PUBLIC SUBSIDIES R&D POLICIES EVOLUTION SINCE THE CRISIS AND PROPOSALS FOR THE FUTURE. THE SPANISH AND GALICIAN CASE

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ABSTRACT
This work analyzes the evolution of the public R&D support for the last world economic crisis in Spain, namely, the Spanish region of Galicia. Also the proposals from the Spanish Science, Technology and Innovation System (SECTI) main players made to recoup public funds to support business innovation and consequently the competitiveness of the country are examined. It is intended to establish a coherence framework between the planned means and the aims.

Keywords: R&D, innovation, public investment.

INTRODUCTION
There are numerous studies that analyze the capacity for innovation by the business sector, such as making the European Commission through the Innovation Union Scoreborard (IUS) for the 28 member countries or carried out by the World Economic Forum (WEF) worldwide. The latest publication of WEF indicates that the capacity of Spanish companies to innovate has been reduced significantly. Specifically, it has gone from 29th in the world rankings to 55th in the last 10 years. All this despite that Spain held 11th place worldwide in availability of scientists and engineers in 2014. It is remarkable to note how by some institutions, innovation capacity depends on the availability of scientists and engineers (WEF, 2015) and that spending on innovation activities described above, the expense of having trained this group is not contemplated.

Recent reports indicate that there is no clear crowding out effect between public R&D funds and private R&D investment. This effect does not exist in the Spanish manufacturing companies or companies from other EU countries such as France or Germany, although in the latter case a partial influence is not ruled out (Gonzalez, 2008). However, a recent study of textile and clothing sector in Antioquia (Colombia) shows that public subsidies have a positive impact on the innovative efforts of firms (Pérez, 2015).

Moreover, different methodologies are observed in establishing national and regional R&D policies. So, the Regional Smart Specialization Strategy of Galicia (RIS3) is articulated around challenges and priorities (Xunta de Galicia, 2014), while nationally, the National Strategy for Science and Technology is based on basic principles and objetives (MINECO, 2013).
INNOVATION SPANISH AND GALICIAN SYSTEMS
SECTI LEGAL FRAMEWORK AND INFORMATION ACCESS

According to the article 149.1.15 of the Spanish Constitution, the State has exclusive competence on the promotion and general coordination of the scientific and technical research. This competition develops across the Law of the Science, Technology and Innovation of 2011, which considers the concept of scientific and technical research equivalent to research and development, understood as the creative work realized of systematic form to increase the volume of knowledge, included the relative ones to the human being, the culture and the company, the use of this knowledge to create new applications, its transfer and his spreading.

![SECTI legal framework](image)

The Secretary of State for Research, Development and Innovation (SEIDI) is the department of the Spanish Government responsible for proposing and implementing government policy on research and innovation in all sectors. SEIDI is responsible for the coordination of public research organizations and to ensure coherence and coordination of the promotion of RTDI in Spain. Also, the Spanish Strategy for Science and Technology and the Spanish Strategy for Innovation was made by the SEIDI. It represents the framework instrument where the general aims to reaching during the period 2013-2020 in promotion and development of the RDI activities and the competences of the public administrations in Spain are established.

The Spanish Plan of Scientific and Technical Research and Innovation (PEICTI) develops the Spanish Strategies for Science and Technology and Innovation, as well as the financing sources. The plan is structured in 4 programs (promotion of talent and its employability, fostering excellence in scientific and technical research, business leadership in RDI and research aimed at the challenges of society) divided in 18 subprograms and 2 strategic actions (health and the economy and the digital society) divided in 6 and 10 subprograms respectively.
The governance of the SECTI has a special relevancy. The governance consists of the efficiency, the quality and the satisfactory orientation of a country towards the civil society participation to all his levels: native, local, international and regional. This is due to the fact that in this topic there is a great interaction between the different levels, due to the important transfers up and down.

The governance is structured in three pillars: coordination, advice and analysis. The Scientific, Technological Politics and Innovation Council coordinate the scientific and technical investigation and it’s composed by representatives of the Government and the Autonomous Communities (CC.AA.). The Science, Technology and Innovation Advise Council is composed by 14 recognized prestige members of the scientific and technological community, employer and unions\(^1\). Finally, the Science, Technology and Innovation Information System (SICTI) is the instrument to capture and analyze the information for the Spanish Strategy for Science, Technology and Innovation and PECTI production and follow-up.

The Science, Technology and Innovation Advise Council advices to the Department of Economy and Competitiveness, to the Autonomous Communities and to Scientific, Technological Politics and Innovation Council. Also, it proposes modifications and contributions, it monitors the development of the Spanish Strategy of Science, Technology and Innovation and PECTI and promotes the introduction in the SECTI of mechanisms of evaluation.

The SICTI structure is showed in the Figure 2.

![SICTI Structure](image)

**Fig. 2 - SICTI (Source: Cabello, 2015)**

The Automated Platform for Integrating of Information (PAID) is the tool that allows to integrate and to exploit information about RDI funds of State and the CC.AA. The Science and Technoloty Spanish Foundation (FECYT) under the supervision of the SEIDI manages the PAID. The PAID provides homogeneous, consolidated (AGE and CCAA) and exploitable information for the follow-up of the RDI Spanish Strategy, PECTI and the RDI CC.AA. plans. Also it facilitates the follow-up of the annual programs of action of the State Plan, uses

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\(^1\) According to the most recent information, constituted by 9 persons of scientific formation in different areas (genomic, algebra, law, medicine and chemistry), technological (chemistry, structures and telecommunications) and social (economy), 2 representatives of employer organizations (CEOE and CEPYME) and 2 representatives of unions (CC.OO. and UGT)
as database of "inputs" to relate financing to results and answers to the requests of information of the politicians on the RDI funds (Cabello, 2015). The access to the above mentioned information is restricted to RDI public calls managers.

The RDI Spanish Observatory (ICONO) offers public available information about RDI public funds in the RDI memories of activities. The last available edition (march, 2016) offers information until 2012.

According to the web of the MINECO, ICONO generates and analyzes of rigorous form the most current information in relation to the principal regional, national and international indicators and strategies of science and innovation.

RDI GALICIAN SYSTEM LEGAL FRAMEWORK

The Innovation Galician Agency (GAIN) is the entity entrusted to developing the Research and Innovation Galician Plan, according to the Law of Promotion of the Investigation and the Innovation of Galicia of 2013. The above mentioned plan is financed by regional, national and European funds. To date of March, 2016, Galicia does not possess a RDI Plan, since previous, called I2C, it had force between January, 2011 and December, 2015. According to the web of the GAIN, the only innovation plan in the normative frame of Galicia is the Galician Strategy of Intelligent Specialization (RIS3 Galicia), which production is one of the requirements to get the EU structural funds.

According to the same GAIN's web, this one will publish from time to time the reports elaborated from the Galician Observatory of Innovation. However it shows information about the Plan I2C, to public calls in effect, access to the Galician Innovation Platform and to 20 documents on successful cases of innovation in Galicia.

RDI SUPPORT PUBLIC FUNDS EVOLUTION

The public funds that Spain has dedicated to R&D financing have suffered serious cuts during the last years, period characterized by the economic world crisis. The forecast of the Spanish Strategy of Science and Technology was auguring that the internal expenditure for 2015 in R&D activities would be 2.5% of the GDP, nevertheless, in 2014 this number was of 1.23% (Figure 3). This supposes that expectations have been reduced by 50%. The information is even harder if we compared to what happened in Europe in that period, because the above mentioned expense has not stopped growing. This situation has increased the gap between Spain and the average of the Europe of the 28\(^2\).

![Fig. 3 - R&D expenditure on % of the GDP and financial sources (Source: COTEC, 2015)](image)

\(^2\) The decrease in 2004 coincides with the entry of 10 new countries in the EU, to which they follow Bulgaria and Romania in 2007 and Croatia in 2013.
Also the minor weight of the public sector in the above mentioned expense is observed which would not be negative if it was due to the increase of the private sector, though in this case it takes place for the entry of foreign funds.

Also the expenditure in activities for the technological innovation has a constant decrease from 2008, which supposes more than 30 % until 2014 (ICONO, 2016). These expenditure are constituted by the research and development (intern R&D), the acquisition of R&D (extern R&D), the acquisition of new machinery, equipments, hardware or software destined for the production of products or new or improved processes, the acquisition of other external knowledge for innovation, the formation for activities of innovation, the introduction of innovations on the market and the design and other preparations for production and/or distribution.

The situation in Galicia is also worrying, because the gap with the rest of Spanish CC.AA. is important (Figure 4). The R&D expenditure was 30% minor than the national average in 2014, concretely 0,87 % of the GDP. The latter information is specially relevant bearing in mind that the own autonomous government of Galicia, from thr Plan I2C (2011-2015) was raising an aim of RDI investment of 3 % on galician GDP for the year 2020.

![Fig. 4 - R&D expenditure (% GDP) evolution (Galicia – Spain) (Source: ICONO 2016)](image)

Also the expenditure in activities for the technological innovation has a constant decrease from 2008, which supposes a reduction of 53,5 % up to 2014 (ICONO, 2016), almost the double that in the national set, which was 30 %.

**CAPACITY FOR INNOVATION**

There are different studies that analyze the aptitude to innovate by the elements of RDI systems. They are based on indicators and allow to extrapolate capacities from different variables with the aim to be able to effect comparative between regions of different dimensions. One of them is the Innovation Union Scoreboard (IUS) for EU28. The measurement framework used in the Innovation Union Scoreboard distinguishes between 3 main types of indicators and 8 innovation dimensions, capturing in total 25 different indicators. The Enablers capture the main drivers of innovation performance external to the firm and cover 3 innovation dimensions: Human resources, Open, excellent and attractive research systems as well as Finance and support. Firm activities capture the innovation efforts

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at the level of the firm, grouped in 3 innovation dimensions: Firm investments, Linkages & entrepreneurship and Intellectual assets. Outputs cover the effects of firms’ innovation activities in 2 innovation dimensions: Innovators and Economic effects.

According to IUS (IUS, 2015), “Spain is a moderate innovator. Innovation performance was improving steadily up until 2012, after which the innovation index has been in decline. For 2014 performance is at a significantly lower level than in 2007. Together with Romania, Spain is the only country with such a decline in performance. The country’s gap to the EU has increased over time. In 2008, the relative performance level was at its highest at 77% whereas in 2014 it has decreased to 69%. For most indicators, Spain is performing below the EU average. In relative terms, the weakest indicator is License and patent revenues from abroad. Performance in Open, excellent and attractive research systems comes close to the average performance of the EU, mainly because of strong relative performance in International scientific co-publications. Performance has improved most in the dimension of Open, excellent and attractive research systems (6.4%) and has decreased most in Finance and support and Firm investments. The single indicator that has improved most is International scientific co-publications (9.4%) and Venture capital investments (-17%) has declined most”.

In the Figure 6 the fall of Spain is observed from 2012 and the increase of the gap with the rest of EU28 countries. The result is that nowadays Spain occupies the twentieth position inside the "European Innovation" behind Portugal and Malta.
Another relevant indicator is published by the World Economic Forum (WEF). The WEF publishes from time to time the Global Competitiveness Index (GCI). It is structured in 12 basic pillars: institutions, infrastructure, macroeconomic environment, health and primary education, higher education and training, labor market efficiency, financial market development, technological readiness, market size, business sophistication and innovation. The last pillar contain 7 items: Capacity for innovation, Quality of scientific research institutions, Company spending on R&D, University-industry collaboration in R&D, Gov’t procurement of advanced tech products, Availability of scientists and engineers and PCT patents. The Figure 7 shows the last scores of Spain (WEF, 2015)

Also it emphasizes that the Spanish companies’ capacity for innovation has been reduced significantly (Figure 8). Specifically, it has gone from 29th in the world rankings to 55 in the last 10 years. All this despite Spain held 11th place worldwide in availability of scientists and engineers in 2014. It is remarkable to note how by some institutions, innovation capacity depends on the availability of scientists and engineers (WEF, 2015) and that spending on innovation activities described above, the expense of having trained this group is not contemplated.
DO AIMS JUSTIFY THE MEANS?

In any planning process, strategic, tactical or operative, the design and establishment of objectives is the first stage after the analysis of the situation. From there, there appear different alternatives that try to manage to reach, logically, the raised aims. It’s difficult to control a plan when the objectives are diffuse, too ambitious or simply his valuation is subjective,. Different methodologies can be observed in the establishment of national and regional RDI strategies in Spain.

The RIS3 Galicia indicators and metric of every instrument and objective try to converge towards a standard reference frame, concretely to the system established by the OECD for the design and evaluation of strategies of intelligent specialization to European level, facilitating this way the general monitoring, as well as the comprehension of the explanatory character of the strategy achievements. A Control panel realizes the evaluation. This is composed by Execution, Results and Impact indicators that will be updated permanently thanks to the monitoring that will be realized on the part of the Observatory of Innovation of Galicia. These indicators will evaluate by means of an objective value, a initial value and a actual value. The quantitative information of each one of them is not reflected in any of 168 pages of the analyzed document (XG, 2014).

Moreover, different methodologies are observed in establishing national and regional RDI policies. So, RIS3 Galicia is articulated around challenges and priorities (XG, 2014), while nationally, the National Strategy for Science and Technology is based on principles and strategic goals (FECYT, 2007).
Another important aspect is the transparency in the assignment, execution and evaluation of the planned expenditures. For example in the Boletín Oficial del Estado (official gazette) of December 31, 2015 (SEIDI resolution of 22 of December) a call of grants are published for doctors' incorporation in companies and other public and private entities. The term of request is until March, 2016 for a contracting from March, 2015 up to the date of resolution of the summons and the financing is chargeable to expenditures budgets of 2017 to 2020.

CONCLUSIONS AND RESULTS

Spanish innovation capacity has had a significant decrease during the last global economic crisis in relation to other neighboring countries. According to the WEF indicator “innovation capacity” Spain has moved from number 29th to 55th between 2006 and 2015 (WEF, 2015). So also it is stated respect the IUS where, for example, the ability to generate innovative products or processes by Spanish companies has fallen by 6.5 % in the last year (the average of the EU -28 fell by 1.7 %).

Although the European Union has set a goal of reaching 2020 to invest 3% of GDP in research and innovation between the public and private sectors (European Commission, 2014), Spain has dropped since 2009, when it stood at maximum of 1.35% , reaching 1.23% in 2014.

The process of coordination of the different RDI plans and policies in the different administrations (regional, national and European) needs a normalized methodology to be able to evaluate the results of objective form. Since it has been indicated, every administration designs an own methodology. For example, in the design of the RIS3 of Galicia there has been in use an own methodology that does not seem to line up with the national SEIDI.

Too many confusion exists in the language and exposition of the RDI calls of grant and subsidies. It gives the impression that they are directed to the managing entities that dominate the legal terminology and not to the investigative users of the same ones.

The Science, Technology and Innovation Spanish Advice Council has a representative majority of the scientific community and not so much of the technological one. This fact can be an example that the current system is more orientated to publications that to get industrial applications.

Speaking of RDI, it seems that the center of attention is the “I”, innovation; nevertheless, the technological innovation is obtained by means of the “D”, the technological development. When the measures of technological improvement are analyzed, an incorrect approach is observed in this area. For example, in the CEOE proposals (CEOE, 2014) about of Innovation in Spain, it just puts on the accent in improving the innovation and communication technologies (ICT) and the digital economy. It seems that other technologies do not exist and, therefore, it was not necessary to worry for promoting the applied research and the technological development not related to the ICT.

After decades of studies on innovation capacities, there are infinity of recommendations, most of them made in a vague way and without quantifying. In this line, according to the union CC.OO., “the document that articulates the Agenda for the Industrial Strengthening is replete with multitude of infinitives: to reinforce, to create, to promote, to help, to favor, to stimulate, to study, to guarantee, to reform …., lacking all of them of instruments, financing and plans of action for the development of the proposed actions, beside being exempt from concrete mechanisms of action that make them effective (CC.OO., 2015).
There has been verified that some call of grants and subsidies use financial resources of economic exercises later to the periods in those that will be used. Possibly it is a legal action based on a strategy of containment of the public deficit.

The information offered by the different analyzed indicators regarding innovation in Spain shows a clear setback. The ones related to capacities turn out to be acceptable enough (availability of engineers and scientists and quality of research resources), but not those who reflect the economic and social benefits. Bearing in mind that Europe has been and continues asking for continuous measures of economic adjustment to Spain and these adjustments have had a direct influence in the assignment of funds destined to improve the RDI systems, it is possible to conclude that the condition of the current situation has, between other probable reasons, the current politics of austerity.

In summary, at least three structural problems related to the Spanish RDI public politics are observed if the improvement of the industrial competitiveness is wished. First, there is an erratic planning regarding lack of coordination between the different Public Administrations. Secondly, the existence of call for grants and subsidies is poorly adapted to its purpose and specially focused on scientific publications and not on business results. Finally, there is a decrease of the public and private RDI funds.

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