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Research and Innovation Observatory Country Report 2016 Spain

The 2016 series of the RIO Country Report analyses and assesses the development and performance of the national research and innovation system of the EU-28 Member States and related policies. It aims at monitoring and evaluating the EU policy implementation as well as facilitating policy learning in the Member States.

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Foreword

This report offers an analysis of the R&I system in Spain for 2016, including relevant policies and funding, with a particular focus on topics of critical importance for EU policies. The report identifies the main challenges of the Spanish research and innovation system and assesses the policy responses implemented. It was prepared according to a set of guidelines for collecting and analysing a range of materials, including policy documents, statistics, evaluation reports and online publications. The quantitative data are, whenever possible, comparable across all EU Member State reports. Unless specifically referenced, all data used in this report are based on Eurostat statistics available in November 2016. The report contents are partly based on the RIO Country Report 2015 (Fernández-Zubieta and Zacharewicz, 2016).

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HIGHLIGHTS

- Spain's real GDP continued increasing in 2015 (3.2%), with positive forecast for 2016 (3.2%) and 2017 (2.3%).
- In 2015, budget deficit as a percentage of GDP decreased to 5.1 % (5.9% in 2014). Government debt slightly decreased, but it remains very high (99.8% of GDP; 100.4% in 2014).
- The unemployment rate has considerably improved over the last year (by 9.8 %). It is however still among the highest in the EU-28 (22.1%).
- Gross Expenditure on Research and Development has declined in 2015 to 1.22% GDP (1.23% in 2014), reaching a figure below 2007 levels.
- BERD has been declining since 2009 and although it increased in 2015 it is below 2006 levels. GOVERD follows a similar trend. The GERD target of 25 in 2020 is unlikely to be reached.
- An acting government was in place between December 2015 and November 2016. This affected the implementation of the reform agenda for R&I.

MAIN R&I POLICY CHALLENGES

- **Improving framework conditions for R&I.** The Spanish industrial structure is characterised by a significant proportion of SMEs in low-tech sectors. Over the crisis, Spain has suffered an important reduction of companies active in R&D. The low productivity of SMEs and micro-companies indicates that additional efforts are needed to improve the framework conditions for innovation.
- **Improving funding and governance of R&I system.** The levels of execution of R&I public budgets have kept declining since 2006, although at a lower path since 2011. No significant structural reform has been implemented to reallocate funding towards the most efficient programs. An effective policy evaluation mechanism could help to improve efficiency and increase transparency of the R&I system.
- **Improving the labour market for researchers.** The number of researchers in the public sector has declined by 12.0% between 2010 and 2015. The substitution of the replacement rate of 10% for civil servants retirees in universities to a maximum of 50% for 2015 and to a maximum of 100% for 2016 is one of the most emblematic measures taken by the government to reverse the trend.
- **Stimulating regional R&I potential and performance.** Spanish R&D activities and funding are highly concentrated in four regions, among which the Basque Country is the only one displaying an R&D intensity above the EU average. Reducing the lack of synergies between regions and improving coordination mechanisms may foster regional R&I performance.

MAIN R&I POLICY DEVELOPMENTS IN 2016

- In June 2016, 15 members of the governing board of the Spanish Research Agency (AEI) were appointed.
- Launch of the funding programme [Innoglobal](#).
- Launch of the [CDTI-ERA-NET funding instrument](#)
- Increased funding for the State Program for the promotion of talent and employability, including "EMPLEA grants" aimed at SMEs, young innovative companies and spin-offs.
- New call to finance the development, consolidation and updating of scientific and technological infrastructures.

1. Main R&I policy developments in 2016

An acting government was in place between December 2015 and November 2016. This slowed down the implementation of the reform agenda for R&I.

Spanish Research Agency	In June 2016, 15 members of the governing board of the Spanish Research Agency (AEI) were appointed. The AEI was created the 27 November 2015. It is expected to be fully operational by 2017.
Innoglobal	Launch of the funding programme Innoglobal. This support scheme targets private companies aiming to promote international cooperation in R&I through bilateral and multilateral cooperation projects or projects in cooperation with big research infrastructures (EUR 10 million in PAA 2016).
Launch of the CDTI-ERA-NET funding instrument	Launch of the CDTI-ERA-NET funding instrument for Spanish companies applying to the ERANET programme.
State Program for the promotion of talent and employability	Increased funding for the State Program for the promotion of talent and employability, including "EMPLEA grants" aimed at SMEs, young innovative companies and spin-offs. For the first time the EMPLEA program provides grants, whereas in previous calls the programs provided loans.
Scientific and technological infrastructures	Launch of a new call to finance the development, consolidation and updating of scientific and technological infrastructures

1.1 Focus on National and Regional Smart Specialisation Strategies

Description and timing:

The Spanish Strategy for Science, Technology and Innovation (EECTI, 2013-2020) is officially considered as the national RIS3 and is implemented through the National Plan for Scientific and Technical Research and Innovation (2013-2016). In 2014, all 17 Spanish regions adopted Smart Specialization Strategies. Many regions focused on similar priorities (ERAC, 2014): sustainable agriculture and natural resources (14 regions), intelligent and sustainable transport (13 regions), sustainable energy (9 regions) and digital society (9 regions).

New developments

In 2015 and 2016, most regions have adopted further measures to implement their smart specialization strategies. Some of the actions include:

- Updates of the RIS3.
- Meetings with several regional R&I agents in workshops, fora or seminars to discuss the implementation phase and potential strategic plans.
- Annual RIS3 working plans, or other operational or industrial development plans in line with their respective strategies.
- Selection of a technical team to drive the strategy project forward.

- Regional subsidies programs for innovation and technology with priority to RIS3 sectors.
- Call for regional strategic sectors structured in the RIS3CAT Communities¹.
- A RIS3 governance proposal to social agents.

Outstanding issues

There is still substantial room for improvement in the development of Smart Specialization in Spain. Possible developments include:

- **Deepening mechanisms for intra- and inter-regional cooperation.** Smart specialization “gives a chance to all regions, provided that they mobilise their resources and connect to resources outside their own territory” (ERAC, 2014: 60). Nurturing and expanding diversified networks beyond constrained administrative boundaries become essential to obtain the multiple benefits of inter-regional collaboration in R&I
- **Enhancing transparency and monitoring mechanisms** for better public accountability of the developments in the implementation phase. Currently, action plans are difficult to monitor at regional level as these are often not publicly available. RIS monitoring mechanisms could face problems with regard to implementation in Spain because of an evaluation culture of the country, dominated by a control function (Molas-Gallart, 2012). This involves that evaluations are often mainly fiscal controls, in which the learning function tends to be reduced. As a plausible way forward, building on existing monitoring structures could be complemented with underpinning new internal capacities in the application of indicator systems and the consolidation of reviewing practices.
- **Improving coordination between national and regional strategies** to increase the potential synergies in the Spanish system. In that sense, the network "Red de Políticas Públicas de I+D+I (REDIDI) plays a supporting role to promote synergies between national and regional RIS3 strategies. Under the mandate of MINECO, the Spanish Foundation for S&T, (FECYT) has been collecting R&D data from regional and national programmes since 2009 to foster a better coordination of R&D policy among the different administrations. Besides, in the frame of REDIDI, along 2014-2015 several thematic working groups (energy, health, water, tourism, design and evaluation and monitoring systems) were carried out aimed at improving the cooperation and coordination among all ES administrations for their RIS3 implementation. These efforts still need to be strengthened (ERAC, 2014: 59-60).

2. Economic Context

2.1 Structure of the economy

The economic structure of Spain is dominated by the service sector, which accounted for 68.4 % GDP in 2014 (INE-2016). The same year, the industry sector contributed 15.5 % to the nation's GDP, followed by the construction sector (4.9 %) and the agriculture sector (2.3 %) (INE-2016). The weight of the construction sector, in terms of Spain's economy, declined from 10.1 % in 2008 to 4.9 % in 2014 (INE-2016). The service sector has increased its weight in the Spanish economy after the economic crisis, increasing from 63 % to the current 68.4 % over the same period. The Spanish economy was positively moving towards a more innovative economy until 2013, but it has suffered an important decline over the last two years distancing itself from the European average (EC, 2016a).

¹“Each community is expected to carry out initiatives to facilitate collaboration among sectorial stakeholders, to improve competitiveness and to generate solutions to society's changing needs” (Marinelli et al., 2016: 7).

2.2 Business environment

Spanish business structure relies highly on small and medium enterprises (SMEs) and especially on micro-companies of less than 10 employees (EC, 2016a). Although the share of SMEs in Spain is similar to other European countries, its role in employment creation and value added is high in European terms (EC, 2016a). The productivity gap between the largest firms and micro-companies is high in Spain. Additionally, Spanish firms' growth rate stands below the European average (EC, 2016a).

2.3 Supply of human resources

Spain has considerably reduced its researcher base over the last years, both in the public and private sectors. The total number of Full time equivalent researchers has passed from 134 653 in 2010 to 122.437 in 2015, decreasing by 9.1 % and reaching its levels of 2007. Simultaneously, the ratio of new doctoral graduates follows an opposite trend. It has increased from 1.79 in 2010 to 2.28 in 2014, substantially higher than the EU-28 average (1.1 in 2013). This indicates an imbalance between the supply and demand of human resources for research and innovation. In addition, young researchers face important problems to access and progress into an academic career, resulting in an ageing academic labour force. The number of academics with more than 50 years working at the Spanish universities has increased from 38.5 % in 2008-2009 to 45.5 % in 2014-2015 (MEDU-2016).

3. Main R&I actors

Spain has a relatively well-developed R&I structure in place, but its effectiveness and stability has been challenged by budgetary cuts during the financial crisis period and by difficulties in coordinating national and regional authorities (ERAC, 2014). The central government provides an R&I policy framework, which sets the definition of broad policy orientation on a multiannual basis through national strategies and PECTI (2013–2016).

Among the policy-making bodies, the [Ministry of Economics and Competitiveness](#) (MINECO) is the main organisation responsible for R&I policy design and operational management. Other ministries relevant for the management of R&I are the [Ministry of Energy, Tourism and the Digital Agenda](#), the [Ministry of Defence](#) (MDEF) and the [Ministry of Education, Culture and Sports](#) (MEDU). R&I policy-makers are supported at national level by the **Executive Committee for Science, Technology and Innovation Policy (CDCTI)**. CDCTI is an inter-ministerial body responsible for the planning, evaluation and coordination of the main Spanish instruments for R&D and innovation.

In addition to the policy-making bodies, a number of organisations are in charge of implementing R&I policy. The **State Secretary for Research, Development and Innovation** (SEIDI) implements MINECO's R&I related decisions. Its tasks include the execution central government policies on R&I, the supervision of OPIs, coordination with regional R&I bodies and the international representation of the Spanish government on R&I issues. The main funding agencies involved in the implementation of R&I policies are the **Spanish Research Agency (AEI²)** and the [Centre for Industrial Technological Development \(CDTI\)](#). The **Information System of Science, Technology and Innovation (SICTI)** will be responsible for the data collection, ex post analysis and impact assessment of all policy programmes and instruments of the R&I policy.³ The two

²Created in December 2015. The Agency should be fully operational by 2017.

³ The current monitoring system for EECTI coordinated by SEIDI is supported by the Automated Data Platform for I+D+I (PAID); the Network of Public Policies for R&I ([REDIDI](#)), as an informal coordination network; and the Spanish Observatory for R&D (ICONO) technology platform.

main advisory bodies of MINECO are the **Council of Science, Technology and Innovation (CPCTI)** and the **Centre for Research Scientific and Technological Support (CACTI)**.

In 2013, the Higher Education Sector (HES) included in 48 public universities, 29 private universities and other 86 centres. The government sector (GOV) includes 8 PROs, 56 other public national centres, 356 regional and local public centres and other 69 centres that performed 42%, 10.6%, 36.2% and 11.3% of government sector GERD in 2014, respectively (Eurostat and INE-2015). The main Public Research Bodies (PROs) are: the [Spanish National Research Council \(CSIC\)](#); the [Research Centre for Energy, Environment and Technology \(CIEMAT\)](#); [Geological and Mining Institute of Spain \(IGME\)](#); [Spanish Institute of Oceanography \(IEO\)](#); [National Institute for Agricultural and Food Research and Technology \(INIA\)](#); [Carlos III Health Institute \(ISCIII\)](#). In addition, the [National Institute for Aerospace Technology \(INTA\)](#) is under the umbrella of MDEF.

4. R&I trends

4.1 Public allocation of R&D and R&D expenditure

Total GERD in Spain was EUR 13 171.8 million in 2015. Out of the total R&D funding, the business sector represented in 2014 EUR 6,038.5 million in 2015, the government sector EUR 5,959.3 million and foreign funding EUR 1,059.1 million.

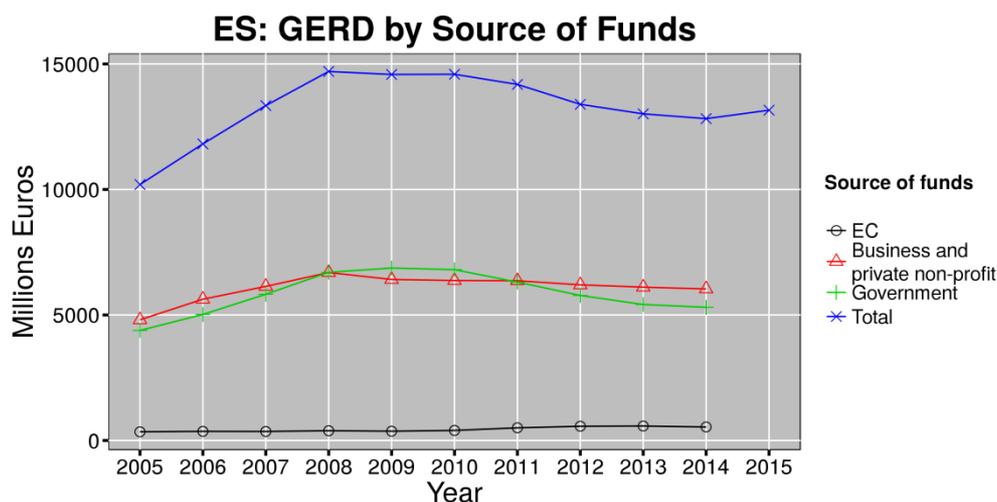


Figure 1 Development of government funding of the total GERD.
Data source: Eurostat, November 2016.

The governments' and private sector's (i.e. the aggregated funding from business and private non-profit) contributions to the total GERD are the most relevant and are of a comparable nominal level, although the private sector slightly outperformed the government sector as a source of funds for Spanish R&I in 2012 and 2013. The effect of the crisis is apparent because of the negative growth of the overall GERD in Spain from 2009 onwards, and the 2014 levels are comparable to the 2007 levels.

Funding from the European Commission (EC) for Spanish R&D plays a very marginal role, despite a slight increase after 2010.

As one of the most generous schemes among OECD countries, the Spanish system of R&D tax incentives also needs to be mentioned. It is based on a combination of three different elements: (1) Tax deduction for R&D and Innovation activities (ex-ante and ex-post); (2) Income reduction for transferring intangible assets ("Patent Box") and (3) Social security benefits for full-time R&D personnel. This system was first introduced

with a Royal Decree-Law 4/2004 and was later further developed (among others through the Royal decree 475/2014). It sets up a tax incentive to employers for personnel exclusively involved in research, development and innovation related activities. The tax relief consists in a 40% reduction to employer social security contributions for its researchers. Despite its formal generosity, the impact of this R&D tax incentives on the funding of the Spanish R&D system remains limited.

4.2 Private R&D expenditure

The intensity of the Spanish BERD is relatively modest (slightly more than 0.64 % of the GDP in 2015). An increasing trend during the 2005–2008 period is apparent, which was almost entirely reversed over the following years (in 2014, the intensity of the total BERD was close to the 2006 level). The economic crisis that affected all aspects of the Spanish economy had particularly negative effects on the overall business R&D intensity. No sign of recovery is observable, since BERD is still decreasing, that is, from 0.68 % of GDP in 2012 to 0.67 % in 2013 and 0.65% in 2014.

BERD intensity in both the service and manufacturing sectors remained low and relatively stable since the beginning of the crisis in 2008. BERD Manufacturing changed from 0.31 % of GDP in 2008 to 0.3 % in 2014, while services changed from 0.36 % to 0.31 %.

Most business R&D funding comes from business itself. It has been very stable over the crisis and post-crisis period (0.55 % of GDP in 2008; 0.56 (2015) % in 2013). The funding from government is much lower and, after an increase between 2005 and 2008, followed a downwards trend until 2013 (0.07 %). Its 2013 level was below the level observed in 2005 (0.08 %). It should be noted that despite the severe economic crisis, the private part of business R&D has remained stable over recent years (albeit at a low level).

In 2014, within manufacturing, the 'manufacture of other transport equipment' and the 'manufacture of basic pharmaceutical products and pharmaceutical preparations' sectors reached a similar level of R&D expenditure (around EUR 568 million). However, while the former showed a continuous downwards evolution from 2010, the latter showed a remarkable increase between 2008 and 2011, before decreasing until 2013.

With regard to the service sector, all of the top services, in terms of R&D investments, showed a similar modest downwards trend.

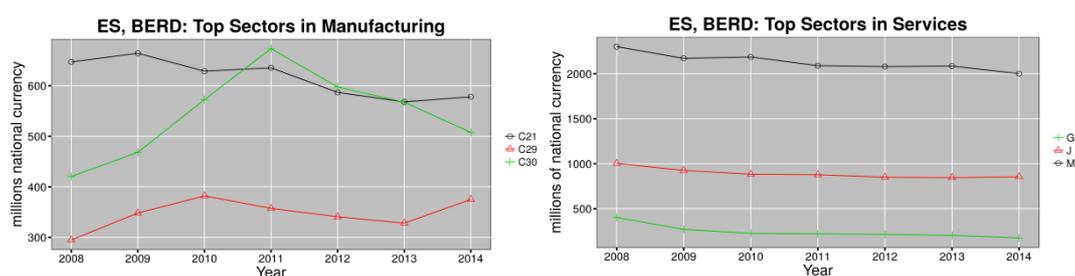


Figure 2 Top sectors in manufacturing (C21, manufacture of basic pharmaceutical products and pharmaceutical preparations; C29, manufacture of motor vehicles, trailers and semi-trailers; C30, manufacture of other transport equipment). Top service sectors (J, information and communication; G, wholesale and retail trade; repair of motor vehicles and motorcycles; M, professional, scientific and technical activities).

4.3 Public sector innovation and civil society engagement

Spain made a great effort to make available its public services on-line. As a result, 49% of Spanish citizens interacted with the public authorities via Internet in 2015, 15 percentage points higher than in 2009. Spain ranked 12th in the E-Government development index in 2014 and ranked 101 in the government procurement of advanced technology products. Spain ranks 2nd among EU Member States regarding open data (EC, 2016c).

The [Spanish Observatory of Citizen Science](#) includes a registry of 107 citizen projects. This web was launched within the European project [Socientize](#). The FECYT promotes science dissemination, including citizen science projects.

At city level, several large cities have launched important citizen science projects (e.g. [BarcelonaLab](#) and [Medialab-Prado](#), in Barcelona and Madrid respectively).

5. Innovation challenges

5.1 Challenge 1 Improving framework conditions for innovation

Description

The Spanish industrial structure is characterised by a significant proportion of small and medium-sized firms in low-tech traditional sectors. It lacks large private investors with a leading role in creating R&D-related networks. In addition, since the beginning of the crisis in 2008, Spain has faced a dramatic reduction in the number of companies active in R&D, which decreased from 12 997 in 2008 to 7 628 in 2014 (INE-2016). The [European Innovation Scoreboard 2016](#) confirms that Spain is often lagging behind regarding innovation. Out of 28 EU Member States, it stands at the 21st position for the two indicators of Number of SMEs innovating in-house and SMES introducing product or process innovation and at the 25th position on the number of SMEs introducing marketing/organizational innovation. At a more macro-level, the report also shows a relatively low performance regarding employment in knowledge-intensive activities (18th position), Medium and high-tech product exports (19th position) and knowledge-intensive services exports (19th position). On the other hand, Spain shows a very good performance in terms of Sales of new to the market and new to firm innovation (5th position). While the economic crisis remains the direct determinant of the low level of R&D activities, longer-term structural challenges need to be highlighted. Over the decade 2000–2009, the considerable increase in public and private R&D expenditure did not significantly boost innovation in Spain. During this period, the country made little progress in accumulating intellectual assets (e.g. patent applications, community trademarks and designs), improving public–private and private–private partnerships or introducing new innovative products, processes and services (EC, 2012: 25). These characteristics suggest that the low engagement of business with R&I can partly be ascribed to a lack of innovation-friendly framework conditions and to a limited innovation culture (ERAC, 2014; COTEC, 2015; COTEC, 2016).

Policy response

Spain has designed a large number of support schemes to foster R&D activities, to increase knowledge transfer between public and private sectors and, more generally, to increase innovation culture. In 2011, the Law on Science, Technology and Innovation (LCTI) introduced several changes to improve knowledge transfer mechanisms. It encourages, for example, the creation of technological spin-off companies by allowing researchers to work part-time in private companies that were created by the organisations for which they originally worked. To complement this, several programmes

have been launched to promote innovation clusters and knowledge transfer mechanisms.⁴ Support measures for SMEs targeted at industries with a growing market are offered through some CDTI programs. Policies and instruments to encourage cooperation and knowledge sharing and to create a more favourable business environment for SMEs also exist. For example, the 'CIEN Strategic private consortia for innovation' requires that consortia include at least one SMEs among their members and that consortia collaborate with public research centres, which aims to increase cooperation and knowledge sharing. In June 2016 the government published the regulatory bases for subsidies to support innovative business groups aiming at improving SMEs' competitiveness ([Orden IET/1009/2016, 20th June](#)).

Policy Assessment

The development of an institutional framework shows that there is a definite will to improve the amount and scope of R&I activities. Nationwide public-private partnerships geared towards innovation and gathering the best resources from both private and public sectors may have the potential to boost the R&I system. The absence of a sufficient number of small and medium-size companies that perform R&I activities is still a major structural weakness of the innovation system.

5.2 Challenge 2 Improving funding and governance of the Research system

Description

Since the beginning of the crisis, the considerable reduction of GBAORD between 2009 and 2013 (by 33.6 %) has limited Spain's growth potential. The central government's budget for public expenditure on R&I in 2014-2016 indicates that the decreasing trend has been halted. However, budget levels remain at the 2005-2006 level. Total and relative GERD figures are still decreasing. In this context, it is still essential to increase R&D intensity and that the effective and efficient use of resources is ensured (Country Specific Recommendation, 2015). In addition to the lack of flexibility of the public research system (see Challenge 1), four main factors have inhibited national research and innovation performance. The first one is directly linked to the drastic reduction of public funding for research. In relative terms, total government budget (PGE-46/PGE) has decreased from 2.7 % of total budget in 2008 to 1.47 % in 2016. The second factor is the unequal quality and fragmented character of the scientific system (ERAC, 2014). Spain's performance, as based on scientific publications, is at the OECD median, although the ratio of public R&D expenditure to GDP is slightly below (OECD, 2014). A third aspect that might influence national research outputs is the weakness of the incentives for research performance. Spain's science funding is often not reliant on international peer review and funding to universities and public research organisations does not take into account their performance (EC, 2016; Jonkers & Zacharewicz, 2016). This hinders quality and impact of scientific outputs (Country Specific Recommendation, 2016). Finally, the fourth factor is linked to the lack of an effective R&I policy evaluation mechanism.

⁴ Some relevant sub-programmes that aim to promote knowledge transfer are the RETOS Colaboración, Torres Quevedo; EMPLEA; EQUIPA (technology parks); INNCIDE (Knowledge Transfer Offices); NEOTEC (New Technology Based firms); Innovative Companies Associations and Clusters (AEI); Technology Platforms; and 'CIEN' Strategic private consortia for innovation, FEDER interconecta and Doctorales Industriales

Policy response

The Law 14/2011 on Science, Technology and Innovation, the Spanish Strategy for Science, Technology and Innovation (2013–2020) and the Plan PECTI (2013–2016) present a set of comprehensive policies and reforms aimed at improving the R&I system. One of the most emblematic measures aimed at increasing the national research performance was the creation of the National Research Agency in November 2015 (it should fully enter into function in 2017). This organisation is tasked with the elaboration and implementation of Spanish research funding policy. The Agency is expected to foster independent peer reviews of projects by international experts and evaluations based on the innovative capacity of projects. Complementary to the elaboration of policy measures, the evolution of the central government's budget for public expenditure on R&D over the last three years indicates that the decreasing trend has been halted. However, in 2016, the national budget for public spending on R&I increased merely by 0.3 %. In addition, the levels of execution of R&I public budgets continue declining since 2006 (i.e. 96.2 % in 2006 to 51.9 % in 2015) (FECYT, 2016). Finally, the need to improve the policy evaluation culture is recognised by the Spanish Strategy for Science, Technology and Innovation (2013–2020), which sets out the intention to reinforce a culture of policy monitoring, accountability and evaluation of the system. The Secretary of State for R&I, with the support of the Spanish Foundation for Science and Technology (FECYT) and the Centre for Industrial and Technological Development (CDTI), carries out the monitoring of the national plan policies and most of the business-oriented R&I policies. However, the reports produced mainly relate to how funding is distributed and generally lack a proper assessment of the quality and efficiency of the funding mechanisms.

Policy Assessment

Despite the progress made and the implementation of important reforms (such as the creation of the National Research Agency), insufficient funding and structural weaknesses in the research system continue to limit Spain's growth potential (EC, 2015: 61). Generally, a change in the government's perception, that public research funding is an expenditure that should be delayed until sufficient economic growth has been achieved, is often recommended (e.g. ERAC, 2014). Rather, such funding should be considered a core part of the economic strategy for recovery. Therefore, the European Research Area and Innovation Committee (ERAC) peer review panel recommends progressively increasing public funding for research in order to reach a target of 0.7 % of GDP by 2017.

5.3 Challenge 3 Improving the labour market for researchers

Description

Human resource constraint is considered the most pressing challenge of the Spanish research and innovation (R&I) system (ERAC, 2014). Two main aspects influence this systemic issue of the Spanish R&D landscape.

The first one is directly linked to the economic crisis. Since its beginning, R&D budget reductions have affected most aspects of the research profession. The number of researchers (Full-Time Equivalent) in the public sector has passed from 88 967 in 2010 to 77 336 in 2014, decreasing by 13.1% and reaching its levels of 2007 ([Eurostat](#)). In comparison, between 2002 and 2010, the same figure had increased at an average yearly rate of 8% ([Eurostat](#)). This decrease has particularly affected young researchers, for which the possibilities to reach a stable position have been drastically reduced. Since 2010, the employment rate for young PhDs has constantly decreased (ERAC, 2014), while the number of graduated Phd students has increased by 44.5 % between 2008 and 2014 ([MECD](#), 2016). This created a strong imbalance between the supply and demand side and nurtured a potential loss of researchers leaving Spain or the research profession altogether. The difficult condition of young researchers is also highlighted by the average

age of permanent researchers in Spain, which is significantly higher than in the rest of the EU (e.g. 53 years in CSIC, compared to 45 in CNRS in France) (ERAC, 2014). In addition, the number of academics in Spanish universities aged 50 or more has increased from 38.5 % in 2008-2009 to 45.5 % in 2014-2015 (MEDU-2016). The government decision to limit the replacement rate for civil servant retirees to 10% between 2011 and 2015 reduced further young researchers' access to permanent positions.

The second factor linked to human resource constraints in Spain has a more systemic nature and regards the dual structure of the research system. On one hand, civil servants, recruited through public competition, form the core permanent staff at universities and PROs. On the other hand, non-civil servants are generally contracted temporarily.⁵ This recruitment mode of stable positions involve that the career of a researcher in Spain is highly dependent both on the call for public competitions and on the number of available positions. Since the beginning of the economic crisis, the availability of such positions has been very limited due to budget restrictions. Furthermore, while formally the recruitment process for permanent research positions at university is open, Spain has one of the highest rates of endogamy in its university system (ERAC, 2014: 26)⁶. In 2014-2015, a total of 69.8 % of the university research personnel had obtained their PhD in the university at which they work (MEDU, 2016).

Policy response

In the last few years, Spain has deployed a number of formal policy responses to improve the public labour market for researchers. Law 14/2011 on Science, Technology and Innovation, the Spanish Strategy for Science (2013–2020) and the PECTI (2013–2016), provide additional resources for doctoral and postdoctoral training grants, mobility schemes and new types of stable contract to non-civil servant researchers. To complement them, the government substituted the replacement rate of 10% for civil servants retirees to a maximum of 100% for 2016.⁷ In 2016, the Spanish PROs will offer 312 new civil servant positions (57% increase in comparison to 2015).⁸ In addition, the programme for the stabilisation of researchers (i.e. allowing researchers to have a permanent contract) for 2016 has considerably increased by 476.9 % from EUR 1.3 million in 2015 to EUR 7.5 million in 2016. This should allow 100 researchers (mainly Ramón y Cajal researchers) to get a permanent position.

Policy Assessment

While these strategic policy documents meant to improve the human resource situation in the public research system, drastic budget cuts often hindered the implementation of these policies. As a result, the demography of the research system remains a pressing problem for Spanish R&I. Strengthening positions such as 'Profesor Contratado Doctor' or further implementation of the 'Contrato de investigador distinguido' envisaged by Law 14/2011 could allow a progressive improvement of the career path. So far, the number of such positions is very low and they have not been translated into stable contracts.⁹

⁵Although most non-civil servant contracts are temporary, some of them are permanent (*contrato indefinido*) (e.g. 'Contratado doctor' for universities).

⁶Endogamy is measured by the proportion of staff that obtained their PhD in the university at which they work

⁷ See Ley de Presupuestos Generales del Estado 2016 (art. 20, 2, I, p.68): http://www.congreso.es/docu/pge2016/pge2016/PGE-ROM/doc/L_16_A_1.PDF

⁸<http://www.idi.mineco.gob.es/portal/site/MICINN/menuitem.edc7f2029a2be27d7010721001432ea0/?vgnnextoid=9f9be4e6bed893510VgnVCM1000001d04140aRCRD&vgnnextchannel=4346846085f90210VgnVCM1000001034e20aRCRD>

⁹ In December 2014, the government opened 25 positions of 'contrato de investigador distinguido'. The work plan for 2015 (i.e. the Annual Work Plan) considered the opening of 15 positions of 'contrato de investigador distinguido'.

5.4 Challenge 4 Stimulating regional research and innovation potential and performance

Description

Out of the 17 Spanish autonomous communities, only the Basque Country display a R&D intensity at the EU average and is the single region considered by the European Innovation Scoreboard 2016 to be a 'strong innovator'. Canary Islands and Extremadura are considered 'modest innovators'. The other 16 regions fall into the category of 'moderate innovators', with an R&D intensity situated below the EU average. In addition, R&D activities are highly concentrated in four regions, which accounted for 70.4 % of all R&D expenditure in 2014: Madrid (25.8 %), Catalonia (22.9 %), Andalusia (11.4 %) and the Basque Country (10.2 %). This fragmentation of the regional R&I landscape, the lack of synergies between regions and the weak coordination mechanisms between national and regional strategies create important challenges for the Spanish R&I system with regard to stimulating R&I potential and performance (ERAC, 2014: 18).

Policy response

The Spanish Strategy for Science, Technology and Innovation (2013–2020), was jointly elaborated by the state and the autonomous communities and is presented as a 'RDI political agenda which includes coordination between the actions of the General State Administration, the Autonomous Communities and the European Union'. This document has been complemented by the adoption, in 2014, of Smart Specialisation Strategies in each autonomous community. Spanish Autonomous Communities are amongst the EU regions which are most active in designing and adopting smart specialisation strategies (ERAC, 2014). These strategies aim to identify comparative advantages for each region and take into account the diversity of regional potential. In the case of Spain, many of the autonomous communities focus on similar priorities (ERAC, 2014): sustainable agriculture and natural resources (14 regions); smart and sustainable transport (13 regions); sustainable energy (9 regions); and digital society (9 regions).

Policy Assessment

While the adoption of a national strategy for science, technology and innovation and the complementary regional Smart Specialisation Strategies offer a policy framework that grasps the diversity of territories and the priorities in Spain, there is still substantial room for improvement.

In particular and according to the ERAC peer review (2014) for some autonomous communities, the elaboration of Smart Specialisation Strategies might have consisted of a replication of Spanish priorities, without strategic work being carried out to identify genuine regional strengths. In addition, most regional strategies do not include any mechanism for cooperation with other Spanish regions (ERAC, 2014: 59).

6. Focus on creating and stimulating markets

This section aims at describing and assessing national level efforts to introduce demand-side innovation policies to stimulate the uptake of innovation or act on their diffusion, including public procurement and regulations supporting innovation. It also analyses policy measures aimed at internationalisation of companies with the aim of increasing the innovativeness of the economy.

Spain had introduced a 3 % target for the public procurement of innovative products and services in its procurement law of 8 July 2011. Since then, while several regulatory measures on pre-commercial and innovative public procurement have been developed, no update regarding the progress towards the 3% target is available.

Public demand-driven innovation is one of the key pillars of Spain's renewed National Plan for R&D and Innovation. This encompasses both an R&D procurement phase based on PCP and a phase of procuring innovative solutions ready for market deployment based on 'forward commitment procurement'. It also foresees the development of a financial support mechanism governed by a central government body, namely the CDTI, that encourages public procurers to undertake such procurements. CDTI can finance up to 75% of R&I costs related to Innovative Public Procurement projects¹⁰.

Public procurement of innovative goods and services has been increasingly encouraged in Spain. The Spanish legal framework differentiates two complementary mechanisms for Pre-commercial Procurement and Public Procurement for Innovation.¹¹ The first one (*Compra Pública Precomercial*) sets the conditions for the purchase of R&D services by public actors and generally involves the delivery of a prototype. The Public Procurement for Innovation (*Compra Pública de Tecnología Innovadora*) defines the conditions for the purchase of innovative products.

The Council of Ministries agreed to promote innovative public procurement through the elaboration of a Spanish *Guide on Innovative Public Procurement (Compra Pública Innovadora, CPI)*, published in 2011.¹² The document describes administrative action to foster the development of new innovative markets from the demand side, through public procurement. This guide was updated and a second version was released in December 2015.¹³ Alongside public procurement for innovation, the internationalization of the economy is being promoted as a tool to stimulate markets. MINECO's Strategic Plan for Internationalisation of the Spanish Economy 2014-2015¹⁴ aims to strengthen the export base of the Spanish economy through financial support for internationalisation – i.e. Fund for Foreign Investment (FIEX), Fund for SME's Foreign Investment (FONPYME) and Agreement on Reciprocal Interests Adjustment (CARI). The generous Spanish tax incentive portfolio for R&D is also used as a mean to attract FDI through providing bonuses for full time R&I personnel and projects. Inward FDI stock increased from 42.8 per cent of the GDP in 2014 to 44.5 per cent in 2015 (UNCTAD, 2016). In 2014, Spain was the second largest recipient of FDI and the fifth largest investor in the EU in 2014 (UNCTAD, 2015). FDI inflows meant a 3.8 per cent of gross fixed capital formation in 2015 - in contrast with 8.4 per cent in 2014, 12.5 per cent in 2013 and 10.0 per cent in the pre-crisis period 2005-2007.

¹⁰<https://ec.europa.eu/digital-single-market/en/news/innovation-procurement-initiatives-around-europe>

¹¹http://ec.europa.eu/information_society/newsroom/image/document/2015-50/spain_12540.pdf

¹²http://www.idi.mineco.gob.es/stfls/MICINN/Innovacion/FICHEROS/Políticas_Fomento_Innv./Guia.CPI.pdf

¹³ <http://www.idi.mineco.gob.es/portal/site/MICINN/menuitem.7eeac5cd345b4f34f09dfd1001432ea0/?vgnextoid=281c12c94d364410VgnVCM1000001d04140aRCRD>

¹⁴http://www.mineco.gob.es/stfls/mineco/comercio/140228_Plan_Internacionalizacion.pdf

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List of abbreviations and definitions

ADE	Digital Agenda for Spain
AEI	Spanish Research Agency - Agencia Estatal de Investigación
AGE	National State Administration - Administración General del Estado
ANEP	National Agency of Evaluation and Prospective - Agencia Nacional de Evaluación y Prospectiva
BERD	Business R&D Expenditures
CACTI	Advisory Council of Science, technology and Innovation - Consejo Asesor de Ciencia, Tecnología e innovación
CDCTI	Executive Committee for Science, Technology and Innovation policy - Comisión Delegada del Gobierno para Política Científica, Tecnológica y de Innovación
CDTI	Centre for Industrial Development - Centro para el desarrollo tecnológico Industrial
CIEMAT	Research Centre for Energy, Environment and Technology - Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas
COSCE	Spanish Confederation of Scientific Societies - Confederación de Sociedades Científicas de España
CPCTI	Council of Science, Technology and Innovation - Consejo de Política Científica, Tecnológica y de Innovación
CRUE	Spanish Conference of University Rectors - Conferencia de Rectores de las Universidades Españolas
CSIC	Spanish National Research Council - Consejo Superior de Investigaciones Científicas
EDP	Entrepreneurial Discovery Process
ERAC	European Research and Innovation Area Committee
EU	European Union
FDI	Foreign Direct Investments
FECYT	Spanish Foundation for Science and Technology - Fundación Española para la Ciencia y la Tecnología
FTE	Full-Time Equivalent
GBAORD	Government Budget Appropriations or Outlays on R&D
GCI	Global Competitive Index
GDP	Gross Domestic Product

GERD	Gross Expenditure on Research and Development
HES	Higher Education Sector
ICONO	Spanish Observatory of R&D - ObservatorioEspañol de I+D+i
ICT	Information and Communication Technology
IEO	Spanish Institute of Oceanography - Instituto Español de Oceanografía
INE	Spanish Institute of Statistics - Instituto Nacional de Estadística
ISCIII	Carlos III Health Institute - Instituto de Salud Carlos III
LCTI	Law of Science, Technology and Innovation - Ley de Ciencia, Tecnología e Innovación
MDEF	Ministry of Defence - Ministerio de Defensa
MINECO	Ministry of Economy and Competitiveness (before MICINN) - Ministerio de Economía y Competitividad
OPIs	Public Research Bodies - Organismos Públicos de Investigación
PECTI	Spanish State Plan of Scientific and Technical Research and Innovation (2013–2016) (It merges the envisaged PECT and PEI) - Plan Estatal de Investigación Científica y Técnica
PROs	Public Research Organisations
R&D	Research and Development
SICTI	Information System of Science, Technology and Innovation - Sistema de información sobre ciencia, Tecnología e innovación
SMEs	Small and Medium Enterprises
SEIDI	State Secretary of Research, Development and Innovation - Secretaría de Estado de Investigación, Desarrollo e Innovación

Factsheet

	2009	2010	2011	2012	2013	2014	2015	2016
GDP per capita (euro per capita)	23300	23200	22900	22300	22100	22400	23300	
Value added of services as share of the total value added (% of total)	70.43	71.44	72.55	73.47	73.96	74.25	73.8	
Value added of manufacturing as share of the total value added (%)	13.17	13.28	13.46	13.21	13.43	13.78	14.24	
Employment in manufacturing as share of total employment (%)	12.05	11.77	11.6	11.25	10.99	10.79	10.7	
Employment in services as share of total employment (%)	73.53	74.62	75.89	77.15	77.96	78.48	78.54	
Share of Foreign controlled enterprises in the total nb of enterprises (%)	0.33	0.37	0.46	0.42	0.48			
Labour productivity per hour worked (Index, 2010=100)	97.7	100	101.4	103.5	104.9	105.2	105.6	
New doctorate graduates (ISCED 6) per 1000 population aged 25-34	0.62	0.71	0.69	0.77	0.86	0.96		
Summary Innovation Index (rank)	23	23	23	23	23	24	25	
Innovative enterprises as a share of total number of enterprises (CIS data 2012) (%)				33.6				
Innovation output indicator (Rank, Intra-EU Comparison)			18	18	18	19		
Turnover from innovation as % of total turnover (Eurostat)		19		14.3				
Country position in Doing Business (Ease of doing business index WB)(1=most business-friendly regulations)						34	33	32
Ease of getting credit (WB GII) (Rank)						48	53	
Venture capital investment as % of GDP (seed, start-up and later stage)	0.013	0.01	0.012	0.009	0.008	0.008	0.01	
EC Digital Economy & Society Index (DESI) (Rank)						16	17	15
E-Government Development Index Rank		9				12		17
Online availability of public services - Percentage of individuals having interactions with public authorities via Internet (last 12 months)	34	38	38	44	44	49	49	
GERD (as % of GDP)	1.35	1.35	1.33	1.29	1.27	1.24	1.22	
GBAORD (as % of GDP)	0.81	0.77	0.68	0.59	0.55	0.55	0.5	
R&D funded by GOV (% of GDP)	0.64	0.63	0.59	0.56	0.53	0.51		
BERD (% of GDP)	0.7	0.69	0.69	0.68	0.67	0.65	0.64	
Research excellence composite indicator (Rank)				12				
Number of scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country		9.16	9.3	9.08				
Public-private co-publications per million population	17.58	19.55	22.97	20.53	19.15	16.32		
World Share of PCT applications	1.08	1.16	1.06	0.94	0.9	0.83		

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