and other resources, a smaller environmental footprint, and innovation towards greener products and services.

Energy intensity and renewable energy are improving, but there is still a gap with Europe and the 2030 targets

Energy indicators show that the Basque Country significantly improved its *energy intensity* (the ratio of gross domestic energy consumption to GDP) in 2023 and slightly in 2024, as did Spain, the EU-27 and Germany. Its lead over the EU-27 average (and, in particular, over Germany) has narrowed. The *share of renewable energy in gross final energy consumption* has increased in the Basque Country every year since 2022, standing at almost 25 per cent, although this remains below the EU-27 average and well below the target set out in Law 1/2024 on Energy Transition and Climate Change to reach 32 per cent by 2030 (Official Gazette of the Basque Country, 2024). In January 2026, the Basque Government announced that the slowdown in renewable energy projects and high consumption of petroleum products could jeopardise the commitments for that year (Lázaro, 2026). In this context, increasing renewable generation capacity and the electrification of energy uses (industry, transport and buildings) will help reduce dependence on fossil fuels and, consequently, the impact of rises in international energy prices, thereby improving the balance of payments, energy security and strategic autonomy.

Meanwhile, *the ratio of environmental tax revenue* to GDP remains well below the EU-27 average. Revenue fell in 2022 and has since remained relatively stable across all the territories under consideration. Given the nature of these taxes, the objective of environmental tax revenue is for it to be zero, as this would mean that the taxable events generating such revenue are not occurring. In this context, it would be worthwhile to examine in greater depth the underlying causes of the decline and subsequent stabilisation.

Leadership in employment and GDP in the environmental sector compared to Germany and the European average

Finally, *the indicators on the weight of the environmental goods and services sector in the economy* (which have undergone statistical adjustments in their calculation) show that the Basque Country is well positioned relative to the EU-27 average, particularly in terms of employment. In both indicators, including GDP, the Basque Country outperforms Germany, which ranks last.[58]

[58] The international comparative data can be supplemented by that provided by Aclima, the Basque Country's environmental cluster development organisation. It has 139 member organisations that provide employment for 7,300 professionals, who, in 2025, generated a turnover of 3,205 million euros, meaning that the Basque environmental sector accounts for more than 5 per cent of GDP.

TABLE 4-3 Dynamic drivers of competitiveness

Indicator	Year	Value	Change (last year)	Relative ranking within the EU-27	
				Level	Change
Natural capital					
Energy intensity (Tep / M€)	2024	74.4	=	↑↑	–
Share of renewable energy in gross final energy consumption (%)	2025	24.5	→→	↓↓	++
Environmental tax revenue (% of GDP)	2024	1.52	←	↓↓	–
Share of employment in the environmental goods and services sector (% of total employment)	2023	2.61	→	↑↑	–
Gross Value Added in the environmental goods and services sector (% of GDP)	2023	2.47	→	↓	+
Physical capital					
Gross capital formation (% of GDP)	2025	24.5	=	↑↑	=
Stock of physical capital (times GDP)	2024	3.1	←	↑↑	–
Gross capital formation in equipment (% of total gross capital formation)	2025	38.2	←	↑↑	=
Funding					
Net equity to total assets (median; %)	2025	53.0	→		
Inflow of foreign direct investment (FDI) (% of GDP)	2024	22.6	→→	↓↓	++
Opening stock of foreign direct investment (FDI) (% of GDP)	2024	109.0	→→	↑↑	++
Knowledge					
Total R&D expenditure (% of GDP)	2024	2.1	=	↓	=
EPO patents per million inhabitants (three-year average) (patents / million inhabitants)	2024	65.9	←←	↓↓	++
WoS scientific publications per million inhabitants (three-year average) (publications / million inhabitants)	2025	3,801	→	↑↑	+
Percentage of EPO patents in environmental technologies (three-year average) (% of total patents)	2024	12.7	←←	↑↑	++
Human capital					
Population per doctor (population/doctor)	2024	165.9	→→	↑↑	++
Population aged 25-34 with upper secondary or tertiary education (ISCED 3-8) (%)	2025	87.7	=	↑	–
Population aged 25-34 with tertiary education (ISCED 5–8) (%)	2025	68.6	→	↑↑	–
Employment rate (% of the population aged 15-64)	2025	69.1	=	↓	=
People employed in ICT occupations (% of total employment)	2025	4.7	←←	↓↓	––
Population with digital skills above the basic level (% of population aged 16-74)	2025	35.5	←	↑↑	––
Social capital					
Governance Quality Index (EU-27 standardised index = 0)	2024	0.05	←←	↑	
SMEs engaged in R&D&I (% of CORE establishments)	2024	24.5	←←	↑↑	++
Publications in collaboration with industry (three-year average) (% of publications)	2025	2.56	←	↓↓	=

Source: Compiled by the authors based on the charts and sources included in Appendix 6.

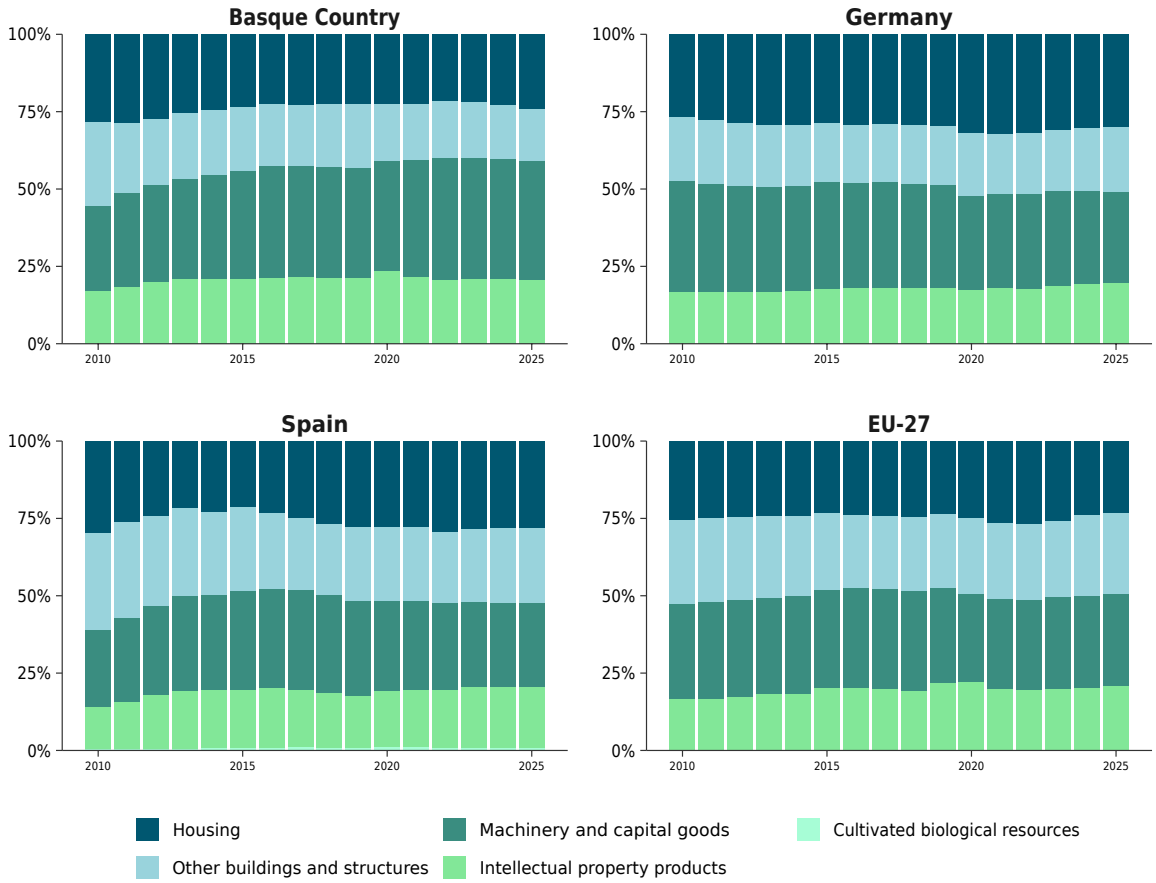
The second driver, **physical capital**, is another key determinant of the economy's productive capacity and the level of efficiency with which the labour factor is utilised.

Gross Fixed Capital Formation stands at 24.5 per cent of GDP, higher than in Spain, Germany and the EU-27

Gross Fixed Capital Formation (GFCF) measures investment made during the year and is therefore a flow variable. Its share of GDP, commonly used as an indicator of investment activity, has consistently stood in the Basque Country over the last decade above the figures for Spain, Germany and the EU-27.[59] Following the increase recorded after the health crisis, this indicator has remained stable at 24.5 per cent of GDP, staying above the figures for Spain (20.6 per cent), Germany (20.2 per cent) and the EU-27 (21.4 per cent).

Chart 4-2 shows the trend in the percentage breakdown of gross fixed capital formation (GFCF) by asset type in the Basque Country, the EU-27, Spain and Germany between 2010 and 2025. It allows us to observe how the relative weight of each asset within total investment has changed and to compare its distribution across regions.[60]

CHART 4-2 Composition of Gross Fixed Capital Formation (2010-2025)



Source: Compiled by the authors based on data from Eustat and Eurostat.

[59] For the Basque Country, data from Eustat are used, which differ from those of Eurostat. The differences between the two sources stem from the fact that Eurostat draws on data from the INE, which applies a *top-down* approach based on breaking down the gross national capital formation figures across the various autonomous communities, whilst Eustat carries out a more detailed assessment of investment by businesses and the public administration within the region, which provides a more accurate picture of the situation.

[60] It should be borne in mind that these shares are calculated at current prices and reflect both changes in both investment volumes and the prices of the various assets. Therefore, an increase or decrease in their weight does not necessarily imply a corresponding trend in investment in real terms.

Intellectual property products account for 20.4 per cent of the Basque Country's GFCF in 2025, compared with 16.9 per cent in 2010. Their share is also rising in the other territories, particularly in Spain, where it rises from 13.3 per cent to 19.4 per cent. In the EU-27, it stands at 20.5 per cent and in Germany at 19.4 per cent; the Basque Country's share is therefore similar to that of the EU-27 and slightly higher than that of Spain and Germany.

Machinery and capital goods account for 38.2 per cent of investment, surpassing Germany and the EU-27

Machinery and capital goods constitute the main component of Basque investment, accounting for 38.2 per cent of GFCF in 2025, compared with 27.2 per cent in 2010. This category includes transport equipment, ICT equipment and other machinery and capital goods. This trend contrasts with that of Germany, where its share declined between the two years, from 35.8 per cent to 29.6 per cent, with fluctuations over the period. In the EU-27, its final share is close to that of 2010, at around 30 per cent, although it has fluctuated over the period. In Spain, it rose from 24.9 per cent to 27.4 per cent between 2010 and 2024, although it has been on a downward trend since 2017. Thus, the Basque Country went from ranking below Germany and the European average in 2010 to surpassing them in 2025. In recent years, its share has stabilised, with a slight reduction from 39.4 per cent in 2022 to 38.5 per cent in 2025. This trend is consistent with that of *the gross capital formation in capital goods* indicator (Appendix 6).

As for *other buildings and structures*, their share of Basque GFCF fell from 27.5 per cent to 16.7 per cent between 2010 and 2024. It also falls in Spain, from 31.5 per cent to 24.2 per cent, whilst the changes are smaller in the EU-27 and Germany, where they account for 26.3 per cent and 21 per cent, respectively, in 2025. The Basque Country therefore has the lowest share of this category amongst the territories analysed.

Finally, *housing* accounts for 24.3 per cent of Basque investment in 2025, compared with 28.3 per cent in 2010, although its share has recovered from a low of 21.7 per cent. Its share also declines in Spain and the EU-27, albeit less sharply, to 28.1 per cent and 23.3 per cent, respectively. Germany follows a different trajectory, with an increase from 26.8 per cent to 29.9 per cent. These variations reflect changes in the composition of investment at current prices and do not necessarily imply a corresponding trend in the volumes invested.

The stock of physical capital stands at at 3.1 times GDP, narrowing the gap with the EU-27 and Germany

To conclude the section on physical capital, the *stock of physical capital* is analysed *in relation to GDP*. Whilst investment constitutes an annual flow, the stock reflects accumulated capital, net of depreciation. In 2024, this ratio falls slightly in the Basque Country to around 3.1 times GDP, following a similar trend to that of Spain. By contrast, Germany and the EU-27 show a slight upturn compared with the previous year, although their figures remain lower than those of the Basque Country. The Basque Country's gap with respect to both benchmarks is thus narrowing.[61]

As regards the **financing** leverage ratio, *the ratio of equity to total assets of companies* continues to trend positively, reaching a median of 53.0 per cent in 2025. This indicator reflects the proportion of equity used to finance assets, which includes both shareholders' contributions and retained earnings, as well as other components of net assets. On the other hand, *foreign direct investment (FDI) indicators* show a mixed picture of the Basque Country's international investment position. In 2024, the *stock of outward FDI* increases as a proportion of GDP, reaching 109 per cent and exceeding the EU-27 average. By contrast, the stock of *FDI* stands at 22.6 per cent of GDP,

[61] It should be borne in mind that these variations depend both on changes in the stock of capital and on those in GDP; therefore, a fall in the ratio does not necessarily imply a reduction in accumulated capital.

although it remains below the European benchmark. Cumulative direct investment abroad therefore continues to account for a considerably larger share than investment from abroad.

The **"Knowledge"** lever encompasses knowledge-based and ICT assets that contribute to generating economic value and well-being. The indicators analysed provide an insight into both the effort invested in research and development and the outcomes of technological and scientific activity; although these have been discussed in depth in previous chapters, they are presented again in this section to ensure the consistency of the analysis. Furthermore, Box 4-3 examines in greater detail how Basque companies are incorporating AI and implementing ICT security measures.

R&D expenditure stands at 2.1 per cent of GDP, narrowing the gap with the EU-27 but still far behind Upper Austria and Baden-Württemberg

R&D expenditure as a percentage of GDP provides an indication of the economy's investment in research and development. In the Basque Country, it stands at 2.1 per cent in 2024 and has remained relatively stable in recent years, following the increase recorded in 2020. Although the gap with the EU-27 average has narrowed compared with the start of the period analysed, the Basque indicator remains slightly below the European benchmark (2.2 per cent). The gap is wider compared with Germany (3.1 per cent) and, in particular, with Upper Austria (3.6 per cent) and Baden-Württemberg (5.6 per cent), which have maintained a considerably higher level of R&D expenditure throughout the series.

EPO patents per million inhabitants provide an indication of the level of technological activity. The Basque Country (65.9) ranks higher than Spain (25.9), but lower than the EU-27 average (79.2) and, in particular, than Germany (169.0), Upper Austria (213.3) and Baden-Württemberg (277.1).

In terms of scientific output, the Basque Country showed an upward trend between 2016 and 2021, followed by a levelling off of the indicator for *scientific publications in Web of Science per million inhabitants* across all regions, which can be attributed to the lack of a complete data record in recent years. In 2025, the figure for the Basque Country (3,801) stands slightly above that of Baden-Württemberg (3,672) and remains considerably higher than that of Spain (2,609), the EU-27 (2,495), Germany (2,377) and Upper Austria (1,865).

Environmental patents have fallen to 12.7 per cent, but their share still exceeds the European average

Finally, the *proportion of EPO patents in environmental technologies* falls to 12.7 per cent in 2024, on a three-year average. Despite this decline, its share remains higher than that of the EU-27 and the relative trend is favourable for the Basque Country. In any case, the trend in this indicator across the different territories contrasts with the gradual increase in the share of the environmental goods and services sector and with the urgency of the transition towards an environmentally sustainable economy. This indicator provides insight into the presence of environmental technologies within patenting activity, although on its own it does not allow for the determination of trends in the number of patents in this field.

BOX 4-3: Artificial intelligence and ICT security in Basque companies

AI and ICT security are key to business digitalisation

The Basque Country's DESI 2025 report (Peletier and Wilson, 2025) examines in depth two key dimensions of the digital transformation of Basque businesses: the adoption of artificial intelligence (AI) and the implementation of ICT security measures.

In 2024, 12.3 per cent of businesses in the region were using AI, compared with 13.5 per cent across the EU-27. This difference, however, masks varying patterns depending on company size. Medium-sized and large Basque companies have higher adoption rates than their European counterparts, whilst small companies lag behind. This gap is particularly significant in a business landscape where smaller companies account for a large proportion of the total, and highlights the difficulty of extending the most advanced technologies beyond those companies with greater financial, organisational and digital capabilities.

The pattern of AI adoption also reflects certain characteristics of Basque industrial specialisation. Its use is particularly prominent in production functions, automation and robotics, but its integration into administrative, commercial and content-generation areas remains more limited. Furthermore, 94.7 per cent of Basque companies that have considered incorporating AI cite a lack of specialist knowledge as a barrier, compared with 70.9 per cent in the EU-27. The development of talent and specialist skills thus emerges as a particularly relevant factor for the wider adoption of AI, alongside the reduction of costs associated with its implementation. By contrast, the perceived lack of usefulness carries relatively little weight in the Basque Country.

In the field of ICT security, implementation levels are high. In 2024, 93.5 per cent of Basque companies have some form of security measure in place, compared with 92.8 per cent in the EU-27. The greatest strengths lie in measures aimed at protecting information and ensuring business continuity, as well as in staff training and awareness-raising. However, there is room for improvement in capabilities relating to risk prevention, detection and management. There is also a lower degree of formalisation of security responsibilities: 21 per cent of Basque companies include ICT security obligations in their employment contracts, compared with 34.3 per cent in the EU-27.

Developments in both these areas are closely interlinked. The adoption of advanced digital technologies —and AI in particular— increases reliance on data, systems and digital infrastructure. Consequently, ICT security is no longer solely a technical issue but is gradually becoming an integral part of a company's risk management and digital transformation strategy. The table below summarises the strengths, areas for improvement and challenges associated with these dimensions.

	Artificial intelligence	ICT security
Strengths	• Greater uptake amongst medium-sized and large enterprises • Prominent use in production and operational functions • Perception of lack of usefulness as a barrier is lower	• High levels of implementation, particularly in data protection and business continuity • Lower exposure to security incidents
Areas for improvement	• Lower uptake amongst small businesses • Lower use of linguistic and generative AI, as well as in administrative and commercial functions • Greater reliance on external providers	• Lower deployment of measures for prevention, detection and risk management • Less formalisation of staff security obligations
Future challenges	• Boosting adoption amongst small businesses • Expand usage to management, commercial and content-generation functions • Strengthen talent and specialised digital skills	• Strengthening capabilities for risk prevention, detection and management • Integrating cybersecurity into the digital transformation strategy

Source: Compiled by the authors.

The challenge lies in achieving a broader and more strategic integration of digital technologies

The challenge for the Basque Country is therefore to move from a technological adoption focused on certain companies and functions to a broader and more strategic integration. This involves narrowing the gap between companies of different sizes, extending the use of digital technologies to functions that are still less digitised, and strengthening capabilities and specialised talent. At the same time, it will be necessary to move away from an approach centred primarily on protection and continuity towards more preventative, formalised security models that are integrated into business management.

The **"Human Capital"** lever encompasses capabilities linked to training, health and participation in the labour market that contribute to the region's competitiveness and well-being. The indicators show that the Basque Country is well placed in terms of medical staffing levels and the educational attainment of its young population, although there are differences in their recent trends.

In the healthcare sector, the *number of inhabitants per doctor* stands at 166 in 2024, reflecting a higher ratio of doctors to population than the EU-27 average (220), Germany (210) and the reference regions.

The proportion of young people with upper secondary or tertiary education stands at 87.7 per cent, exceeding the EU-27 average

In terms of education, the *proportion of the population aged 25 to 34 with upper secondary or tertiary education (ISCED 3–8)* has risen in the Basque Country from 78.7 per cent in 2016 to 87.7 per cent in 2025, remaining stable between 2023 and 2025. This trend has enabled it to exceed the EU-27 average (86.5 per cent) and that of Germany (85.9 per cent). Only Upper Austria has a higher proportion (90.3%). It is in the *proportion of the population aged 25 to 34 with tertiary education* that the Basque Country, with a percentage of 68.6%, truly stands out from the European average (44.8%) and from the rest of the regions.

The *employment rate for the population aged 15 to 64,* which reflects the extent to which a region utilises its available human capital, stands at 69.1 per cent in the Basque Country in 2025, compared with 65.1 per cent in 2016. Following the decline in 2020 and the subsequent recovery, the indicator falls in 2024 (68.8 per cent) and shows a slight improvement in 2025 (69.1 per cent), without regaining the 69.9 per cent reached in 2023. The Basque Country remains below the EU-27 average (71 per cent) and further behind Germany (77.2 per cent), Upper Austria (77.4 per cent) and Baden-Württemberg (79.6 per cent). Although it maintains a higher rate than Spain (66.97 per cent), Spain's progress is narrowing the gap between the two regions. Thus, overall, the Basque Country's favourable position in terms of educational attainment coexists with a lower proportion of the working-age population in employment.

ICT employment falls to 4.7 per cent, but advanced digital skills exceed the European average

In terms of skills related to digitalisation,[62] the proportion of *people employed in ICT occupations* is set to fall to 4.7 per cent of total employment by 2025. In contrast to what has happened in the other reference territories, where this indicator has continued to rise, in the Basque Country it has fallen over the last two years. As a result, it stands below the level for Spain (4.8 per cent), the European average (5.0 per cent) and that of Germany (5.5 per cent). However, the proportion *of the population with digital skills above the basic level (35.5 per cent)*, although it has fallen slightly, remains well above the EU-27 average (27.3 per cent) and the German average (19.8 per cent), and slightly below the Spanish average (38.6 per cent).

The **"Social and Institutional Capital"** lever encompasses aspects relating to the quality of institutions and cooperative relationships that contribute to competitiveness and well-being.

The *governance quality index,* which is calculated every 3 or 4 years, is standardised so that the annual value for the EU-27 is zero; consequently, it is not directly comparable from one year to the next. The decline observed in the Basque Country's score indicates that citizens' assessment of the administrations operating within the territory (from national to local level), which was previously more positive than the European average, is now converging with it.

SMEs excel in R&D&I collaboration, but not in joint publications

The diagnostic panel also includes two indicators that have been discussed in previous chapters: the percentage of SMEs involved in R&D and publications produced in collaboration with industry. As regards business collaboration, *the percentage of SMEs involved in R&D&I* has fallen to 24.5 per cent. However, the Basque Country continues to fare very well compared with the EU-27. Meanwhile, *publications produced in collaboration with industry* accounted for 2.6 per cent of the total in 2025, based on a three-year average. This proportion has fallen compared with the previous year and remains below the European average, with no significant changes in its relative position. Both cooperation indicators therefore show contrasting results: the favourable position of SMEs in R&D cooperation coexists with a lower share of industrial collaboration in scientific publications.

[62] The definition of these indicators and others relating to digital skills is available in the report **The Digital Economy and Society of the Basque Country. DESI 2025** (Peletier and Wilson, 2026).

4.3 Structural context

Competitiveness policies must be adapted to the specific context of the region

The structural context refers to the characteristics inherent to the territory, which are neither good nor bad in themselves; this is why colours are not used, as in the previous tables of indicators. The indicator data are presented in Table 4-4 and the trend charts in Appendix 7. These are relatively stable elements, whose trends reflect long-term dynamics that were the subject of a specific analysis in the 2022 Competitiveness Report (Orkestra, 2022). Nevertheless, their ongoing updating is important, as they form the framework of opportunities and constraints within which competitiveness policies operate. This perspective is in line with the *"place-based policies"* approach, according to which there are no universal development strategies; rather, these must be adapted to the specific characteristics of each territory.

TABLE 4-4 Structural context

Indicator	Year	Value	Trends (most recent year)	Relative ranking within the EU-27	
				Level	Change
Geodemographics					
Population density (inhabitants per km²)	2024	310.9	=	↑↑	=
Birth rate (births per 1,000 inhabitants)	2024	5.8	←	↓↓	–
Ageing rate (% of people aged 65 and over as a proportion of the total population)	2025	24.2	→	↑↑	=
Population (millions)	2025	2.2	=	↓↓	=
Proportion of the population born abroad (% of total population)	2025	14.0	→	↓	=
Heating degree-days (°C-days (base 18°C))	2025	1,518	=	↓↓	––
Cooling degree-days (°C-days (based on 21°C))	2025	98.1	→→	↓↓	++
Economic and business structure					
Concentration index of the sectoral structure (A38) of employment (%)	2024	40.5	=	=	=
Employment in companies with ≥ 50 employees (%)	2025	52.7	=	↑	+
Average size of industrial enterprises (B–E) (people)	2025	18.1	→	↑↑	++
Share of employment in industry (B-E) (% of total employment)	2025	19.9	→	↑↑	++
Share of employment in advanced business services (% of total employment)	2025	14.0	→	↓	=
Industry's share of GVA (% of total activity)	2025	22.4	←	↑↑	=
Share of GVA from advanced market services (% of total activity)	2025	17.0	=	↓↓	+

Source: Compiled by the authors based on the charts and sources included in Appendix 7.

The first section on **geodemographics** analyses indicators relating to the population structure of the region.

The Basque Country has a relatively small *population* (2.22 million inhabitants), although this is higher than that of Upper Austria (1.53 million inhabitants). However, its *population density* is high compared with the territories under consideration. In 2024, it stands at around 310.9 inhabitants per km², second only to Baden-Württemberg (317.9 inhabitants/km²) and well above Upper Austria (236.4 inhabitants/km²),

Upper Austria (130.9 inhabitants per km²), the EU-27 average (109.7 inhabitants per km²) and Spain (97.2 inhabitants per km²). Its small population therefore coexists with a high population density relative to its surface area.

Although not sufficient in itself, high geographical density may foster agglomeration economies

This density can facilitate the realisation of economies of scale in the provision of services and infrastructure and create conditions conducive to agglomeration economies, in which the proximity between the population and businesses facilitates access to broader labour markets and specialised suppliers, as well as the exchange of knowledge (OECD and European Commission, 2020). However, whilst population density helps to contextualise these opportunities, these advantages do not automatically stem from higher population density. Boschma (2005) points out that geographical proximity is not, in itself, a necessary or sufficient condition for learning and innovation, and that it must be analysed alongside other dimensions of proximity: cognitive, organisational, social and institutional. This involves considering the existence of knowledge that enables actors to understand and learn from one another, the bonds of collaboration and trust, and the norms and institutions that facilitate their relationships, as has been the focus of the analysis in previous chapters.

Together with the size and territorial distribution of the population, the birth rate, ageing and the proportion of residents born abroad help to complete the demographic profile of the Basque Country. Trends in these areas show a sustained decline in the birth rate and an increase in the proportion of older people, accompanied by a growing presence of people born in other countries.

The birth rate in the Basque Country falls from approximately 8.67 births per thousand inhabitants in 2015 to 5.81 in 2024, representing a reduction of nearly a third. The Basque Country has the lowest figures of the group analysed throughout the entire period. Although the decline in the birth rate is shared by the reference territories when comparing the start and end of the period, in the Basque Country the decline is continuous and starts from a level that is already relatively low.

This trend coincides with a rise in the *ageing rate*, which is set to increase from approximately 21.6 per cent in 2016 to 24.2 per cent in 2025. The Basque Country continues to have the highest proportion amongst the territories compared, although the ageing of the population is progressing in all of them. In the Basque Country, the increase is around 2.4 percentage points, widening the gap with Germany, the territory with the second-highest figure (22.7 per cent).

Low birth rates and rapid population ageing pose challenges for competitiveness and generational renewal

The combination of a low birth rate and a growing proportion of older people poses challenges for generational renewal and the adaptation of services to the demographic structure. From the perspective of competitiveness, it is important to pay attention to the future trends in the working-age population and the needs of generational renewal. However, these indicators alone do not allow us to determine how the availability of workers will evolve, as this also depends on efficiency gains, migration and labour force participation.

The final demographic indicator in this section —the *proportion of the population born abroad*— is set to rise from 8.9 per cent in 2016 to 14.0 per cent in 2025, an increase of around 5.2 percentage points. This growth is sustained and becoming more pronounced between 2022 and 2024. Although the Basque Country remains below Germany (20.5 per cent) and Spain (19.3 per cent), it is approaching the EU-27 average

(14.4 per cent). This indicator is key to meeting labour demand across various sectors and, against a backdrop of an ageing population, already fulfils part of the care sector's needs. The increase in the immigrant population interacts with the cross-cutting theme of inclusion within the competitiveness framework (see Orkestra, 2024).

Degree-days confirm a greater potential demand for heating than for cooling compared with other regions

Finally, the assessment includes two demographic context indicators that have an impact on energy consumption relating to heating and cooling. The first of these is *annual heating degree-days*, a unit of measurement used to quantify the energy demand required to heat a building, calculated by adding the difference between a comfort temperature (18°C) and the average outdoor temperature, provided that the latter is less than or equal to the base temperature of 15°C. This is an indicator for which the Basque Country stands at 1,518 degree-days, indicating a lower potential demand than in the other territories considered. The second indicator is that of annual *cooling degree-days*, a measure analogous to the previous one which is calculated by adding the difference between a comfort temperature of 21°C and the outdoor temperature, provided that the latter is above 24°C. In this case, the Basque Country's potential demand of 98 degree-days remains below the European and Spanish averages, but above that of the other territories considered. These indicators suggest that the Basque Country is a territory where consumption related to heating takes precedence over that related to cooling.

The second section focuses on the region's **economic and business structure**.

One of the indicators used to characterise the economic structure of a region is *the sectoral concentration index for employment*, which reflects the percentage of total employment accounted for by the five sectors with the highest employment volume, according to the A38 classification. A higher value indicates that a greater proportion of employment is concentrated in those sectors. In the Basque Country, the five sectors[63] accounted for approximately 40.5 per cent of employment in 2024, a figure close to that of the EU-27 and Germany, which stand at around 40 per cent, and below that of Spain, where it stands at approximately 46.1 per cent. Between 2014 and 2024, the Basque indicator remains stable, with minor fluctuations.

The *business dimension* offers another perspective on the economic structure of the Basque Country. In 2025, 52.7 per cent of employment is accounted for by companies with 50 or more employees, compared with approximately 50.4 per cent in 2019. In 2023, the most recent year for which data is available for all four territories, the Basque Country ranks above Spain and the EU-27, although below Germany. Meanwhile, the *average size of industrial firms* has increased from around 14 employees in 2016 to 18.1 in 2025. In the comparable years, it also exceeds the figures for Spain and the EU-27, but remains a considerable distance behind Germany.

Industry continues to play a significant role in the Basque economy

Industry continues to play a significant role in the Basque economy. In 2025, it accounts for 19.9 per cent of total *employment*, a proportion similar to that of Germany (19.7 per cent) and higher than that of Spain (13.5 per cent) and the EU-27 (17.1 per cent), although lower than that of Baden-Württemberg (27.9 per cent) and Upper Austria (23.6 per cent). Since 2016, its share of employment has remained relatively

[63] The five sectors in the Basque Country are: 1) Wholesale and retail trade; repair of motor vehicles and motorcycles; 2) Education; 3) Manufacture of basic metals and metal products, except machinery and equipment; 4) Construction; and 5) Administrative and support service activities.

stable, at around 20 per cent. *In terms of gross value added (GVA)*, the industry will account for 22.4 per cent in 2025, higher than Spain (15.7 per cent) and the EU-27 (19 per cent), and slightly lower than Germany (22.8 per cent). This share is lower than that recorded in 2015, when it stood at around 24.5 per cent, and has fallen over the last three years of the period following the recovery in 2021 and 2022[64].

Finally, *advanced business services* are gaining ground in terms of both employment and value added. Their share of *employment* will reach 14.0 per cent in 2025, compared with approximately 13.5 per cent in 2016, having been on an upward trend since 2020. In 2024, the latest year for which data is available, the Basque Country ranks slightly below Germany and the EU-27, and above Spain. Its contribution to GVA rises from around 15 per cent in 2015 to 17 per cent in 2025. With this latest figure, it comes close to overtaking Germany (16.7 per cent) and Spain (16.6 per cent), whilst remaining below the EU-27 (18.5 per cent).

Employment in advanced market services is growing (14.0 per cent) and GVA (17 per cent), outperforming Germany and Spain

4.4 Summary

The analysis confirms robust competitiveness, underpinned by an industrial and diversified economy capable of sustaining high levels of well-being. However, the basis for this performance has shifted. Recent growth is driven more by rising employment than by productivity growth, and the gap with leading industrial regions is not narrowing.

In terms of *economic and business performance*, the Basque Country continues to enjoy a per capita income well above the European average, contained unit labour costs and business margins that have recovered following the pandemic. Productivity exceeds that of Spain and the EU-27, but remains far behind Germany and the benchmark regions, particularly in terms of productivity per hour worked. Innovation among SMEs is progressing but has not yet reached the European average, whilst internationalisation has seen the poorest performance, losing momentum on the export front and narrowing the trade surplus.

Well-being outcomes present a favourable picture. Life satisfaction, income, low inequality, life expectancy and lifelong learning place the Basque Country in leading positions. Environmental indicators also show a generally favourable trend, although specific challenges remain in fully achieving the established targets. The main weaknesses centre on an unemployment rate that remains higher than the European average, energy poverty and, in particular, outcomes in compulsory education.

Among the **drivers of competitiveness**, the Basque Country stands out in terms of skilled human capital (albeit with a slight decline in employment in ICT occupations), investment activity and corporate solvency. In terms of knowledge, R&D expenditure is around the European average, with outstanding scientific output and pat-

[64] The decline in industry's share of GVA at current prices does not necessarily imply a fall in industrial output in real terms: it may be due to changes in relative prices or to stronger growth in other sectors. Similarly, the outsourcing of services previously carried out within industrial enterprises may shift value added towards the services sector without severing its link with industry. This phenomenon must be distinguished from servitisation —the incorporation of services into the industrial offering— which does not in itself entail a change in sectoral classification. The indicator does not allow the contribution of these processes to be identified.

enting activity that remains below the European average, though with a significant number of patents in environmental technologies. Furthermore, challenges persist in the areas of renewable energy, attracting foreign investment and making the most of available human capital, given that the employment rate remains below the European average. There is also evidence of a certain deterioration in social and institutional capital.

The **structural context** highlights an industry with significant weight and larger companies than at national level, combined with a small, dense and ageing population, in which generational renewal will increasingly depend on achieving higher labour force participation and on the influx of people from abroad.

Conclusions

The 2026 Competitiveness Report shows that the Basque Country maintains a solid competitive position and high levels of well-being, although weaknesses persist in productivity, internationalisation and certain aspects of innovation. Against this backdrop, the report examines in depth technology and knowledge transfer, a key driver for ensuring industrial transformation in a global landscape of growing uncertainty.

1. General assessment of competitiveness and well-being

The assessment confirms that the Basque Country continues to enjoy robust competitiveness, underpinned by a broad and diversified industrial base capable of sustaining high levels of well-being. However, it is essential to recognise the threats to this competitiveness so that we can address them by acting swiftly on those factors within our control.

The Basque Country continues to enjoy robust competitiveness, underpinned by a broad and diversified industrial base

Solid economic and business results, with the challenge of boosting productivity to respond to a changing external trade environment

The Basque Country maintains a leading position in European comparisons in terms of GDP per capita and apparent labour productivity. Furthermore, its business profit margins have recovered following the pandemic, and indicators relating to innovative SMEs, the rate of entrepreneurial activity and high-growth companies show a very positive recent trend.

However, although innovation amongst SMEs is progressing, it still falls short of the European average. In fact, recent economic growth is driven more by rising employment than by productivity growth, which remains far below the levels seen in Germany and other benchmark regions (particularly in terms of hours worked). This, combined with the relatively high unit labour costs in the manufacturing sector, highlights the need to continue working on the levers that drive productivity gains.

Recent economic growth has been driven more by rising employment than by productivity growth

The internationalisation dimension has performed the worst, with exports losing momentum and the trade surplus narrowing. The contraction in exports experienced in 2024 against an adverse geopolitical backdrop has become more entrenched in 2025. This trend highlights the vulnerability of an economy with strong international links and a dependence on exports at a time when global value chains are being reconfigured. However, as noted in the 2025 Competitiveness Report, the high levels of

The decline in exports has become entrenched

outward foreign direct investment from the Basque Country represent another avenue through which our companies are gaining access to international markets in the face of this new context.

Economic performance translates into high levels of well-being

The overall picture regarding well-being indicators remains very positive. The Basque Country outperforms the European average and the reference regions in terms of median household income, life satisfaction and social life, and has lower levels of inequality and risk of poverty or social exclusion. It also performs particularly well in health indicators, although its lead is narrowing, and in lifelong learning amongst the adult population, where the Basque Country is actually extending its lead over the regions compared.

The 2025 PISA results call into question the quality of learning amongst the younger generations

Despite this, structural challenges persist in employment rates, with unemployment figures remaining above the EU-27 average. Furthermore, the latest PISA 2025 results for compulsory education raise questions about the quality of learning amongst the younger generations. On environmental matters, the trend in indicators is generally very positive, although there is still some way to go to achieve some of the targets set.

Future competitiveness will require a stronger focus on the adoption of advanced technologies, the energy transition, generational renewal and the integration of immigrants

With regard to the drivers of our competitiveness, the Basque Country stands out in the areas of physical capital, financing and human capital, owing to its investment efforts (although these have declined over the past year and its ability to attract foreign investment remains below the EU-27 average), the financial soundness of its businesses, and the skills of its workforce (although there has been a slight decline in employment in ICT occupations).

R&D expenditure is close to the European average, with outstanding scientific output but lower patenting activity

In the "knowledge" pillar, R&D expenditure is close to the EU-27 average, with outstanding scientific output and patenting activity that remains well below the European average, though with a high proportion of patents in environmental technologies. On the other hand, the DESI Report highlights a relative gap in the adoption of advanced technologies (such as artificial intelligence and cybersecurity) amongst small businesses. In the natural capital pillar, the generally positive results indicate that further work is needed to increase the uptake of renewables for decarbonisation.

At a structural level, an ageing population and low birth rates are affecting generational renewal, making the sustainability of the labour market dependent on greater participation and the integration of people from abroad.

2. From knowledge to the market: How does the Basque system of technology and knowledge transfer work?

Technology and knowledge transfer is essential for the emergence of both innovation and new businesses that have an impact on the region's economic performance

and the region's well-being. Specifically, its effectiveness determines the capacity of Basque industry to enhance its competitiveness and adapt to ongoing transformations in a way that strengthens its position in a constantly changing global environment. Without effective mechanisms to bring this knowledge to market, it will not be possible to undertake the transformations that the coming years will demand. For this reason, this report has examined the Basque technology and knowledge transfer system in depth to understand how it operates, how it impacts the business sector and the market, and which elements need to be strengthened.

An analysis of the three chapters of the report devoted to this subject indicates that the Basque system retains many of the strengths that have made it unique. Its limitations lie not so much in the knowledge it generates or the channels through which this knowledge circulates, but rather in the breadth of the business community it reaches and in the growth potential of the new companies emerging from it.

The Basque system retains many of the strengths that have made it unique, but it must broaden its scope

A comprehensive, well-established system with extensive international links

The Basque Country is classified as *a "strong innovator"* on the *Regional Innovation Scoreboard* and, within that index, the indicators for technology transfer are among its main strengths. A comparative analysis of European regions suggests that, in addition to the availability of resources, cultural and institutional factors help to explain the Basque Country's superior performance in the area of technology transfer.

In fact, the Basque system stands out for the clear direction of a policy that has been sustained for decades, as reflected in the RVCTI decree, which is currently being updated. It has fostered a network of stakeholders in the technological sphere (technology centres and corporate R&D units), the scientific sphere (university research groups, BERCs, CICs and IISs) and the educational sphere (universities, vocational training and programmes such as TKgune), all dedicated to generating and transferring knowledge and maintaining close links with businesses of various sectors and sizes. The system is energised by the support of numerous enabling organisations and innovative initiatives such as the recently introduced Transformative Projects and Innovation Beacons. It benefits from structural and cross-cutting support from public administrations through a set of instruments that have evolved to address the priorities of the industrial strategy.

The Basque system brings together a wide network of technological, scientific and educational stakeholders, driven by enabling organisations

Furthermore, the system's international connections – which are critical for achieving scale, visibility and influence —are evident in the high level of participation by the STI ecosystem in European research programmes and the Basque presence in European networks. This connection also provides an opportunity to learn from other regional systems whose experience serves as a benchmark in various fields, such as those in Flanders (Belgium), Dresden (Germany) or the United Kingdom, as explored in Chapter 1.

Gaps by company size in both innovative activity and cooperation with actors in the STI ecosystem

The Basque Country allocates resources to R&D at a level comparable to the EU-27 average in terms of expenditure and higher in terms of research staff, and public funding of business expenditure is above the European average. 57 per cent of expenditure is carried out by businesses, 20 per cent by technology centres and CICs, 17 per cent by the university sector and 7 per cent by the public administration.

Both innovation activity and cooperation to drive innovation vary according to the size of the company

In this context, innovation activity amongst SMEs has grown steadily to levels close to those of the EU-27. As in other regions, this activity is not distributed evenly. Innovation activity is concentrated amongst larger firms, and whilst the Basque Country demonstrates its greatest competitive strength amongst medium-sized firms, its main comparative disadvantage lies in the small firm segment.

The proportion of Basque firms that collaborate with other organisations on innovation is well above the European average, but once again there are significant differences by size. Whilst over 90 per cent of large and medium-sized firms that innovate collaborate, only half of small firms that innovate do so. Furthermore, it is observed that innovation cooperation amongst Basque enterprises does not predominantly take place along the value chain, but is instead heavily mediated by actors within the science and technology network. This distinctive pattern is, to a substantial extent, due to the cumulative effect of a framework of public policy instruments which, for decades, has systematically required or rewarded collaboration with the network.

Cooperation enhances the impact of innovation on business competitiveness

Analysis of the EU-27 countries shows that cooperating firms are more likely to innovate and to introduce higher-level innovations. The estimated effect of cooperation remains significant when controlling for sector, firm size and region, and is greater when the partner is a research centre or a university than when it is another firm in the value chain. Cooperation is also associated with a greater economic impact of innovation, as regions where cooperation is more widespread also show a higher proportion of turnover derived from their innovations.

The Basque Country shows a higher level of cooperation than the territories with which it is compared

The Basque Country shows a higher return on cooperation than the other regions compared, particularly amongst small firms, although it has its own distinct profile. Basque industry produces innovations that achieve a high degree of novelty for the market less frequently, but these have a much greater impact on its turnover, and cooperation with client firms plays a more significant role in its most disruptive innovations.

The case of Hidden Champions companies is closer to a process of co-creation than a one-way transfer

The example of "Hidden Champions" companies illustrates how these cooperative relationships are structured from a business perspective. On the one hand, it is closer to a process of co-creation than to a one-way transfer; on the other hand, it encompasses a spectrum of different ways of innovating. Most of these companies innovate through practical experience, drawing on the knowledge that emerges from their relationships with client firms. Collaboration with technology centres is also notable, particularly for strategic developments. Their high level of specialisation, however, sometimes forces them to step outside the regional innovation system in order to collaborate on such projects.

The transfer is facilitated by the alignment between the productive structure and patenting activity, but there is a weaker link with scientific specialisations

Patenting activity is aligned with the Basque Country's productive structure

Patenting activity mirrors the Basque Country's productive structure with remarkable accuracy, and this correlation has become even closer over the last five years, as patenting activity has spread to sectors that were previously excluded from it. A gradual shift from mechanical engineering towards electrical and electronic engineering is also evident.

Scientific output presents a different profile. It is abundant and has a greater impact than the European benchmark, but its specialisation is concentrated in disciplines that are not necessarily the closest to the region's manufacturing core, and its formal collaboration with industry falls below the European benchmark in virtually all fields of knowledge.

A joint analysis of patents and publications identifies the bio-health sector as an emerging field, although its results have not yet translated into significant job creation.

Impact on international markets through a stable export structure

Exports of medium- and high-technology products have gained ground and shown resilience in the face of the contraction in global trade. This is an indication that the favourable environment for technology and knowledge transfer, together with companies' innovation efforts, ultimately translates into a competitive position in foreign markets.

The composition of technology exports, however, has barely changed over the last decade. Diversification into new niches is still in its infancy, although these sectors show potential, and dependence on the automotive sector remains the main source of vulnerability.

The composition of technology exports has barely changed over the last decade

A strong capacity for creating technology-based firms, whilst facing the challenge of scalability

In terms of its relative capacity to generate *spin-offs* (companies created through the impetus of scientific and technological institutions) and new technology-based firms, the Basque Country ranks amongst the leading European regions, with technology and collaborative research centres driving a significant proportion of these. However, funding does not match this capacity. These companies attract significantly less private investment than their counterparts in comparable regions, which limits their ability to grow and scale up. Furthermore, they are far more dependent on public funding than the average.

Spin-offs and new technology-based firms attract less private investment than those in the comparable territories

The immediate interpretation points to a financial bottleneck, but it is worth considering that the shortage of funding is both a symptom and a cause. Thus, it is likely that the constraint also stems from greater risk aversion, a lower level of ambition in the formulation of projects, a lack of "bridge actors" capable of effectively linking technologies that work with what the market needs, or the orientation of projects towards a highly competitive global market.

3. Strategic recommendations for a knowledge and technology transfer system geared towards industrial transformation

Broadly speaking, the analysis aims to preserve the system's strengths, broaden its scope and correct the imbalances that limit business transformation and growth. More specifically, the evidence analysed throughout the report and the lessons learnt from international models lead us to propose **five key areas of action** for the Basque technology and knowledge transfer system.

It is proposed to take action on five elements of the technology and knowledge transfer system

Based on the fundamental recommendation to preserve and strengthen investment in the capacities of the STI ecosystem and businesses, in order to ensure that knowledge generation responds both to current needs and to future technological opportunities, it is proposed to take action on:

1. the **scope** of the system;
2. the **orientation** of the system;
3. the **coordination** of the system;
4. the **impact** of the system; and
5. the system's **connectivity**.

1. Scope: Expanding the base of innovative enterprises

The main limitations identified relate to the scope of the system, both in terms of the reach of innovative activity and cooperation for innovation. The bottleneck relating to company size runs through the entire assessment, and certain limitations have also been identified regarding the dynamics of cooperation within value chains. Thus, the main priority is to broaden the base of innovative enterprises, particularly amongst small businesses, with the aim of transforming available knowledge and acquired capabilities into innovations in products, processes, organisation or marketing.

SMEs require flexible support and straightforward procedures focused on practical application

To this end, the portfolio of instruments must continue to adapt to the diversity of business capabilities and needs. For example, SMEs require flexible, straightforward and application-oriented support to fund proof-of-concept trials, rapid diagnostics and on-site pilot schemes, so that technology can be validated before committing to larger investments. Lateral transfer —understood as the adaptation and industrialisation within traditional SMEs of solutions already proven in other sectors— fits this profile particularly well, and organisations that drive clusters, together with development agencies, are the natural bodies to act as intermediaries in this process.

Proximity also plays an important role. Regional initiatives providing technological support and the network of vocational training centres operate within the geographical vicinity of, and at the level of technological maturity of, the smallest enterprises. Systematising these methodologies would make it possible to bring technological support closer to small enterprises through agents who are already familiar with their circumstances.

Leading companies and the transformative projects under the Industry Plan can drive transfer to SMEs

Furthermore, the driving force should not rest solely with technology providers: the 'tractor' companies and the transformative projects under the Industry Plan are another channel for involving SMEs in technology transfer processes that extend across the entire value chain. The aim is to make it easier for businesses to access the knowledge they need, regardless of whether it comes from technology centres, universities, engineering firms, consultancy firms, equipment manufacturers, clients, suppliers or foreign organisations.

In fact, it seems particularly important to strengthen the learning processes that take place within value chains. Statistics on cooperation with suppliers, customers and competitors suggest a potential weakness, whilst the Hidden Champions demonstrate the significance that such relationships can attain.

None of these measures is effective without absorption capacity within the recipient organisation. Support for the recruitment of qualified staff to act as a bridge between external knowledge and the organisation is a mechanism that has been tried and tested in other European systems, such as the *Knowledge Transfer Partnerships* in the United Kingdom, and deserves to be explored in the Basque context. At the same time, avoiding excessive fragmentation of stakeholders within the innovation and technology transfer system and simplifying access to them will be important for ensuring effectiveness and increasing reach amongst smaller firms.

To increase companies' capacity to absorb innovation, It is necessary to support the recruitment of qualified staff

2. Focus: Transforming to promote competitiveness and well-being

The ultimate aim of the Basque technology and knowledge transfer system is not to indiscriminately increase R&D, patents or cooperation, but to improve innovative capabilities and their contributions to the ongoing transformation of industry in a way that fosters competitiveness and sustainable well-being.

Export diversification is analysed because, if diversification is present, it would be an indication of a certain degree of transformation. The analysis reveals that the export structure of Basque industry has barely changed in a decade, with a high concentration remaining in the automotive sector. However, transformation cannot be entrusted solely to the emergence of new sectors, given that the bulk of industrial employment is concentrated in mature sectors; the system must therefore operate simultaneously on two fronts.

The first is the transformation of established sectors, particularly those identified as *"Irabazi"* in the Industry Plan. Several of these account for a considerable share of employment, but their patenting activity is far below this level, making them the natural arena for lateral transfer and enabling technologies. The shift observed in patents from mechanical engineering towards electrical and electronic engineering suggests that this transformation has already begun.

The second is the support for emerging sectors, particularly those identified as *"Hazi"* in the Industry Plan, but also other disruptive business projects (*"Jauzi"*). The biohealth sector stands out in the analysis and warrants specific monitoring.

More generally, and in line with the international consensus on the need to establish a clear direction for innovation policies, it will be important to focus transformative projects and other support policies on strategic transformation priorities. Furthermore, this approach can facilitate the integration of Basque companies into the continent's emerging value chains in areas such as those related to electrification, clean technologies, semiconductors or artificial intelligence.[65]

Transformative projects and other support policies must be directed towards strategic priorities for transformation

In any case, it is advisable to continue monitoring demand and the capacity of the local business sector to absorb knowledge, given that new technological and scientific capabilities only lead to productive transformation if there are businesses capable of incorporating them.

[65] The *Netzero Basque Industrial Super Cluster* is an example of a public-private initiative with a clear direction, through which the Basque Country is positioning itself as an international leader in to experiment with industrial transformation geared towards decarbonisation (see Menendez *et al*., 2026 and https://www.spri.eus/es/ayudas/net-zero-basque-industrial-super-cluster/).

3. Coordination: Refining responses to industry needs

Businesses and stakeholders in the STI ecosystem agree that their relationship is understood as a process of co-creation. In this sense, the term "transfer" itself is not the most appropriate for a complex system characterised by bidirectional flows of knowledge. To refine responses to industry's needs, it will be important to move towards a system architecture focused on strengthening companies' capacities to generate, acquire, combine, adapt and apply knowledge, whilst maintaining and developing the region's advanced scientific and technological capabilities.

Public policy instruments must take into account the different modes of innovation that coexist within the ecosystem

Applying this approach to the design of policy instruments means taking into account the diversity of business capabilities and needs, which entails reviewing the range of programmes, the selection criteria for beneficiary enterprises, and the mechanisms for involving companies that currently participate little in the programmes. It will be particularly important to respond to the different modes of innovation that co-exist within the business ecosystem. Indeed, the priority of extending coverage must not lead us to neglect the needs of advanced enterprises or to assume that they all require the same forms of cooperation. Specifically, it is necessary to combine short, applied and on-site validation formats for forms of innovation closer to practical application, with multi-year frameworks and shared technology roadmaps for forms of innovation closer to formal R&D. In the latter case, schemes for sharing scientific and technical risk between the company and the research centre are particularly relevant.

Knowledge generation policy must maintain a diversified range of options, without presupposing a single form of engagement with businesses

The survey of "Hidden Champions" companies highlights a key point: not every advanced company needs to maintain an ongoing strategic relationship with research organisations. Some require such a relationship to develop new technologies; others need specialist knowledge to solve specific problems. Therefore, knowledge-generation policy must maintain a diverse range of options, without assuming a single form of collaboration with companies. In fact, the barriers identified by "Hidden Champions" companies —particularly the misalignment of timelines and the disconnect between objectives— point to problems in the design of the relationship rather than a lack of capacity. Added to these is the demand that technology stakeholders play a role in anticipating technological developments and promote consortia between companies from different sectors facing common challenges.

Finally, a sophisticated organisation of the system involves paying attention to institutional and functional coordination. Its aim is not to centralise actions, but to ensure that the various functions are covered and that companies can access them in a coordinated manner. Coordination between administrative levels and the structuring of formal alliances between universities, BERC, and the centres forming part of the BRTA alliance to share scientific infrastructure without-Regulating, coordinating the recruitment of research talent and unifying the response to major industrial challenges directly addresses the risk of fragmentation and the existence of underutilised capacity.

4. Impact: Fostering new business ventures in the Basque Country

The impacts of the Basque technology and knowledge transfer system are evident across multiple areas, including the innovative capacity of businesses, the introduc-

tion of new products and processes, business turnover, the competitiveness of medium- and high-technology exports, and advances in environmental sustainability and well-being.

One of the most visible impacts —and one of the most important in terms of the future diversification and transformation of industry— is the emergence and growth of new business ventures in the Basque Country. It is likely that the constraint on the growth of new technology-based firms identified in the assessment operates simultaneously on the supply side of capital —and its suitability for the different stages of growth— and on the quality of the projects themselves. The response, therefore, must also be structured in both directions.

On the one hand, the region requires specialised investment vehicles of sufficient scale for the various growth phases, linked to the system's own stakeholders, to prevent companies emerging from the system from being forced into a premature sale or becoming stagnant during the intermediate stages of growth.

It is necessary to have specialised investment vehicles of sufficient scale

Furthermore, the priority lies in formulating and pursuing the development of projects with growth potential and international reach. Incentives for entrepreneurship themselves can act as catalysts, and these can be influenced, for example, through tax measures to foster the ambition of entrepreneurs, or through mechanisms to mitigate the risk they face in the event of failure, as well as integrated incubation and acceleration programmes that link the commercialisation capabilities of scientific and technology centres with investor networks and provide early international exposure. However, another factor —one that is particularly critical for facilitating the transition from technologies that work in the laboratory or research centre to real-world solutions on the market— is the range of complementary skills encompassed by the concept of the "venture builder"[66].

5. Connection: Leveraging the system's international connections

The final area of action concerns the system's international connections, which are well established in the Basque Country and essential for achieving scale, accessing specialised knowledge and participating in European technology agendas. The aim of these connections should be to effectively combine local capabilities with international expertise. They must be utilised to achieve scale in projects and anticipate future trends technological advancements and gain access to knowledge that the region does not generate itself, in line with the conclusions of the previous edition of this report regarding the need to strengthen the Basque industry's international connections through the flow of people and knowledge.

The analysis offers an important nuance on this point. Basque participation in European programmes is characterised by a high level of involvement from public research organisations (CTTTs and CICs), rather than by business participation, a fact that reflects the inherent strengths of the Basque STI ecosystem. An important recommendation in this context is to ensure that the efforts of scientific and technical

The capabilities of scientific and technical stakeholders should match sectors with absorption capacity within the industrial sector

[66] The first recommendation of a recent European Commission report on the role of research and technology organisations in fostering industrial *spin-offs-offs* with impact is precisely to encourage the creation of entities dedicated to building companies (*venture builders*), which are made up of complementary profiles —such as former entrepreneurs, PhD holders or former management consultants— who facilitate the transformation of technologies into marketable products (Grande *et al*., 2026).

stakeholders are aligned with technological areas and sectors that have significant absorption capacity within the Basque industrial fabric or the potential to develop for subsequent sectoral diversification.

Finally, an analysis of other benchmark systems points to potential lessons to be learnt regarding the attraction of international research talent, a mechanism which, in other contexts, has become an effective catalyst for technology transfer to industry.

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Appendix 1

Differences in the categorisation of collaboration across innovation surveys

This annex details the technical discrepancy observed between the innovation surveys conducted by the Basque Institute of Statistics (Eustat) and the National Institute of Statistics (INE), the latter of which is standardised in accordance with Eurostat's Community Innovation Survey (CIS) standard.

The main discrepancy lies in the classification and explicit identification of technology centres and cooperative research centres (CCTT and CIC) within the Basque innovation ecosystem. Eustat specifically breaks down this category, which accounted for 35.3 per cent in 2022 and 27.7 per cent in 2024. The INE questionnaire does not treat CCTTs and CICs as a separate category. When responding to the INE, Basque companies reclassify this collaboration by allocating it to other categories, primarily Consultants (where an inflated average difference of +24.9 percentage points is observed in the INE compared with Eustat) and Other companies (+16.3 points), and to a lesser extent in public administration (+8.9 pp), non-profit organisations (+6.8 pp) and universities (+5.7 pp).

TABLE A1 Effect of the reclassification of development cooperation (% of enterprises)

		Consultants	Suppliers	Client companies	Competitors	Other companies	Technology Centres	Other companies within the same group	Universities	Government bodies	Public sector clients	Non-profit organisations
2024	Eustat	30.6%	22.2%	17.2%	11.9%	19.0%	27.7%	21.4%	19.2%	9.8%	6.5%	6.8%
2022	Eustat	40.1%	25.0%	22.3%	12.5%	30.8%	35.3%	22.9%	22.2%	12.2%	3.9%	5.8%
2024	INE	62.4%	28.4%	22.9%	6.9%	41.1%	n.a.	14.9%	25.3%	19.0%	6.9%	11.7%
2022	INE	58.0%	28.7%	24.7%	7.3%	41.2%	n.a.	18.7%	27.7%	20.7%	9.3%	14.5%
Average difference		24.9	4.9	4.0	−5.1	16.3		−5.3	5.7	8.9	2.8	6.8

Source: Compiled by the authors based on data from INE and Eustat.

Appendix 2

Cooperation and innovation outcomes

The models presented below quantify the relationship described in the two figures in this section. On the one hand, the difference associated with cooperation in the probability that a product innovation will be new to the market; and, on the other, how that difference varies according to the type of partner with whom cooperation takes place. In both cases, the dependent variable is the proportion of firms with their own product innovation —where that innovation represents a market novelty— out of the total number of firms that innovate in products, regardless of whether their innovations are new to the market or only to the firm itself. This is precisely the indicator represented by the figures.

The observation unit is the cell defined by region, sector and size bracket, for which the number of firms in each innovation profile is known. Given the number of cases and the number of successes in each cell, the estimation using a grouped binomial logit model is algebraically equivalent to a logit estimated on the individual firms using those same covariates, so that the coefficients are not subject to ecological inference bias. The limitation of the model stems from the availability of covariates, which means it is not possible to control for each firm's expenditure on innovation, its age or other factors; consequently, the results describe a conditional association rather than a causal effect.

For null values or those unavailable due to confidentiality, an exclusion rule is applied: within each variable, a territory lacking any of these values is completely excluded from the model, so that none contributes partial information within the same comparison. In the model by agent type, the rule is applied per agent, such that a territory is included in an agent's comparison only when complete data are available for that agent and for the reference category, against which the comparison is made.

Standard errors are grouped by territory, which allows for arbitrary correlation of the disturbances between cells within the same country. The coefficients are expressed on the logarithmic scale of the odds; the pooled standard error is shown in brackets. The average marginal effect translates the coefficient of cooperation into percentage points of probability, averaged over the sample.

TABLE A2 Cooperation and the probability that a product innovation is new to the market

Dependent variable: market novelty	(1)	(2)	(3)	(4)	(5)
Cooperates	0.596*** *(0.098)*	0.590*** *(0.096)*	0.519*** *(0.079)*	0.530*** *(0.135)*	0.490*** *(0.085)*
Industry (ref.: services)		0.189 *(0.127)*	0.124 *(0.104)*	0.123 *(0.102)*	0.103 *(0.119)*
10 to 49 employees (ref.: 250 or more)		−0.162* *(0.092)*	−0.380** *(0.153)*	−0.361*** *(0.119)*	−0.376** *(0.155)*
50 to 249 employees		−0.260** *(0.110)*	−0.401** *(0.176)*	−0.431** *(0.202)*	−0.398** *(0.177)*
Cooperative × 10 to 49 employees				−0.043 *(0.120)*	
Cooperative × with 50 to 249 employees				0.071 *(0.097)*	
Cooperative × sector					0.055 *(0.079)*
Fixed effects for territory	No	No	Yes	Yes	Yes
Average marginal effect (pp)	14.8	14.5	11.9	12.3	11.9
"Cooperates" odds ratio	1.81	1.80	1.68	1.70	1.63
Observations	295	295	295	295	295
Territories (conglomerates)	27	27	27	27	27
Pseudo-R^2 (McFadden)	0.152	0.175	0.800	0.801	0.801

Notes: Column (1) shows the crude difference; column (2) includes sector and size controls; column (3) incorporates fixed effects for territory and constitutes the baseline specification; columns (4) and (5) include the interaction between cooperation and the size bracket and sector, respectively. Standard errors grouped by territory are shown in brackets. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$.

Source: Author's own calculations based on Eurostat (CIS2022).

TABLE A3 Market novelty by type of partner with whom cooperation takes place

Type of partner (ref.: group companies)	Obs.	Coefficient	Difference (pp)	Odds ratio [95% CI]
Public or private research centres and public administration	60	0.324** *(0.138)*	+7.3	1.38 [1.06 – 1.81]
Non-profit organisations	33	0.313** *(0.139)*	+7.0	1.37 [1.04 – 1.79]
Public sector client	50	0.260*** *(0.091)*	+5.9	1.30 [1.09 – 1.55]
Universities and higher education institutions	72	0.221*** *(0.082)*	+5.0	1.25 [1.06 – 1.47]
Corporate client	69	0.142* *(0.075)*	+3.2	1.15 [0.99 – 1.34]
Consultancy firm	76	0.032 *(0.096)*	+0.7	1.03 [0.86 – 1.25]
Competitor company	50	0.013 *(0.079)*	+0.3	1.01 [0.87 – 1.18]
Other companies	66	–0.027 *(0.093)*	–0.6	0.97 [0.81 – 1.17]
Supplier company	78	–0.029 *(0.073)*	–0.7	0.97 [0.84 – 1.12]
Group companies (reference category)	81	—	—	1.00
Industry (ref.: services)		0.039 *(0.094)*		1.04
10 to 49 employees (ref.: 250 or more)		–0.114 *(0.096)*		0.89
50 to 249 employees		–0.251** *(0.100)*		0.78
Territories (conglomerates)		15		
Pseudo-R^2 (McFadden)		0.599		

Notes: The sample is restricted to cooperating firms and the analysis is carried out at the individual agent level. The reference category is cooperation with firms within the same group. The specification includes fixed effects for territory, sector and size bracket. Standard errors grouped by territory are shown in brackets. *** p < 0.01; ** p < 0.05; * p < 0.10.

Source: Compiled by the authors based on Eurostat (CIS2022).

Appendix 3

Exports of medium- and high-technology products in Spain and the EU-27

This study includes an analysis of foreign trade in goods based on the "Exports of medium- and high-technology products" indicator, which measures the technological competitiveness of the external production sector.

The variables have been calculated and defined in strict accordance with the methodological guidelines of the European Innovation Scoreboard (EIS), ensuring that the results obtained for the Basque Country are fully comparable with those for Spain, the European Union and its Member States.

Calculation Formula

In accordance with the EIS standard, the indicator is formally defined as the ratio expressed as a percentage:

- Numerator: Total value (in current euros) of exports of products classified as medium-high and high technology.
- Denominator: Total value (in current euros) of exports of all goods (total goods).

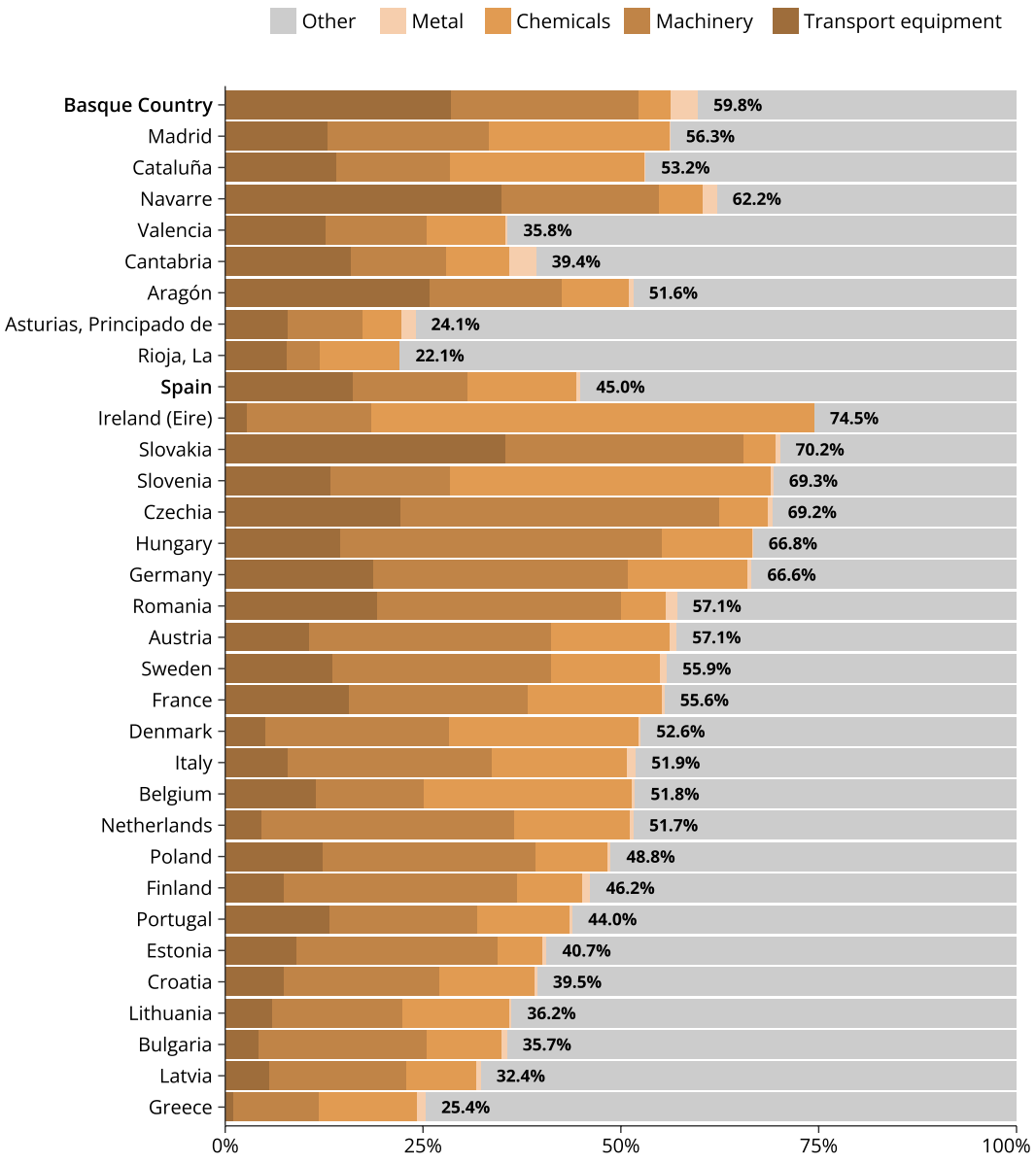
Sectoral Delimitation (Product Classification)

To identify high- and medium-high-technology products, the sectoral aggregation of the SITC Rev. 4 (Standard International Trade Classification) used within the EIS framework has been applied; this is available in the Data-Comex database for Spain at regional level. The groups included are:

- Technical Fibres and Textiles: 266, 267, 653.
- Chemicals and Pharmaceuticals: 512, 513, 525, 533, 54, 553, 554, 562, 57, 58, 591, 593, 597, 598.
- Rubber Products and Advanced Steel Manufacturing: 629, 671, 672, 679.
- Industrial and Precision Machinery: 71, 72, 731, 733, 737, 74, 87, 88.

- Office, Telecommunications and Audio Equipment: 751, 752, 759, 76, 77.
- Transport and Automotive Equipment: 78, 79.
- Other Specialised Manufactures: 812, 891.

FIGURE A.3 Life satisfaction

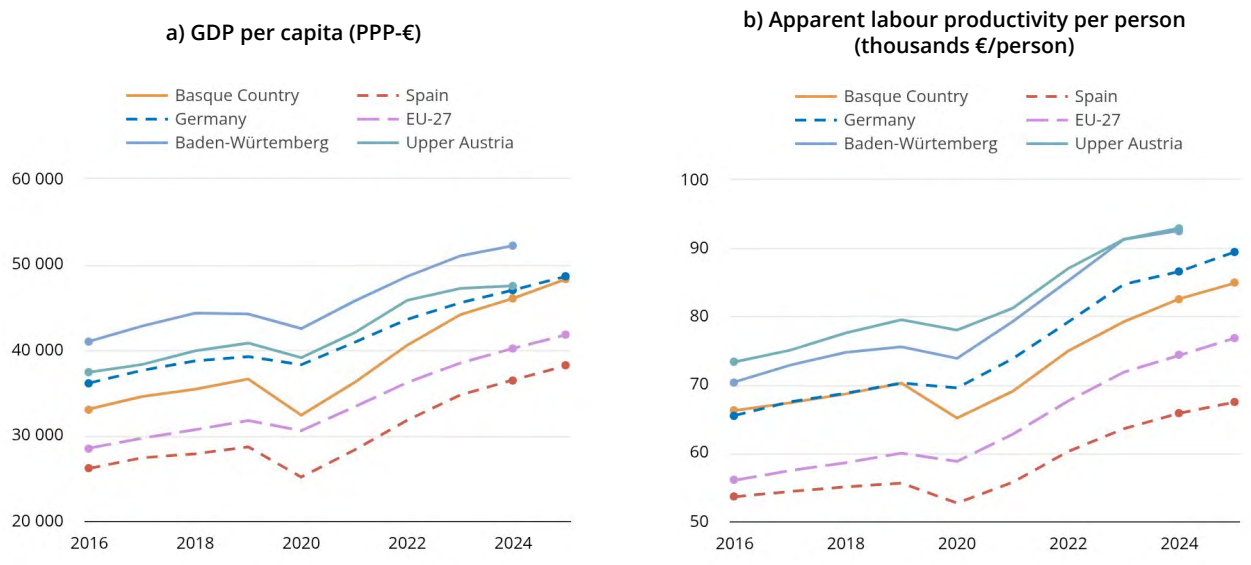


Source: Compiled by the authors based on data from Datacomex and Eurostat.

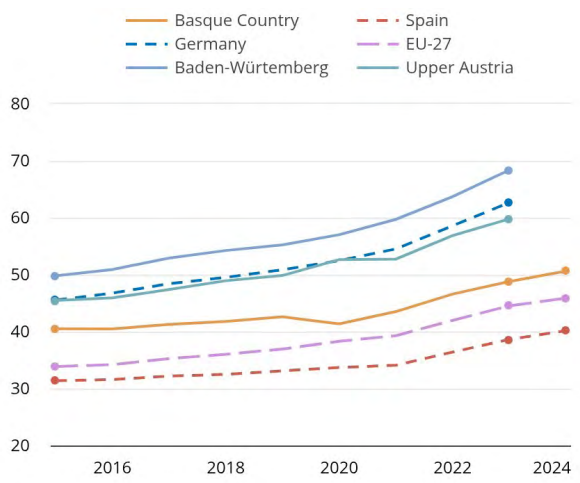
Appendix 4

Indicators of economic and business competitiveness results

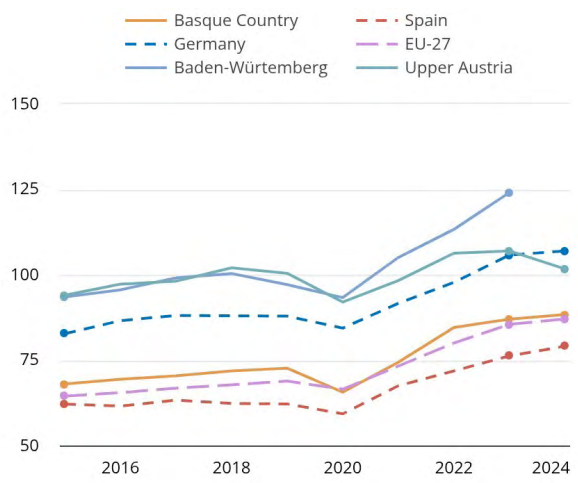
CHART A.4-1 Economic and business performance



c) Apparent labour productivity per hour (€/hour)



d) Apparent manufacturing labour productivity per person (thousands €/person)



e) Apparent labour productivity per hour in manufacturing (€/hour)

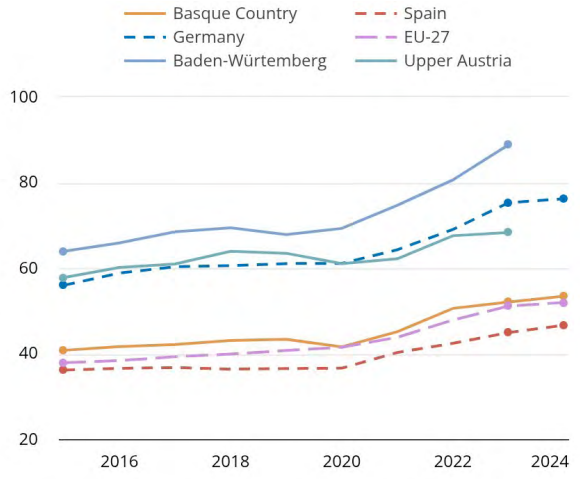
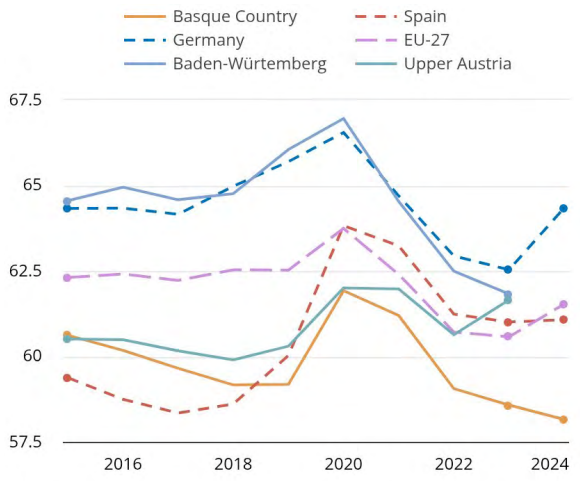
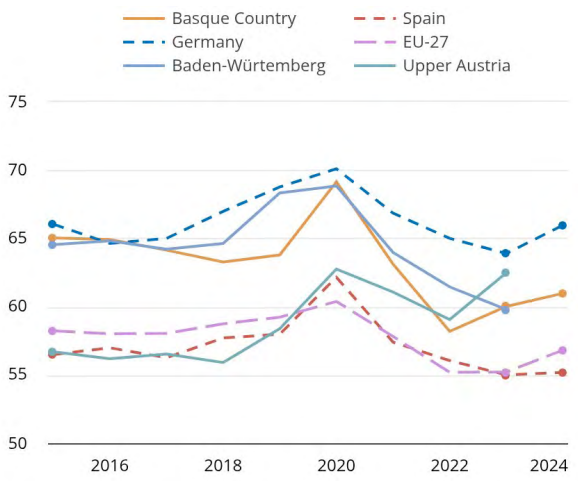


CHART A.4-2 Business profitability

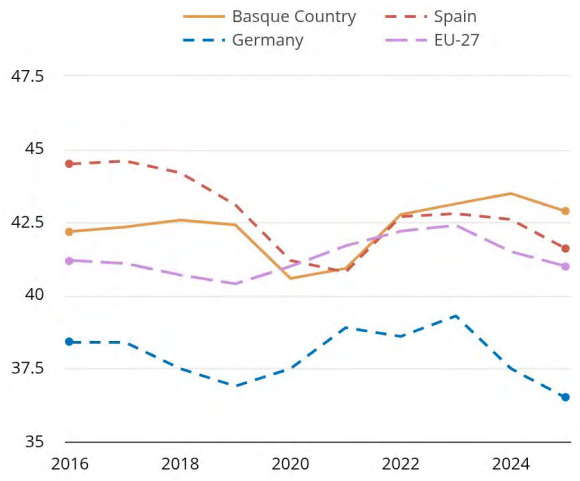
a) Unit Labor Cost (ULC % per occupied person)



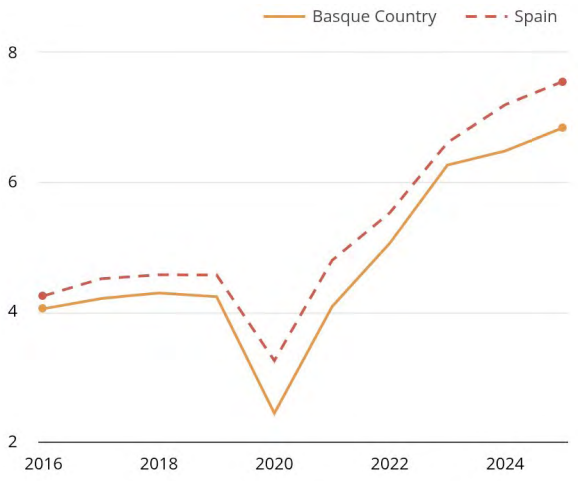
b) Manufacturing unit Labour Cost (ULC, % per employed person)



c) Gross operating surplus (% GDP)



d) ROA



e) ROE

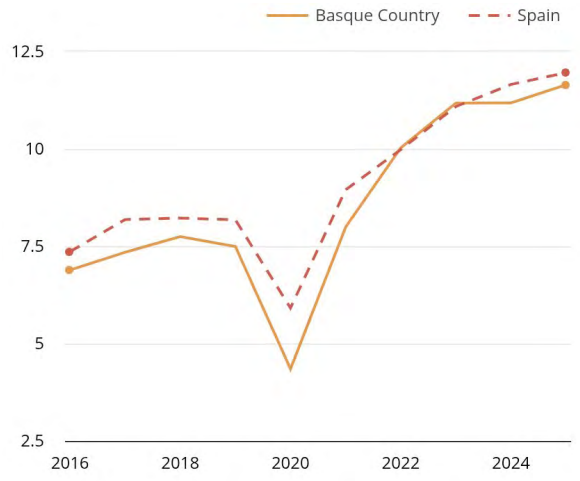
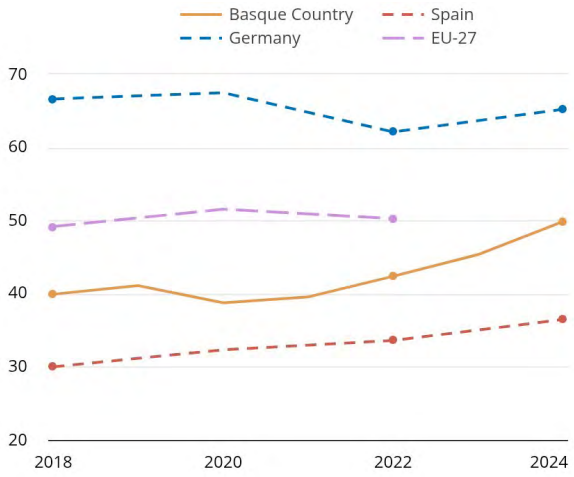
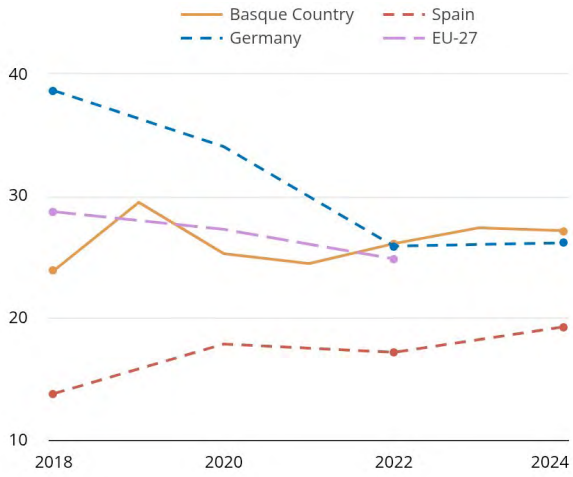


CHART A.4-3 Innovation and entrepreneurship

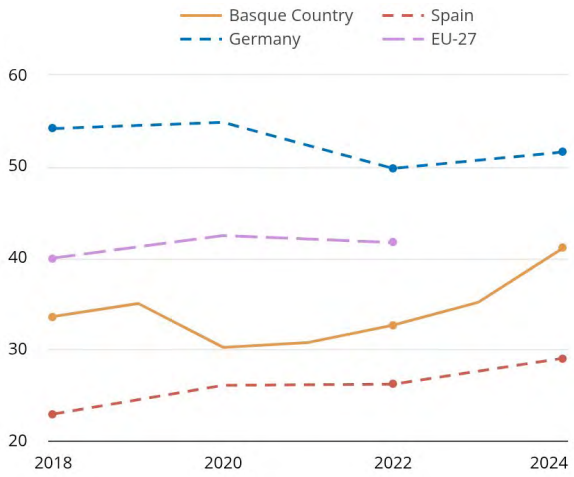
a) Total innovative SMEs (% est. CORE)



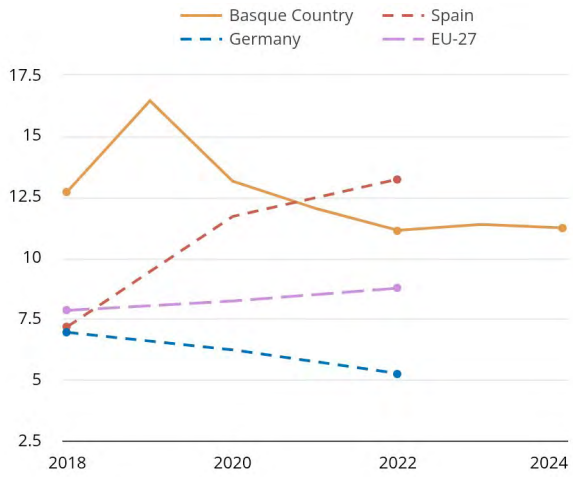
b) Product innovative SMEs (% est CORE)



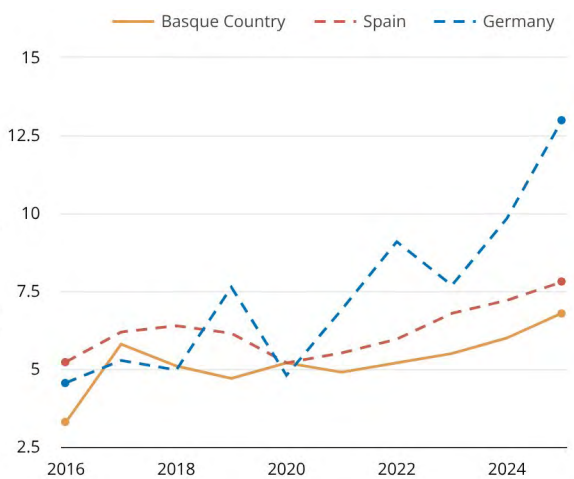
c) Process innovative SMEs (% est CORE)



d) Innovative SMEs sales of new /improved products (% total sales)



e) Total entrepreneurial activity (TEA) (% population 18- 64 years old)



f) High-growth firms (% firms with more than 10 workers)

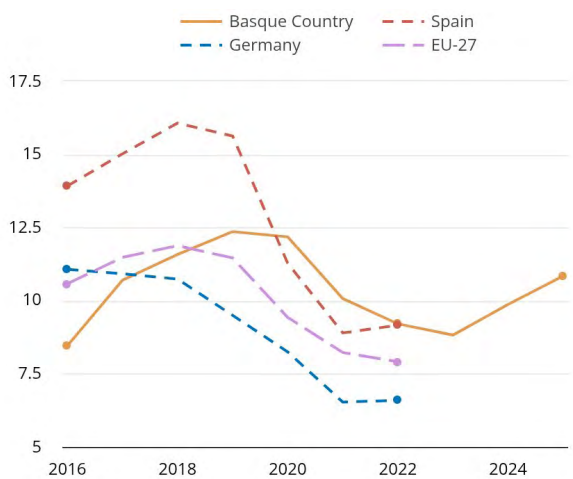
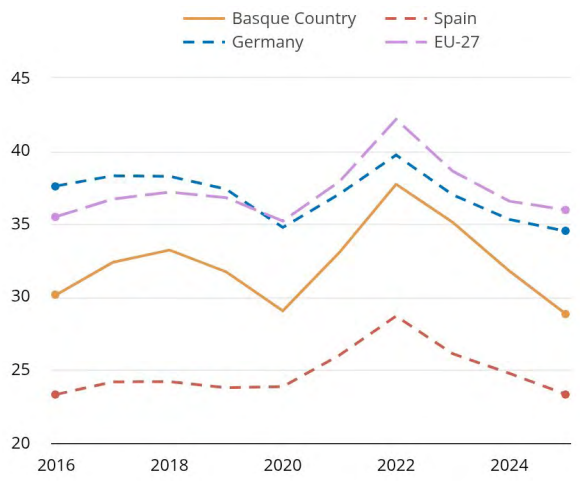
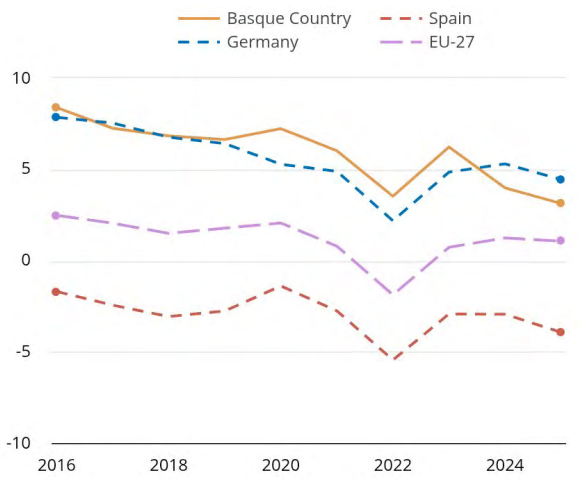


CHART A.4-4 Internationalisation

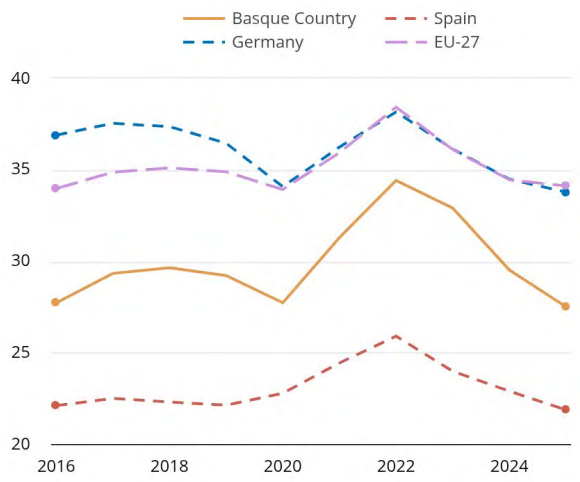
a) International exports of goods (% of GDP)



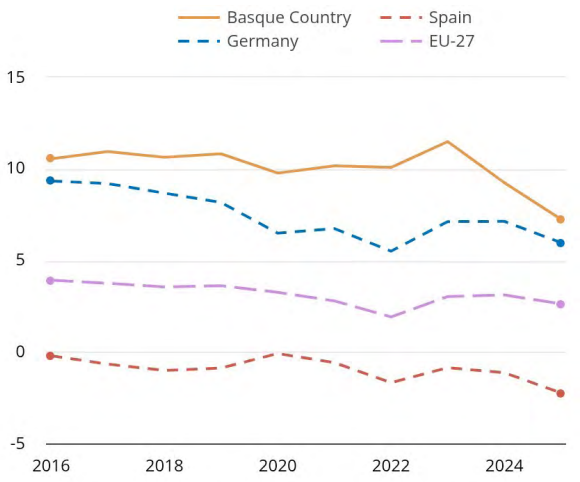
b) Balance of international trade in goods (% GDP)



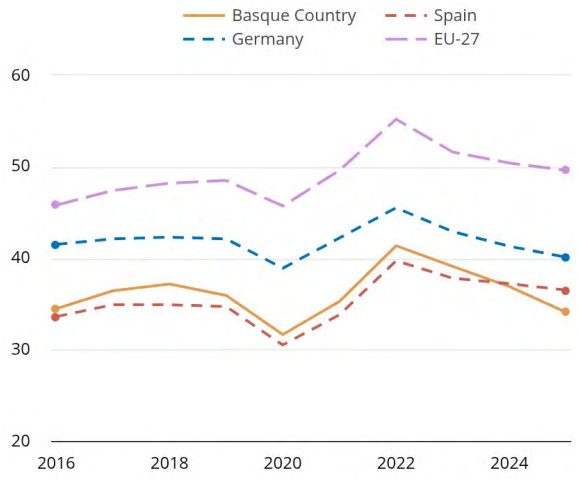
c) International exports of non-energy goods (% GDP)



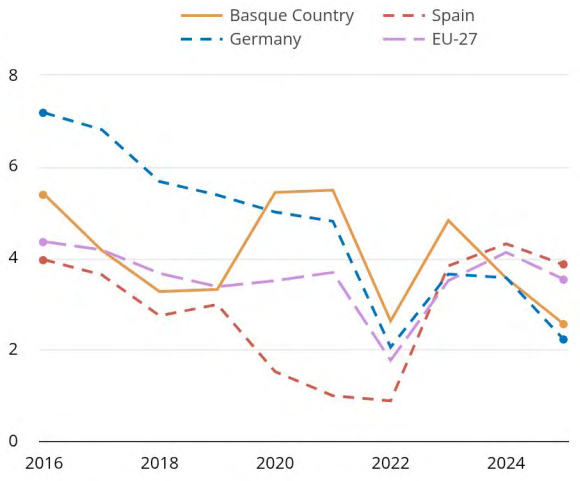
d) Balance of International trade for non-energy goods (% GPD)



e) International exports of goods and services (% GDP)



f) Balance of International trade for non-energy goods (% GDP)



Appendix 5

Wellbeing indicators

CHART A.5-1 Life satisfaction

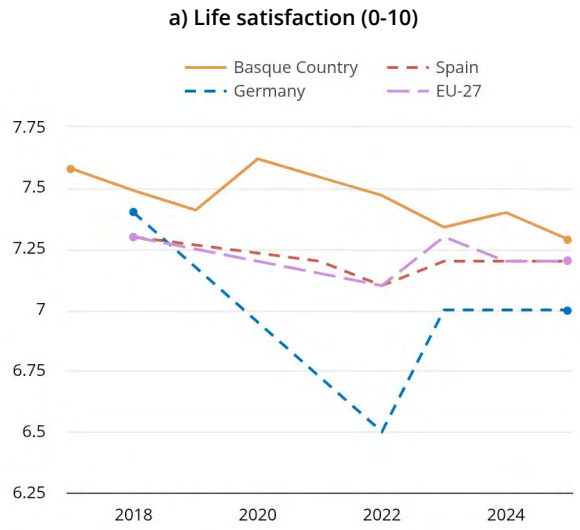
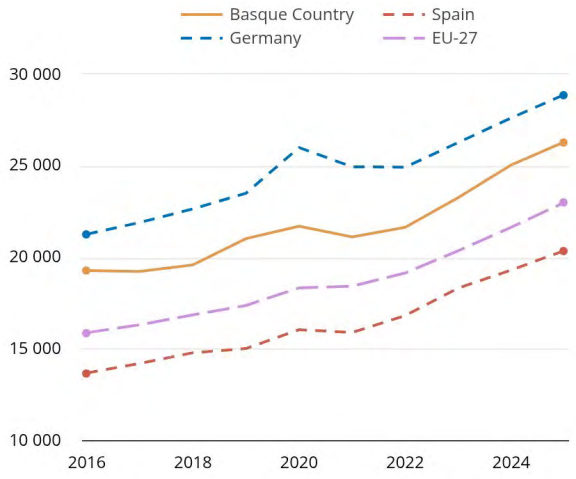
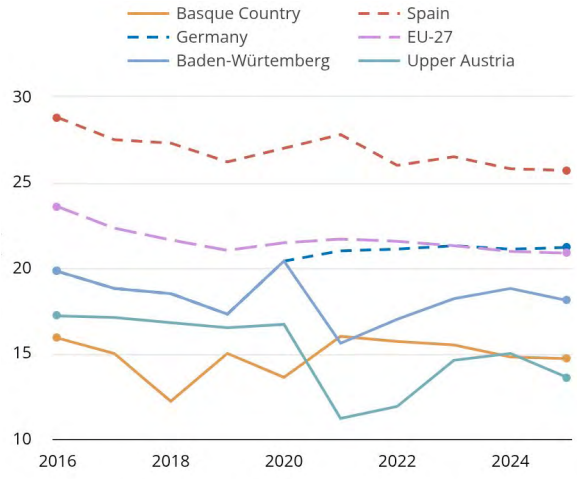


CHART A.5-2 Material life

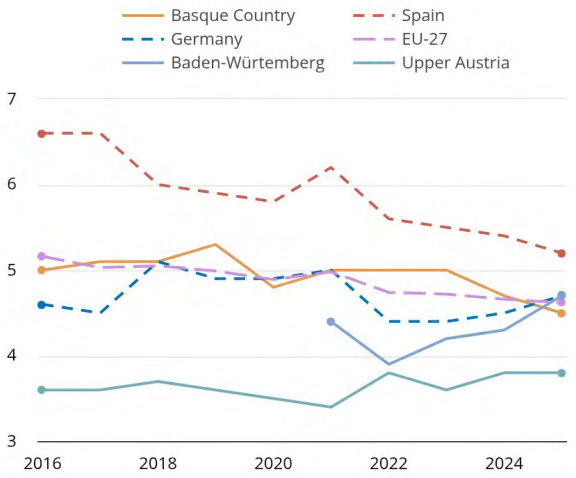
a) Households equivalent median income (PPP) income (€)



b) Proportion of people at risk of poverty or exclusion (AROPE) (%)



c) S80/S20 ratio for income



d) Population who cannot afford to keep their home at an adequate temperature (%)

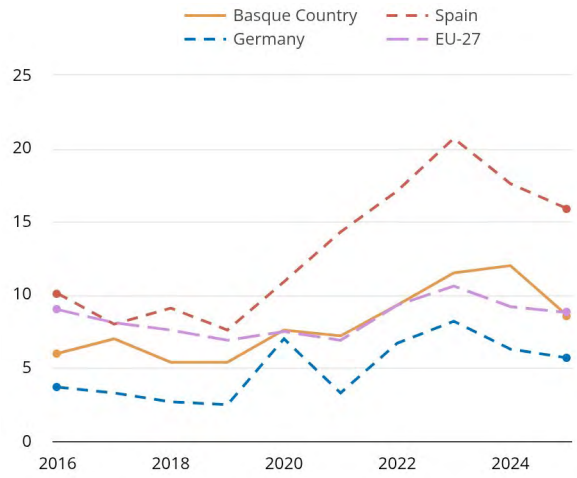
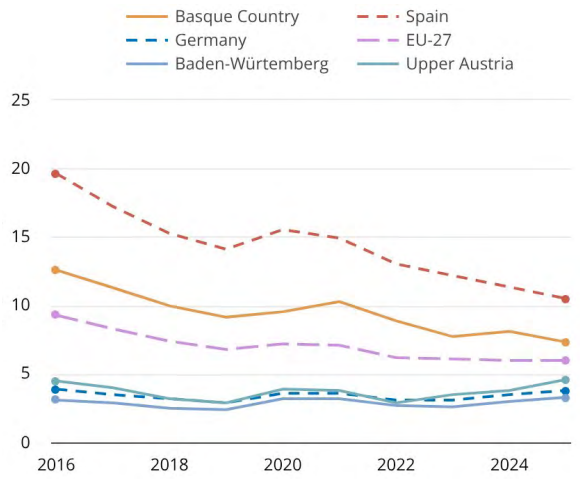
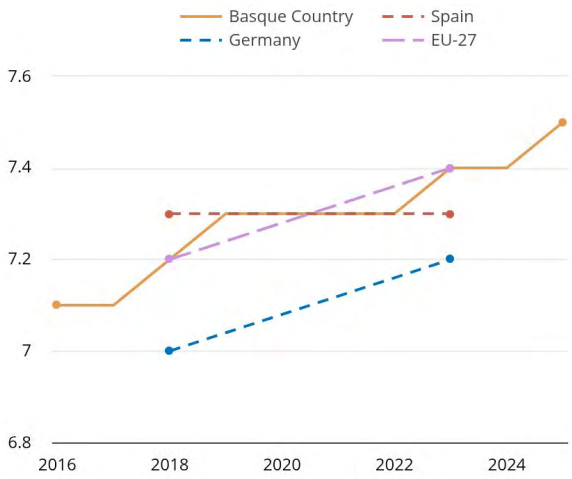


CHART A.5-3 Employment

a) Unemployment rate
(% of population between 15-74 years old)



b) Degree of job satisfaction
(0-10)



c) Gender pay gap per hour worked
(%)

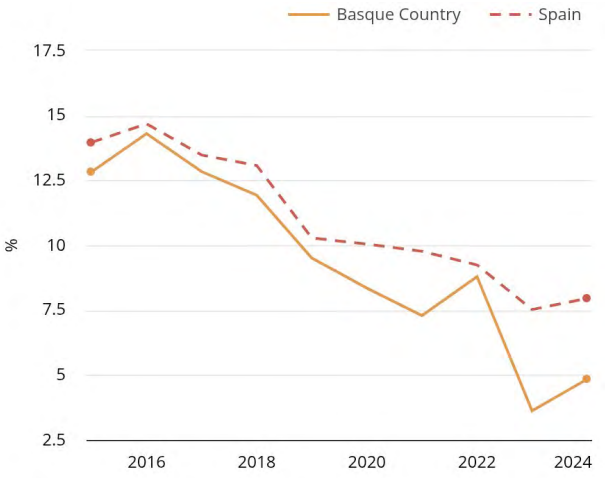
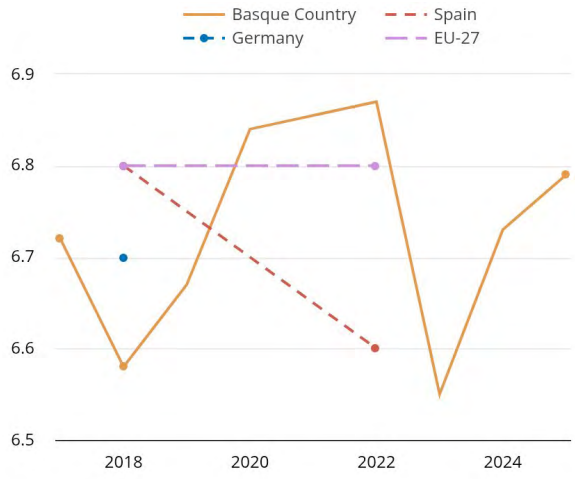
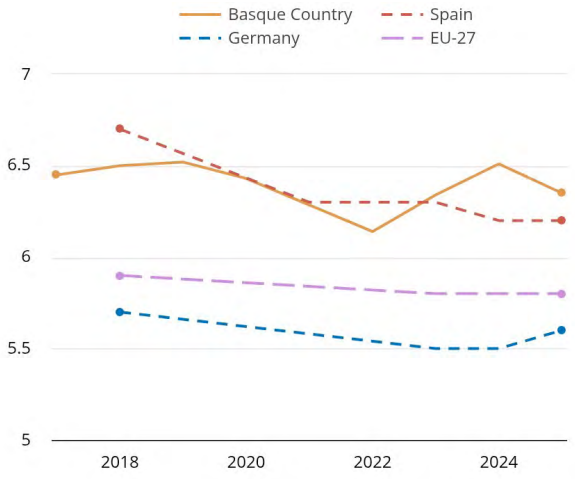


CHART A.5-4 Social life

a) Degree of satisfaction with leisure time (0-10)



b) Trust in people (0-10)



c) Property crime rate (per 100,000 population)

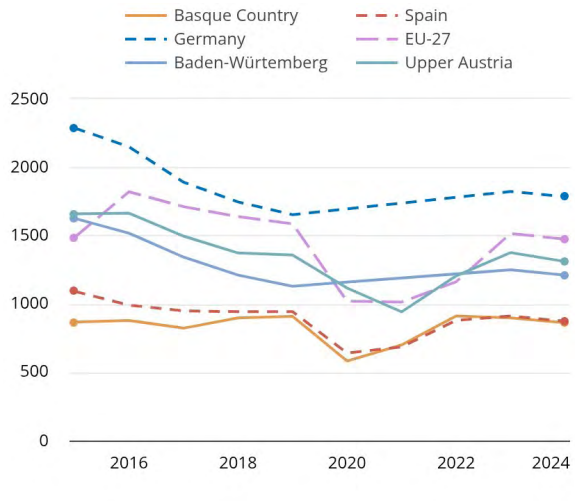
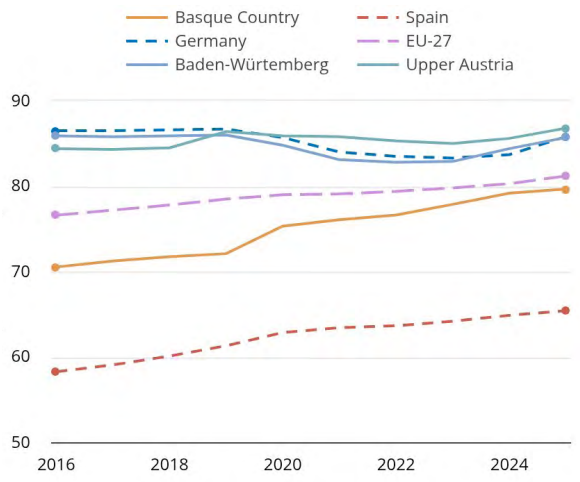
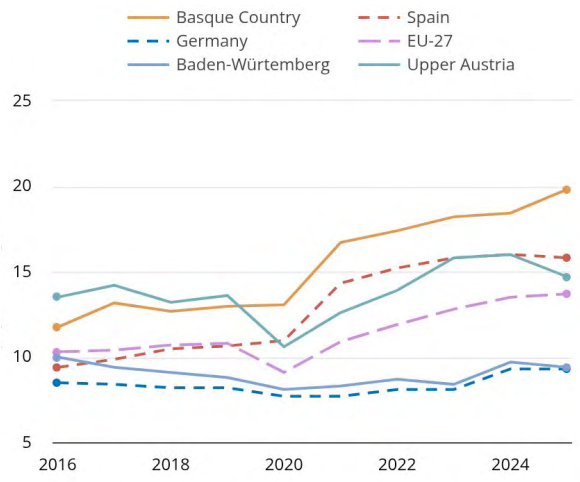


CHART A.5-5 Learning

a) Population aged 25–64 with tertiary education (%)



b) Lifelong learning (% population aged 25-64)



c) Average score in mathematics, reading and science in PISA

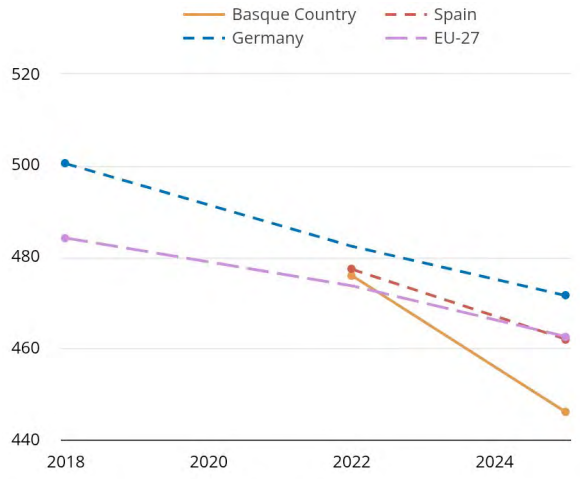
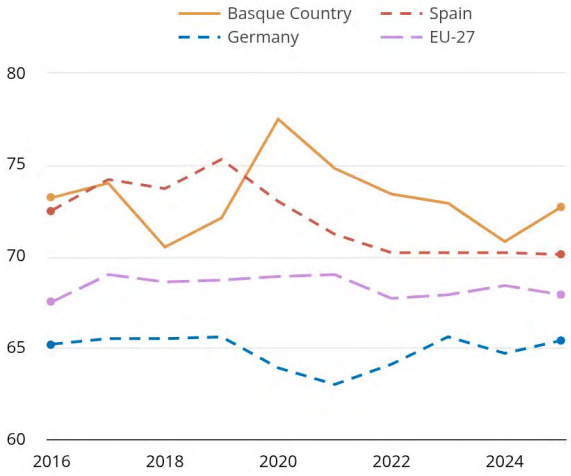
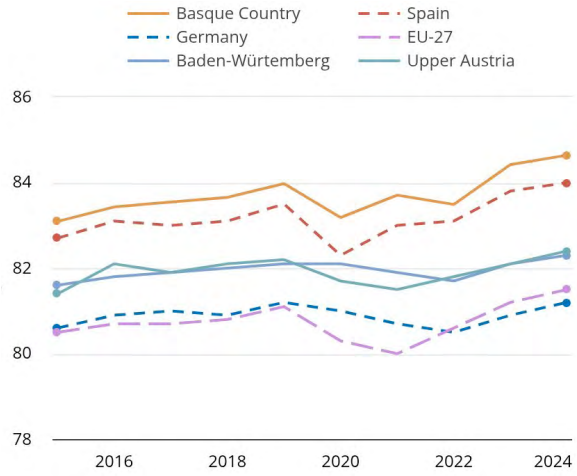


CHART A.5-6 Health

a) Self-perceived health status
(% of population with good or very good health status)



b) Life expectancy at birth
(years)



c) Premature deaths due to air pollution-PM2.5
(deaths / 100k inhabitants)

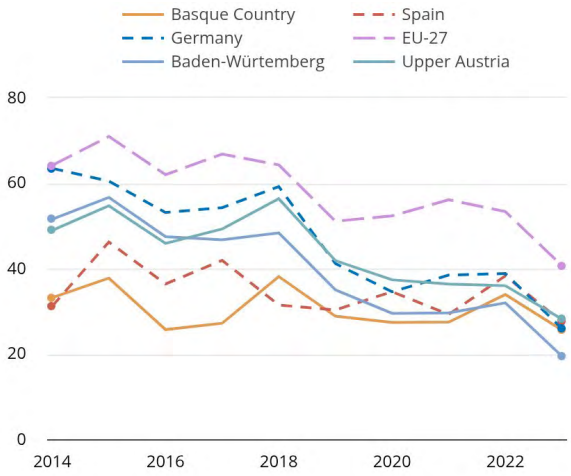
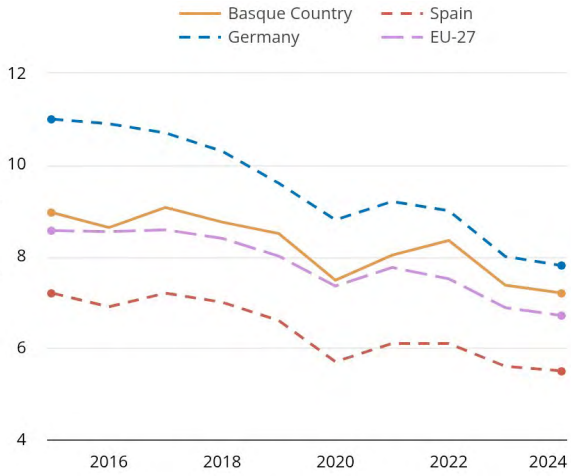
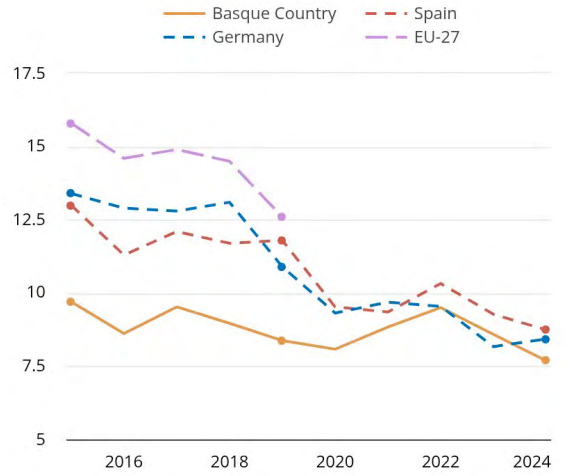


CHART A.5-7 Environment

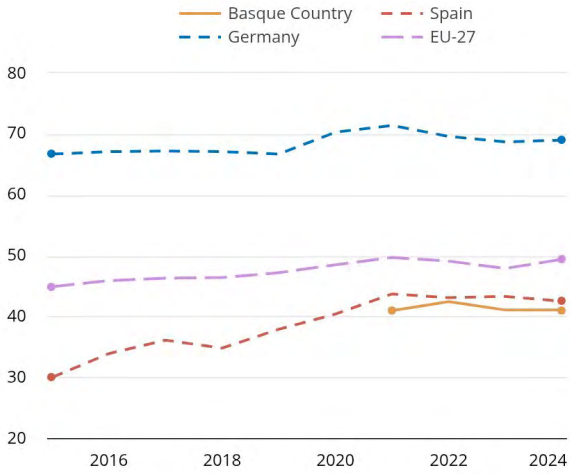
a) Greenhouse gas emissions
(tonnes of CO2 equivalent per capita)



b) Air pollution
(annual average concentration of $PM_{2.5}$ particles in ug/m^3)



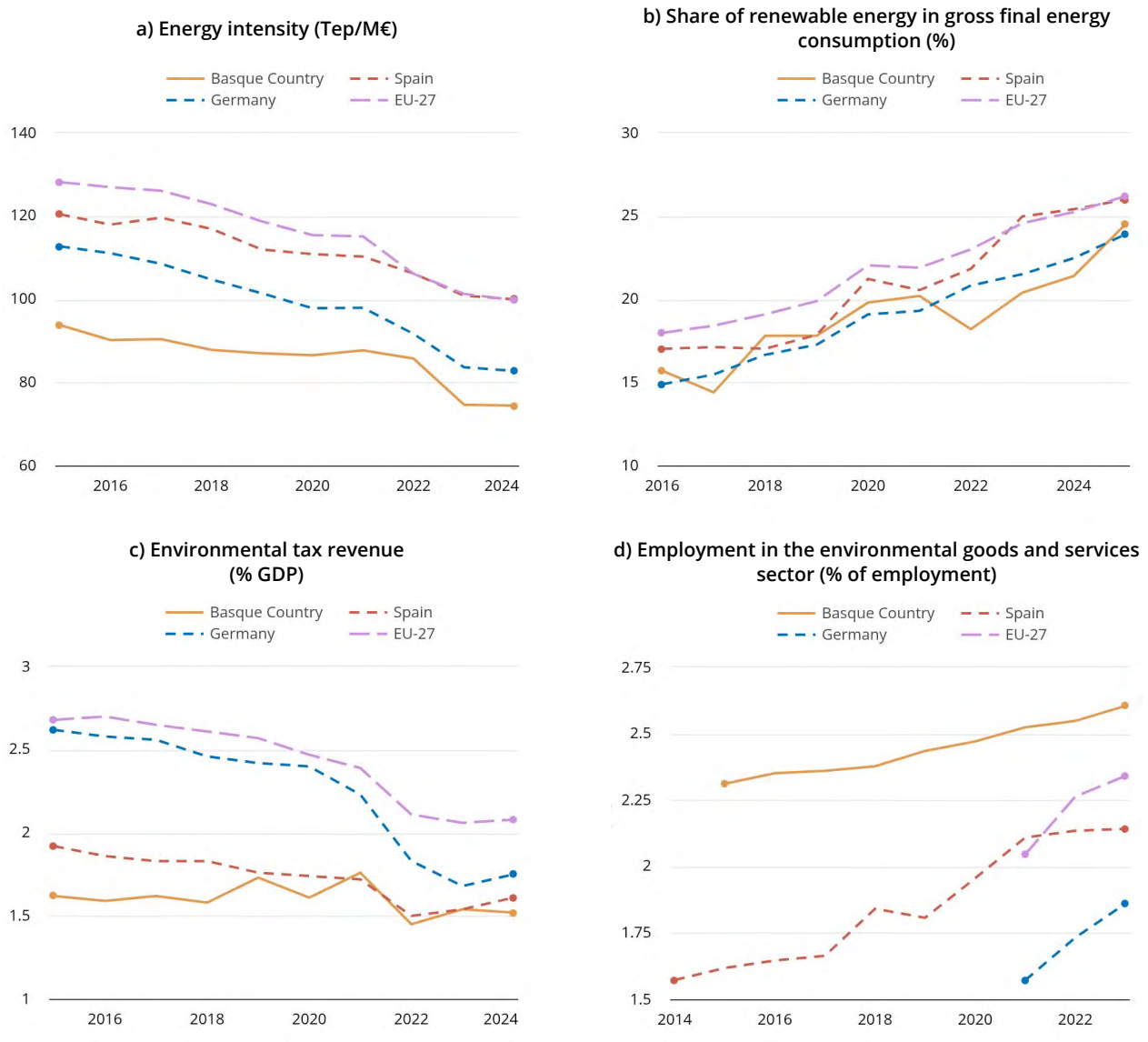
c) Urban waste recycling rate (%)



Appendix 6

Levers of Competitiveness

CHART A.6-1 Capital Natural



e) Gross Value Added in the environmental goods and services sector (% of GDP)

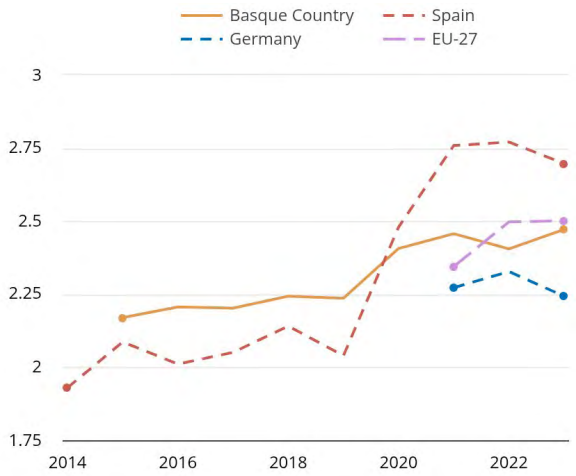
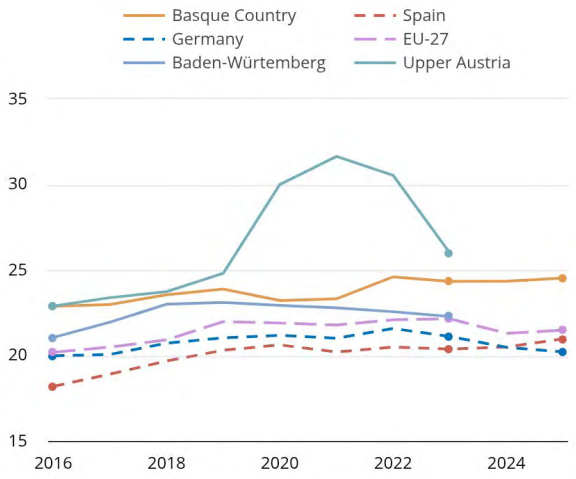
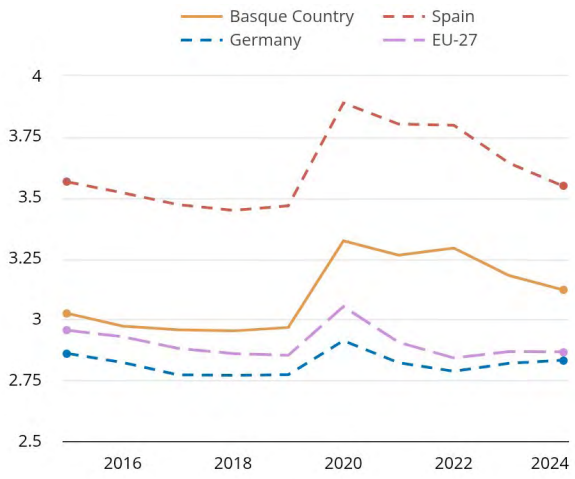


CHART A.6-2 Physical capital

a) Gross capital formation (% GDP)



b) Physical capital stock (times GDP)



c) Gross capital formation in capital goods (% of total gross capital formation)

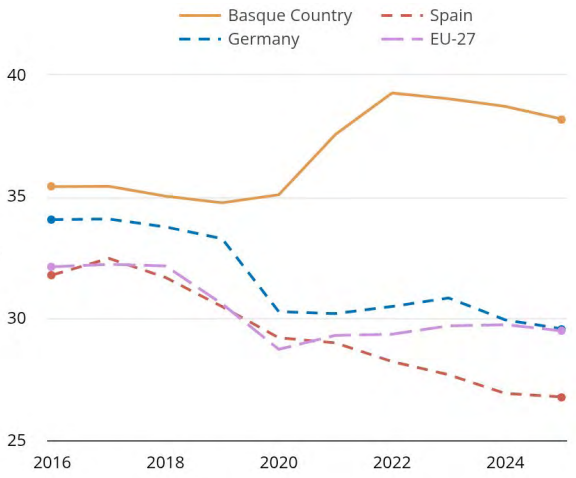
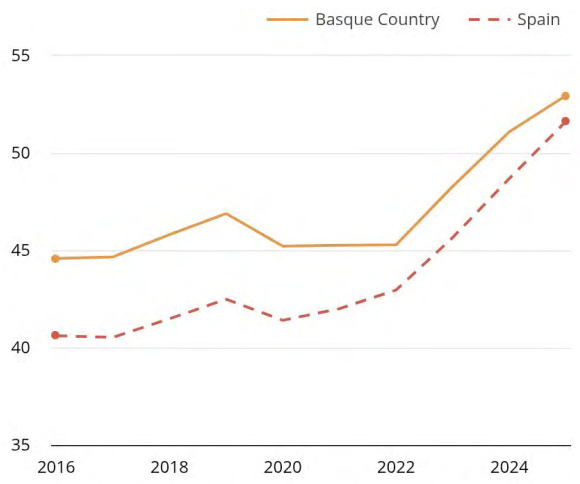
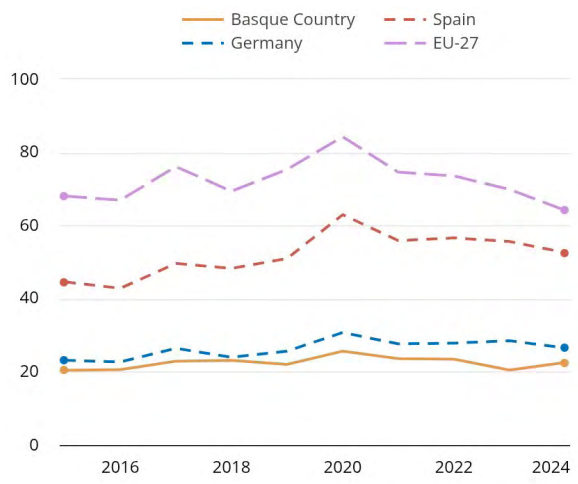


CHART A.6-3 Finance

a) Equity-to-assets ratio of companies (median, %)



b) Inflow stock of foreign direct investment (FDI) (% of GDP)



c) Outflow stock of foreign direct investment (FDI) (% GDP)

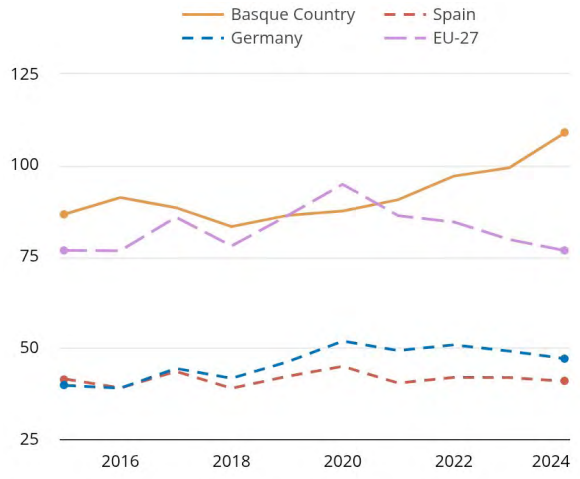
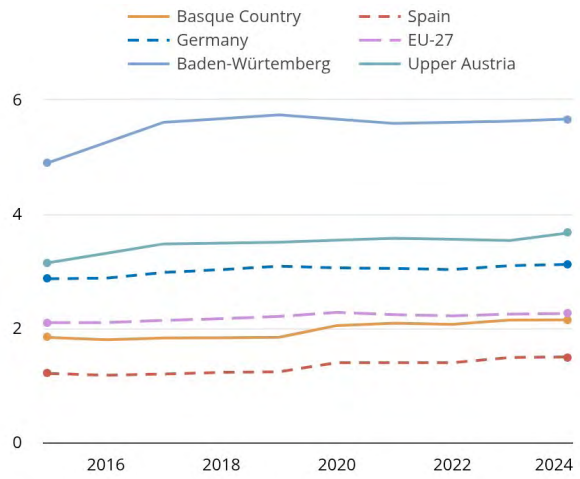
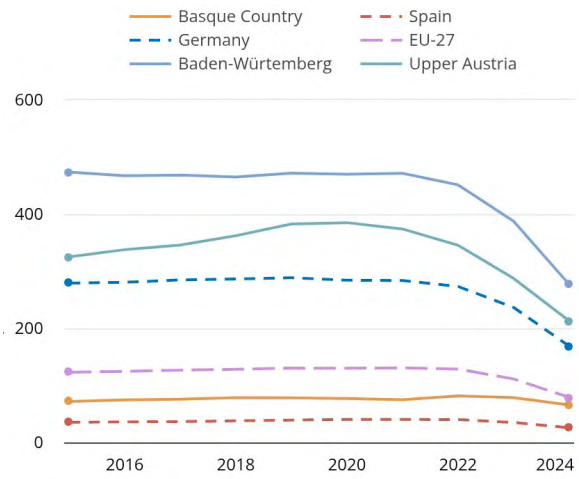


CHART A.6-4 Knowledge

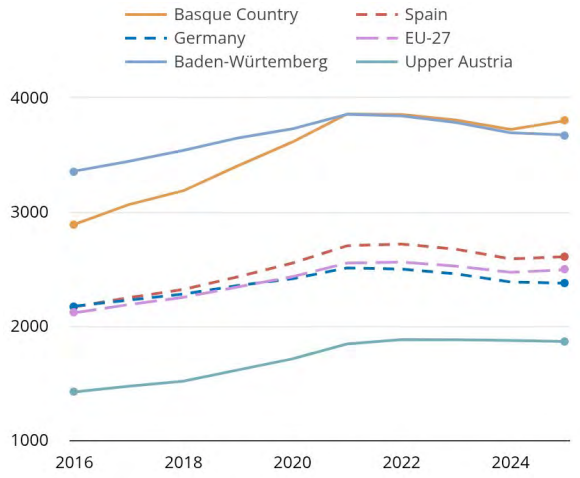
a) Total R&D expenditure (% of GDP)



b) EPO scientific patents per million inhabitants (three-year average)



c) WOS scientific publications per million inhabitants (three-year average)



d) Percentage of EPO patents in environmental technologies (three-year average)

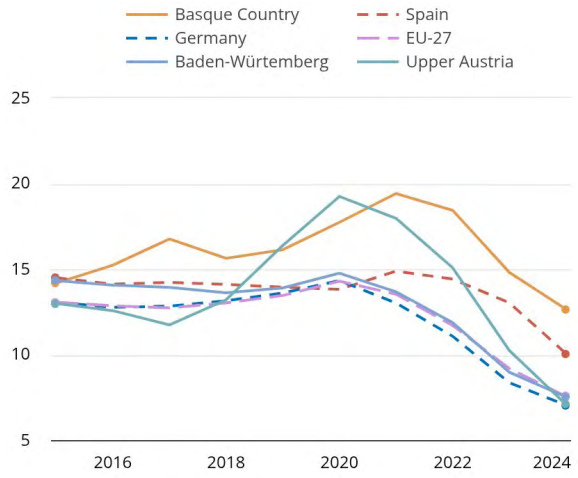
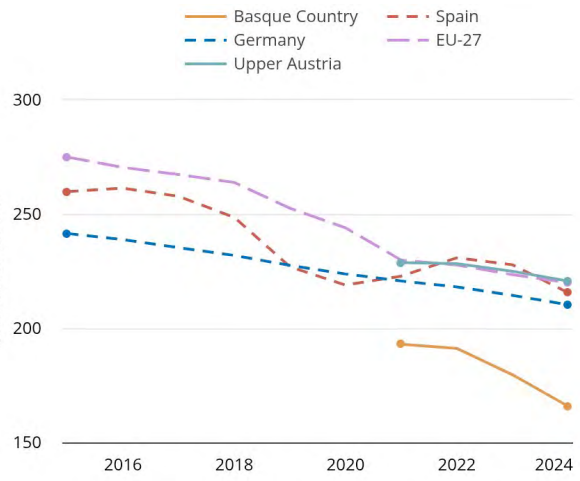
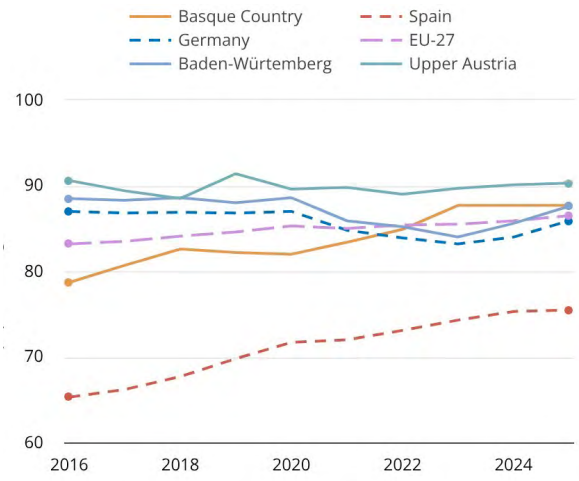


CHART A.6-5 Human capital

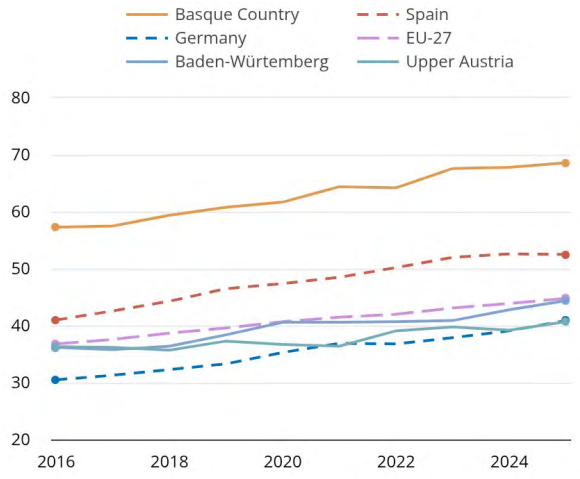
a) Population per physician (population / physician)



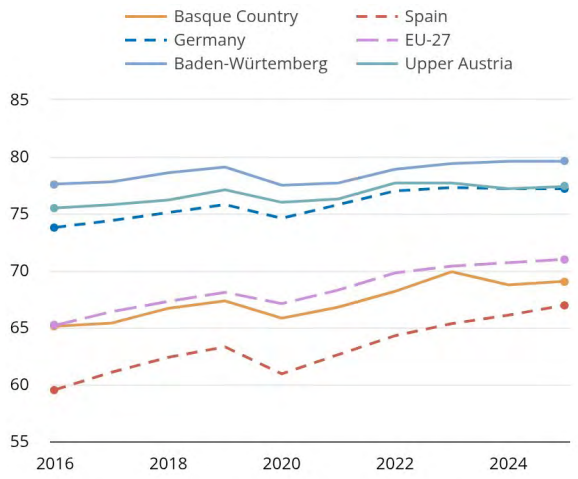
b) Population aged 25-34 with upper secondary or tertiary education (ISCED 3-8%)



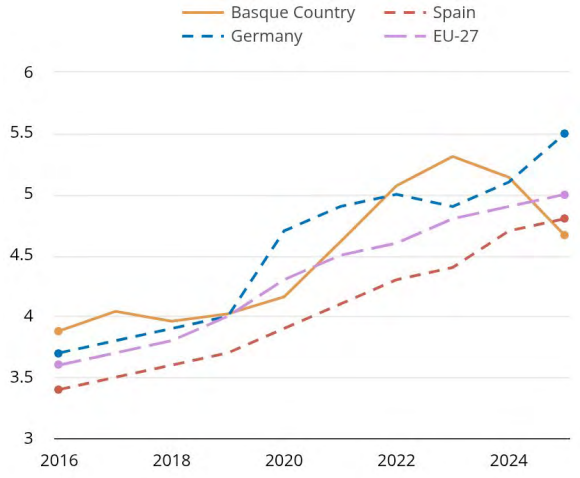
c) Population aged 25-34 with tertiary education (ISCED 5-8)



d) Employment rate (%15-64 years)



e) Persons employed in ICT occupations (% of total employment)



f) Population with with above basic digital skills (% population 16-74)

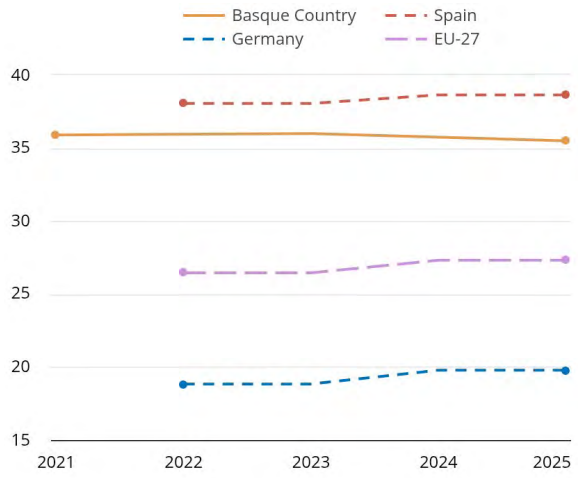
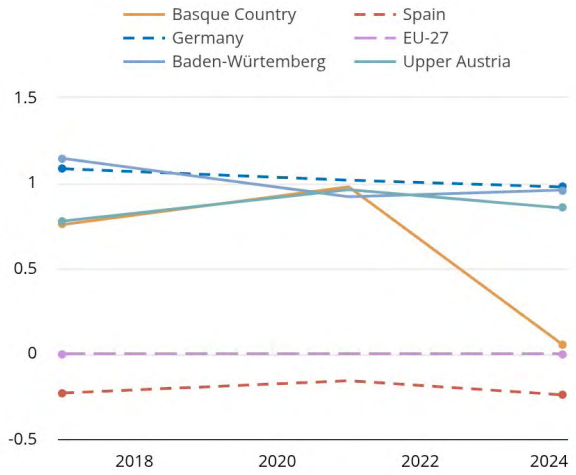
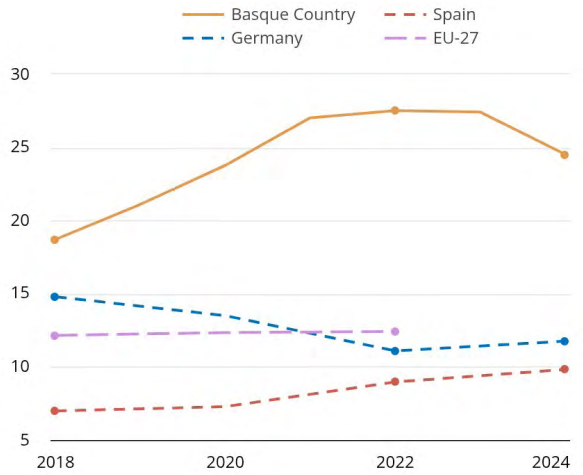


CHART A.6-6 Social capital

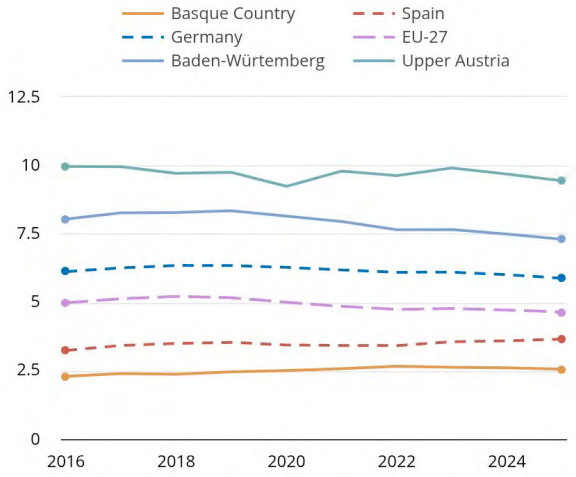
a) Quality of Government Index (normalised EU-27=0)



b) SMEs cooperating in R&D&i (% est CORE)



c) Publications with industry cooperation (three-year average; % publications)

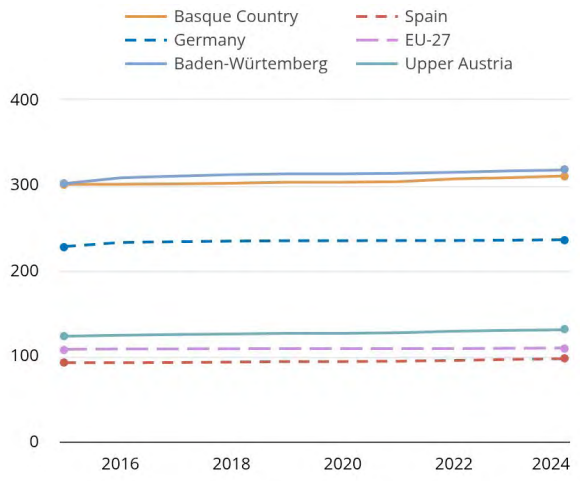


Appendix 7

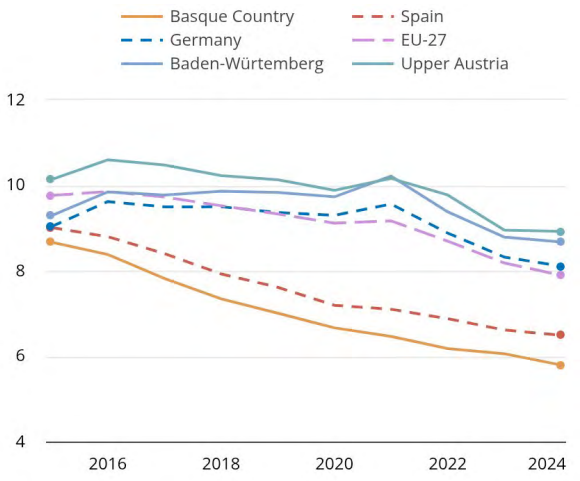
Structural Context

CHART A.7-1 Geodemography

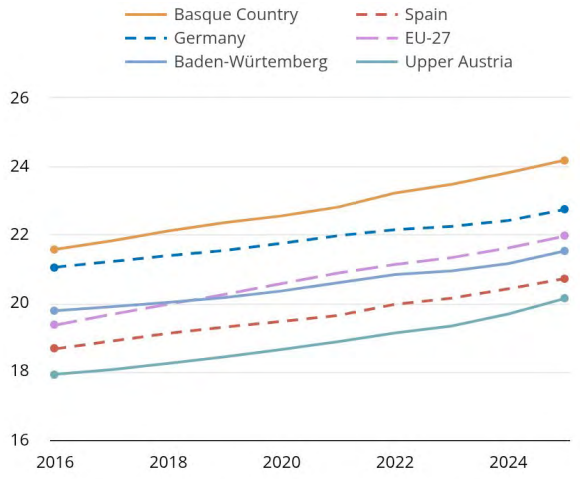
a) Population density (Inhabitants per sq. km)



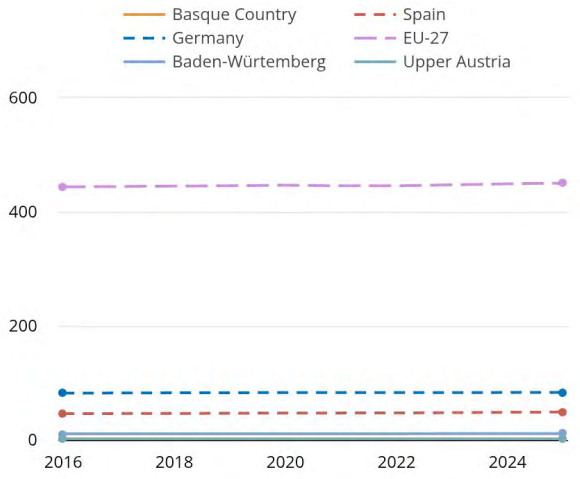
b) Birth rate (births per 1,000 population)



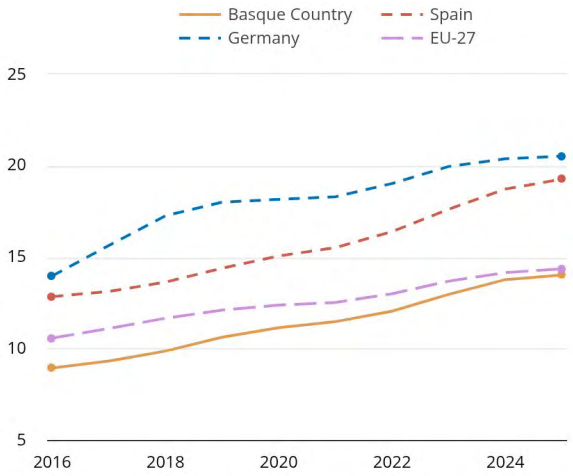
c) Aging rate (% of population aged 65 and over)



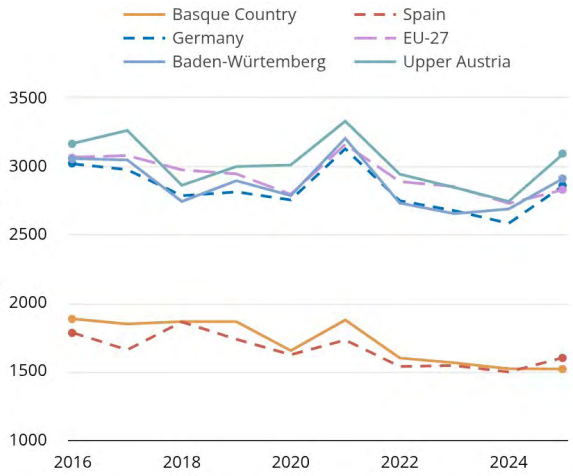
d) Population (millions)



e) Foreign-born population rate (% of total population)



f) Heating degree days (°C-days, base 18 °C)



g) Cooling degree days (°C-days, base 21 °C)

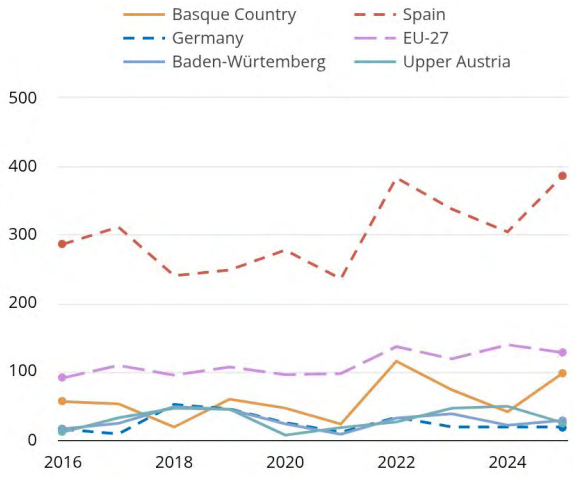
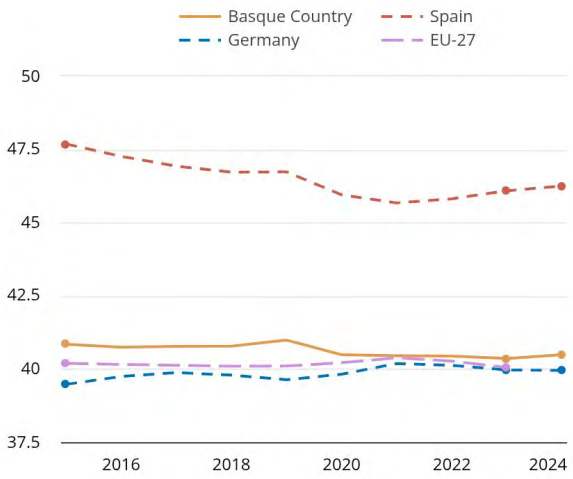
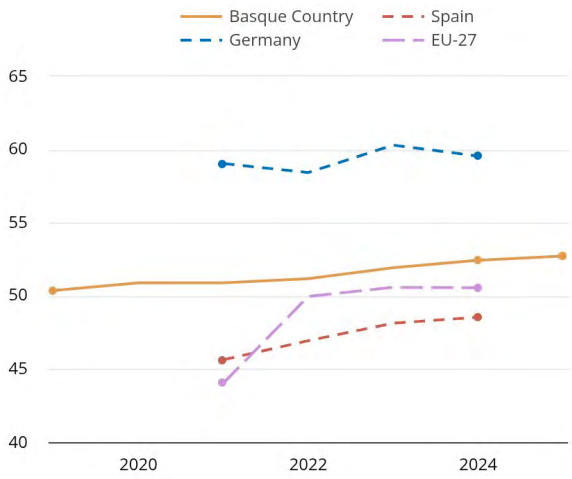


CHART A.7-2 Economic and business structure

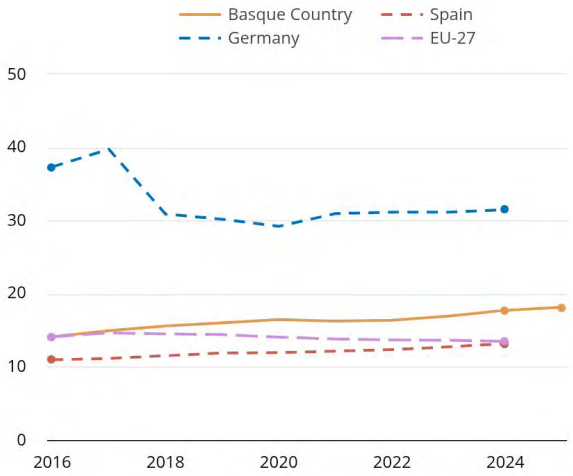
a) Employment sectoral structure concentration index (A38, %)



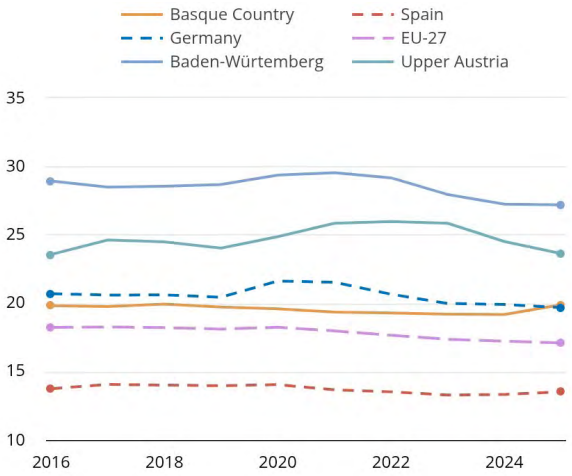
b) Employment in enterprises with 50 or more employees (%)



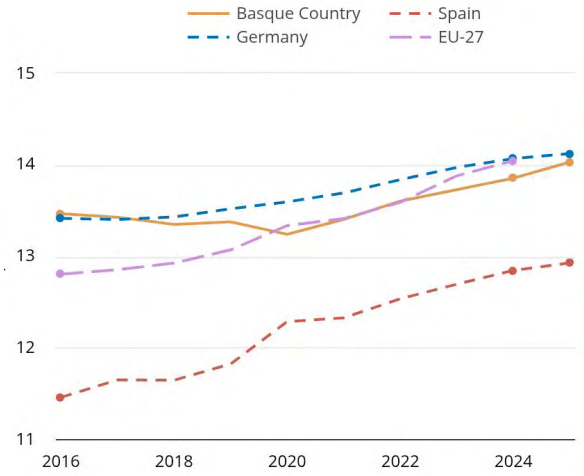
c) Average size of industrial enterprises (B–E) (persons employed)



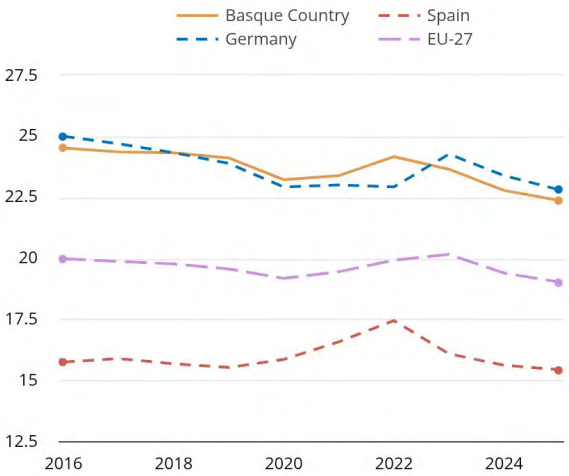
d) Share of employment in industry (B–E) (% of total employment)



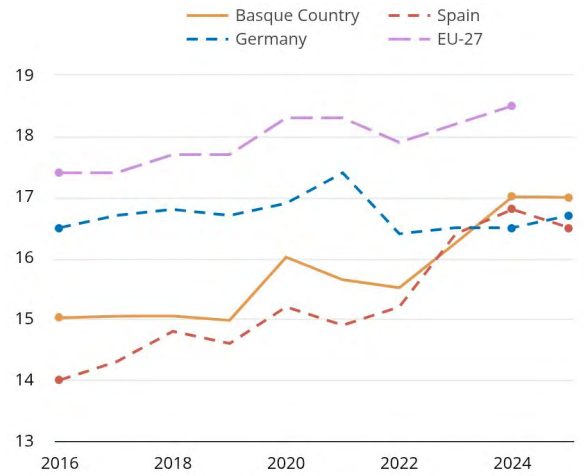
e) Share of employment in knowledge-intensive market services (% of total employment)



f) Share of GVA in industry (% of total activity)



g) GVA of knowledge-intensive market services (% of total activity)



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