

EXECUTIVE SUMMARY
CUADERNOS ORKESTRA

10/2021

ISSN 2340-7638

THE R&D SYSTEM IN GIPUZKOA



Gipuzkoako Foru Aldundia
Diputación Foral de Gipuzkoa



GIPUZKOA
ETORKIZUNA ORAIN

Mikel Navarro Arancegui

2021

Executive Summary. Cuadernos Orkestra, No. 10/2021

Executive Summary

The level of **resources devoted to R&D** by Gipuzkoa is slightly higher than in the EU in terms of expenditure as a percentage of GDP (2.4% compared to 2.2%) and considerably higher in terms of FTE (full-time equivalent) R&D personnel as a percentage of employment (2.4% compared to 1.4%). Gipuzkoa's strong position is even clearer when compared with other regions (where average R&D expenditure is just 1.4%). The reason for Gipuzkoa's different position in the R&D expenditure and personnel indicators is explained by the fact that R&D expenditure per person is lower in Gipuzkoa: in terms of both capital per person and the salaries of R&D personnel. As regards trends, R&D expenditure in Gipuzkoa rose considerably until 2012, topping that of the EU-27 and closing the gap with Germany. However, between 2012 and 2015, R&D expenditure declined, and it fell in the ranking. And since 2015, it has been less dynamic than the EU-27.

By **institutional sector**, the Business sector accounts for a larger percentage of R&D expenditure in Gipuzkoa than in the EU-27 (83% compared to 66%). And this expenditure as a percentage of GDP is also greater in Gipuzkoa (2.0% versus 1.5%). This is essentially due to the unique nature of the Basque Science, Technology and Innovation Network (RVCTI) and especially the importance of cooperative research centres (CRCs) and technology centres in Gipuzkoa's business R&D expenditure. The characteristics of R&D expenditure and personnel vary considerably from one institutional sector to another, and Gipuzkoa's distinguishing features (high dedication to R&D in the R&D personnel; high percentage of researchers, etc.) are largely due to the greater relative share of R&D held by the Business sector. Despite significant organisational changes in the last two decades (creation of the CRCs and BERCs – Basque Excellence Research Centres – development of business R&D units spun off from parent companies, promotion of public health centres, etc.), the distribution of R&D expenditure by institutional sector has not seen much change, beyond slight growth in the Higher Education and Public Administration sectors.

By **scientific discipline**, the concentration of R&D in Engineering and Technology is very high in Gipuzkoa (81% compared to the EU (47%). The specialisation in Engineering and Technology is particularly notable in business R&D. However, with the arrival of the new millennium, there was an uptick in R&D in the Exact and Natural Sciences and the Medical Sciences due to the focus on these areas by Basque government bodies through the CRCs and BERCs.

In Gipuzkoa, **R&D financing** of the business sector with in-house funds is significantly lower than in the EU-27 and Germany (69% compared to 85% and 90%, respectively). In contrast, business R&D financing with public funds is considerably higher in Gipuzkoa (21%) than in the EU-27 (5%) and Germany (3%). In part, this is due to the considerable share of business R&D represented by CRCs and technology centres in Gipuzkoa. Within Gipuzkoa's business R&D, technology centres and CRCs attract considerable funding from EU programmes; but the ability to attract EU funding for R&D in the rest of the Business sector is quite minimal. Another notable fact is the low percentage of Higher Education and Public Administration R&D financed by companies. In terms of trends, the decline in R&D financing with public funds in the last decade has been partially offset by attracting more foreign funds. Lastly, in fiscal incentives as a percentage of GDP, Gipuzkoa ranks third in the OECD, behind France and the United Kingdom, although the scale of these incentives has declined in Gipuzkoa in the past decade.

Despite Gipuzkoa's significant industrial specialisation, how R&D Services by CRCs, technology centres and business R&D units – which account for a considerable share in Gipuzkoa – are reported, along with the importance of certain private health research, means that **manufacturing R&D** accounts for a considerably lower percentage of total business R&D in Gipuzkoa (42%) than in the EU-27 (85%). In contrast, R&D Services represent 42% of total business R&D in Gipuzkoa, while this is just 4% in the EU-27.

Likewise, when Gipuzkoa's distribution of **business R&D expenditure by size bracket** is compared to that of other territories, we find considerable differences. In particular, R&D expenditure in the 250+ employees size bracket is much lower in Gipuzkoa than in other areas. Factors influencing this are: (i) use of the establishment unit (by Eustat, the Basque Statistics Office) rather than the enterprise unit (as Eurostat does); (ii) the smaller presence of large firms and establishments in Gipuzkoa; and (iii) the large share of Gipuzkoa's business R&D held by CRCs, technology centres and business R&D units, which do not usually have more than 250 employees. In

Gipuzkoa, the size bracket which accounts for the majority of business R&D expenditure is medium-sized establishments, while in the EU and Germany, it is large firms.

In Gipuzkoa, the percentage of **women in R&D personnel** (35%) is lower than women in the working population (47%). Additionally, this percentage decreases when personnel measured as full-time equivalents and restricted to researchers. The participation of women in R&D varies considerably by institutional sector: it is higher in Higher Education and Public Administration and lower in Businesses; and also according to scientific discipline: lower in Engineering and Technology and higher in the others. This explains why although in the same institutional sector and scientific discipline, Gipuzkoa is on a par with other economies in terms of gender performance, when looking at total R&D, its position is much more negative.

In terms of **territorial distribution of R&D** within Gipuzkoa, Donostialdea accounts for 45% of R&D expenditure. However, this is not a higher percentage than its share of GDP (48%), and in any event, it is lower than that of Gran Bilbao in Bizkaia (83%) and the Llanada Alavesa in Araba (89%). Goierri, Debagoiena and Debarrena are notable for R&D expenditure intensity above 3.5%; whereas Bidasoa, Urola Kosta and Tolosaldea stand out due to their low intensity. Geographically, the western and southern districts show greater R&D intensity than those in the east and north. In general, a district's R&D intensity appears to correlate to an industrial profile and larger enterprise size.

While Donostia is only home to 27% of enterprises with R&D (excluding R&D Services), it accounts for 55% of CRCs and technology centres, and 65% of Higher Education and Public Administration units. Even so, the degree of concentration of R&D infrastructure in the capital is lower in Gipuzkoa than in Bizkaia and especially Araba. Other Gipuzkoa districts with some degree of R&D infrastructure implementation are Debagoiena and Debarrena, as well as Beterri-Buruntza, taking advantage of the proximity of Donostia.

In **publications and patents**, the main mechanisms for external recognition of the scientific and technological progress resulting from research activity, the situation is very different. In publications, Gipuzkoa has improved considerably over the last two decades. Therefore, the current rate of scientific production per FTE researcher in the public sectors (Higher Education and Public Administrations) is clearly higher in Gipuzkoa than in other territories. Academia and public research institutes have made great strides in this area and are now above the EU and Germany averages for publication rate.

The snapshot is very different if we look at technological output, measured in patents. Gipuzkoa's progress halted in 2008, and since then, rates have declined in both absolute and relative terms. What is more, if patents are linked to researchers in the Business sector, the rate for Gipuzkoa for the last year with available data is slightly below the Basque Country, approximately three times less than Spain, four times less than the EU-27 and more than six times less than Germany.

Based on the analysis, it is possible to formulate twelve **conclusions and recommendations**.

- Despite less favourable progress after 2012, the relative level of **R&D resources** in Gipuzkoa is higher than the EU-27 average. The **scientific output** (publications) produced by these research efforts has grown considerably in Gipuzkoa over the last two decades and is now clearly higher than the EU-27 average, when measured in FTE researcher in the public sectors. But **technological output**, measured in patents, has stopped growing and declined since 2008, and the ratio of patents per researcher is much lower than the EU-27 (and even lower when compared to Germany). In Gipuzkoa, there is a clear inability to transform R&D activities into technological advances recognised internationally by means of patents.
- It would be advisable to continue the successful efforts of recent decades in Gipuzkoa, in order to increase the **scientific output** (international publications) deriving from research activity. In contrast, it is advisable to end the relative slowdown in **technological output** (measured in patents) in Gipuzkoa since 2008, increasing the capacity of the region's R&D system to turn research into technological output, as demonstrated by patents.
- It would be recommended to reduce the imbalance between Gipuzkoa's ranking in terms of R&D expenditure and personnel, one path to which would be improving **management of R&D activity and human resources**, indicators in which Gipuzkoa lags behind. Bringing salaries for current R&D personnel in line with

the EU average would help attract outside talent, incentivise people to choose research as a vocation and promote more quality-based R&D cultures.

- The share of different **institutional sectors** engaged in R&D needs to be reconsidered, weighing the option of strengthening university research and boosting the interrelationship between academia and firms.
- It would be advisable to diversify Gipuzkoa's high concentration of R&D in **Engineering and Technology**, particularly into those areas that make related diversification possible and cover the complementary aspects required by Industry 4.0.
- Given the high level of **public funding** for business R&D in Gipuzkoa, it would be advisable to assess the additionality generated and the possible negative impact of this on business R&D culture. These assessments should also be done in the area of fiscal incentives.
- It is necessary to attempt to increase the ability of firms to attract **EU funding**, with business R&D units being the ideal candidates to serve as a starting point.
- The relatively low R&D intensity of the **manufacturing industry** in Gipuzkoa is largely due to the characteristics of R&D in the RVCTI and how this is reported. It is therefore not as serious. It should also be taken into account that the limited presence of high-tech manufacturing and large firms in Gipuzkoa does not facilitate high R&D intensity. If it is considered advisable to increase this, more structural, long-term plans could be launched to increase the size of Gipuzkoa companies, or specific initiatives to boost R&D in the large firm bracket.
- The **territorial distribution** of R&D activity and infrastructure by the different districts is less uneven in Gipuzkoa than in other historical territories. However, to mitigate the possible negative effects, the path to follow is not so much for infrastructure to be implemented in all districts, but for there to be bridging mechanisms and institutions (VET schools, development agencies, etc.) which enable firms in all districts – especially the smaller ones – to access existing infrastructure, as is already being tackled in the multi-level governance which the Provincial Council of Gipuzkoa (DFG) has established with the different districts.
- **Gender equality** in R&D would benefit from a change in some of the structural characteristics of the R&D system in Gipuzkoa (Engineering and Technology and Business sector R&D accounting for a considerable share). Among other things, these structural imbalances have gender implications and invite an assessment of their suitability in consideration of the interests and motivation of women as a group. Another option would also be to move forward with stimulus measures and even positive discrimination for both the demand (targeting firms) and the supply (women) sides.
- Lastly, it would be advisable for the R&D **data and analyses** published in Gipuzkoa and the Basque Country to make it possible to disaggregate R&D infrastructure elements. Otherwise, the conclusions drawn regarding the characteristics of the R&D system are skewed.



Orkestra

BASQUE INSTITUTE
OF COMPETITIVENESS
DEUSTO FOUNDATION

www.orquestra.deusto.es