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Research and Innovation Observatory Country Report 2016 France
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.

Contents

Foreword

This report offers an analysis of the R&I system in France 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 French 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 (Bitard and Zacharewicz, 2016).

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HIGHLIGHTS

- The French economy slowly recovers from the 2008 crisis with a +1.3% growth rate in 2015, led by household consumption as well as, to a lesser degree, by a pick-up in investment
- The French trade deficit is persistent. Few high-tech industries such as the aircraft or the aerospace industry were able to perform on international markets along with the cosmetic, agro-food and luxury industries. The French productivity is one of the highest in Europe.
- In terms of R&D expenditures, France's GERD has kept on growing in nominal terms since 2006. Within the EU28, France ranks second after Germany.
- The GERD to GDP ratio was 2.24% in 2014. France ranks 8th, above the EU28 average (at 2.03% in 2014), with a general increase of R&D intensity since 2007.
- While France has introduced a high number of policy reforms aimed to improve research performance over the last ten years, national levels remains at average stage both in quality and in quantity.
- According to the European Innovation Scoreboard 2016, France is within the group of "strong innovators" in terms of innovation performance.

MAIN R&I POLICY CHALLENGES

- **Simplify and improve the efficiency of innovation policy.** France presents a wide range of policy instruments and public organizations to foster innovation but shows an average performance in terms of innovation outputs. This mismatch between the number of policy instruments and their actual outputs has led to the implementation of a number of policy initiatives aimed to simplify and improve the efficiency of innovation policy.
- **Promote R&I policy evaluation.** Over the past 15 years, priority for innovation has led to a multiplication of policy instruments without sufficient stability and clarity of objectives. In that context, the lack of evaluation of the complete portfolio of policy instruments in support of research and innovation has been a repeated concern.This lack of regular evaluation induces difficulties for policy makers to assess their past decisions and ground their future policies. To tackle this issue, several evaluating organizations were recently created and stand as a step forward in the development of an evaluation culture.
- **Increase the quality of the public research base**. The average performance of public research is considered as a factor of continuing concern as the French scientific output has been moderate when compared to similar countries for the last ten years. Many reforms have recently been implemented to modify the public research structure. Successive governments have made substantial efforts to further influence research orientations, to increase the role of universities and foster the use of project funding.

MAIN R&I POLICY DEVELOPMENTS IN 2016

- Adoption of the French National Strategy on Research Infrastructure
- Preparation for the launch in 2017 (probably) of a third wave of investments for the future (PIA3)
- New fiscal rules on investments in SMEs with an accelerated amortization scheme for investors since 2015 (40M€)
- Additional development funds at BPI oriented towards large projects
- The Social Innovation Fund (Fonds d'Innovation Sociale or FISO)
- Launch of the Institutes Convergence (interdisciplinary research centres)

1. Main R&I policy developments in 2016

Adoption of the French National Strategy on Research Infrastructure	The Ministry of Higher Education and Research has updated its 'National Strategy on Research Infrastructures' report defining the roadmap for French National Research Infrastructures and their contribution to the European roadmap.
New fiscal rules on investments in SMEs	These new fiscal rules include an accelerated amortization scheme for investors since 2015 (40 M€).
Additional development funds at BPI oriented towards large projects	Additional development funds at BPI oriented toward large projects ("French Tech initiative" , "French Tech Accélération and Large Venture Funds") in some specific areas : health, digital, and environment (a 600M€ fund with 10 M€ tickets).
The Social Innovation Fund (Fonds d'Innovation Sociale or FISO)	The Social Innovation Fund ("Fonds d'Innovation Sociale" or FISO), with 40 M€ dedicated since 2015 to promote innovative solutions regarding unsatisfied socials needs
Institutes Convergences	Within the PIA2, a new call was launched in 2016 to set up new interdisciplinary research centres, called "Institutes Convergences". Five projects have been selected and a second call is currently open.

1.1 Focus on National and Regional Smart Specialisation Strategies

Description and timing. French regions have a substantial experience of managing local complex strategies between central state and regions ("Contrats de plans Etat-Région" or CPER), cities or local public operators (HEI, PROs, COMUE or IDEX mainly). The governance structures and mechanisms are designed to conciliate and agree on R&I priorities and led to two main regional documents: the SRESRI (Schéma Régional de l'Enseignement Supérieur de la Recherche et de l'Innovation) and the SREDEII (Schéma régional de développement économique, de l'innovation et de l'internationalisation. The recent S3 exercise led to a variety of results: some regions chose to specialize in very few technologies (Alsace for example) whereas some other regions (Rhone-Alpes or Britany) rather opted for a generalist approach[1]. Some sectoral activities seem however to be a compulsory relative specialization (e.g. Health, Energy).

New developments The French smart specialization policy was recently adapted following different important evolutions. These include:

- The elaboration of other national specialization strategies such as France-Europe 2020 (2013), Innovation 2030 (2013), "New Industrial France" (2013), National Research Strategy (2015)
- Recent bills (law ESR 2013, loi MAPTAM, 2014 and NOTRe in 2015) reinforced the leadership and competences of regional authorities.
- The recent merging of French regions

[1] The Smart Specialisation Strategies mentioned in this paragraph were developed prior to the reform of regions in 2016 and refer the previous regional classification.

Outstanding issues. The "commissariat général a l'égalité des territoires" (CGET) - an agency attached to the Prime Minister's Office that is responsible for coordination across the French government to ensure balanced regional development - has underlined the complementarity between the different national priorities and the regional smart specialization processes[2]. It highlights the importance of entrepreneurial discovery, of developing complementary products and services, of the openness on other regions, as well as of a sustained evaluation system.

On this basis, four challenges to smart specialization can be identified:

- Competitiveness clusters were based on local R&D dominant actors, either public or private and thus were based on trans-regional logic. One competitiveness cluster often belongs to several administrative entities. Differently, the recent smart specialization initiative adopted however an administrative region delimitation with some S3 specializations not always aligned with clusters in regions (See CGET, 2015).
- The S3 exercise needs to be consistent with other specialization strategies that have been designed centrally by the State. The bottom-up definition of smart specializations has then to handle with top-down orientations (e.g. "France Europe 2020" in 2013; "Innovation 2030" in 2013; "France industrial renaissance" in 2013, "National Research Strategy" in 2015).
- Recent bills (loi MAPTAM, 2014 and NOTRe in 2015) reinforced the leadership and competences of regional authorities especially in economic development and innovationThese bills strengthened the power of cities with more than 400 000 inhabitants and especially foster their role as incubators. Doing so it introduces potential tensions between strategies for smart cities and smart regions
- The transformation of public research driven by central state (IDEX, I-Site, Labex, Equipex, contracts with clusters of universities, schools and research organizations) may introduce some uncertainty in local choices.

2. Economic Context

The French economy slowly recovers from the 2008 crisis with a +1.3% growth rate in 2015, led by household consumption as well as, to a lesser degree, by a pick-up in investment. The unemployment rate started to decline at the end of 2015, reaching 9.9% in the second quarter of 2016. In this context, the French public deficit remained high at 3.5% of GDP in 2015 that is around 1.1pp higher than the EU average based on the European Commission Spring forecast (EC, 2016).

The French trade deficit is persistent with only few high-tech industries such as the aircraft and the aerospace industry performing well on international markets along with the cosmetic, agro-food and luxury industries. The French productivity is one of the highest in Europe but its growth rate has declined sharply since the 2008 crisis (EC, 2016).

2.1 Structure of the economy

The French economy is specialised in services that represent 79% of total value added in 2015, whereas manufacturing industry represents 11% of total value added. 52% of the added value achieved in business services is done In France by knowledge intensive service sectors (KIS) (EU average: 32% in 2014). In manufacturing, France is mainly specialised in transport equipment aerospace, aircrafts and pharmaceuticals industries but also in less technology intensive industries such as ground transportation goods, food industries or luxury products.

[2] http://www.cget.gouv.fr/sites/cget.gouv.fr/files/atoms/files/cget_sri_si_en-12-2015.pdf

2.2 Business environment

The French economy is relatively highly positioned in the World Bank ranking "Doing business 2016", where France was ranked 27th out of 189. 10 EU Member States were ranked higher (World Bank, 2016). France is in a median position among OECD countries regarding barriers to entrepreneurship.

The French financial system provides up to date and competitive solutions for start-ups and SMEs. The digital infrastructure in France is also well developed. The use of internet website, cloud computing, radio-frequency identification or the use of automated data exchange applications in supply chain management remains however lower than in other countries (EC, 2016; OCDE, 2015).

2.3 Supply of human resources

Regarding initial training, investments and performances are at the OECD average for primary, secondary and tertiary levels. Despite its highest participation rate in Europe, France has an average level of successfully completed tertiary education, similar to UK and Germany: 44% of the 25-34 year-old attained in 2014 a tertiary education level slightly higher than in other countries (OECD, 2015b). A relative specialization in engineering emerges at Master level. At PhD level, science and engineering are the dominating fields (14 400 PhD were delivered in 2014 with two-third in science and technology). The share of people working in S&T activities, or in creative activities are higher than in most of EU countries but female graduated still face difficulties to access to high-level jobs.

3. Main R&I actors

The governance of the French research and innovation system has been evolving over the last ten years with the objective of clarifying the system's functions. This clarification implies three levels of action, namely: i) policy-making, ii) implementation and iii) execution. In 2014, a specific mission of evaluation of innovation policies and of the innovation policy mix was assigned to the General Commission for Strategy and Economic Foresight by the Prime Minister,[3] and a related committee was installed.

At policy level, two main ministries share the responsibility for research and innovation policy in France. The **Ministry for Education, Higher Education and Research** (MENESR) designs and coordinates interministerial research policy on the basis of a committee including all research contributing ministries, main PROs and their clusters (Alliances), and the biggest research-oriented industries. The Prime Minister is assisted by a consultative body: the Strategic Research Council (established on 19 December 2013). The **Ministry for the Economy, Industry, and Digital Affairs** is responsible for industrial research and plays a specific role on the subject of business R&D. Innovation policies are shared by the two ministries. In addition, under the direct authority of the Prime Minister, the **High Commission for Investments** (CGI)[4] plays since 2010 a leading role through the investments for the future (PIA).

At operation level, the French research and innovation system is structured around a number of agencies. The vast majority of public funding of research originates from a single interministerial budget, the MIRES (Mission interministérielle recherche et enseignement supérieur). It encompasses ten large programmes; half of them are being run by the Ministry for Education, Higher Education and Research, while the budget is

[3] « La commission d'évaluation des politiques d'innovation créée au sein du Commissariat général à la stratégie et à la prospective », Press Release, Prime Minister, 4 november 2014.
[4] CGI supervises the activities of executive agencies responsible for the implementation of the PIA programme.

implemented through hundreds of "operators". Among the main agencies, the **National Research Agency (ANR)** was created in 2005 to fund research projects on a competitive basis and through public-public and public-private partnerships. The ANR covers basic research, applied research, innovation and technology transfer. The **Agency for Environment and Energy Management (ADEME)** was created in 1991 to support and fund environment and energy research. ADEME's missions consist in promoting, supervising, coordinating, facilitating and carrying out activities aiming at protecting the environment and improving energy savings. In addition to these research agencies, **Bpifrance** (which replaced OSEO), the public investment bank (as of 31 December 2012), provides support for R&D and innovation projects to businesses, especially SMEs.

The main public research performers are higher education institutions (HEIs), which comprise a group of about 70 universities and some "Grandes Ecoles"[5] spending €7.6B R&D expenditure in 2013. Besides, €9.2B are done by PROs, with such as the **National Centre for Scientific Research** (CNRS) had a budget of €3.3B in 2014, while the budget for civilian research of the **Alternative Energies and Atomic Energy Commission** (CEA) amounted to €2.6B in 2014. Other large PROs include the **National Institute for Agricultural Research** (INRA), the **National Institute for Computer Science and Automation** (INRIA), and the **National Institute for Health and Medical Research** (INSERM).

4. R&I trends

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

Total GERD in France was €48,643 M in 2015. There are three main sources of R&D funding: the business sector (€26,669 M, 2014), the government sector (€16,573 M, 2014), and the foreign funding (€3,731 M, 2014).

The public sector is the main recipient of government-funded GERD and these allocations have increased significantly from 2005. Direct contribution from the government to the business R&D is limited, although has constantly been increasing from 2009.

The total GERD has increased almost linearly in the period 2005-2015. The effect of the 2008-2009 crises is not very visible on the total GERD due to the increase of the funding from the business and private non-profit sectors from 2008 onwards. The private sector thus remains the largest source of funds for the French GERD. The direct funding from the government has essentially been stagnating over the last few years and the levels of 2012 are approximately the same as in 2008-2009. The EC contribution represents a much more marginal share of the French GERD with respect to the public and private sectors.

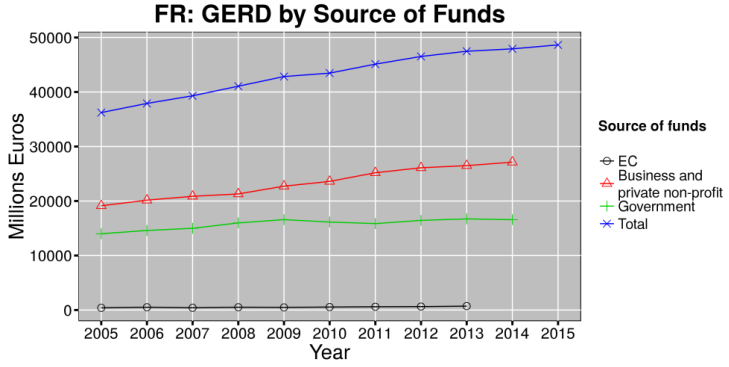

Figure 1 Development of government funding of the total GERD. Data source: Eurostat, 2016.

[5]According to their Association, there are 221 Grandes Ecoles in France in 2016.

In addition to direct R&D funding, France offers research tax credit since 1983. In 2008 there was a major reform of the French R&D tax credit (the Crédit Impôt-Recherche, CIR). allowing companies to benefit from a tax reduction for a large range of research-related spending. The tax credit covers up to 30% of R&D expenses. The foregone revenue due to R&D tax credit has passed from €1,802M in 2007 to €5,600M in 2013. As such, taking into account this indirect measure, the public share in the funding of R&D activities gets close to 50%, when it reaches 30% for other comparable European countries (Germany, UK). This measure has made the French tax credit scheme one of the most generous in the world. In addition to the CIR, other R&D tax incentives have been developed in France such as the innovation tax credit (Crédit Impôt Innovation, CII, 2013). The policy measures regarding tax incentives developed since 2008 are oriented towards the promotion of innovation, through three different channels. The first one consists of achieving better technology transfer from PROs and R&D networking to private companies. The second one aims to complement the existing R&D-based innovation policies by non-R&D based innovation policies. Finally, the creation of start-ups is also targeted[6].

4.2 Private R&D expenditure

Business R&D increased from 1.27% to 1.45% of GDP between 2005 and 2015. The increase took place after 2008 and the economic and financial crisis does not seem to have had a negative impact on overall business intensity as most of the increase occurred after 2008 (BERD was then 1.29% of GDP).

With a R&D intensity passing from 0.75% GDP in 2007 to 0.74% GDP in 2013, manufacturing has remained relatively stable over the last decade. It performed a bit more than half of French business R&D in 2014. To the contrary, services have since 2007 constantly increased their R&D intensity from 0.49% GDP to 0.67%.

Within manufacturing, the sub-sector of computer, electronic and optical products (C26) is the most important research performer and accounts for about €3,669m of BERD expenditure in 2013. It has constantly increased since 2010 (€3,090m). According to the 2015 European Industrial R&D Scoreboard, in this domain, the largest French based R&D performers are Alcatel-Lucent (ranked 17th), Schneider (41st), Orange (52nd), Ubisoft Entertainment (68th) and Dassault Systèmes (73rd).

Aerospace and defence (C30) on the one hand and automotive (C29) on the other are the other main branches of R&D in manufacturing, accounting for about €5,297m in 2013 and in constant increase since 2009. During this period, the R&D expenditure in this two sectors rose by 36% and 15%. According to the 2015 European Industrial R&D Scoreboard, the main French companies in these fields are Peugeot (16th), Renault (20th) Valeo (47th) and Michelin (54th), and Safran (29th), Thales (65th), Dassault Aviation(66th) and Zodiac Aerospace (97).

[6] This classification is adapted from the analysis provided by CNEPI (2016).

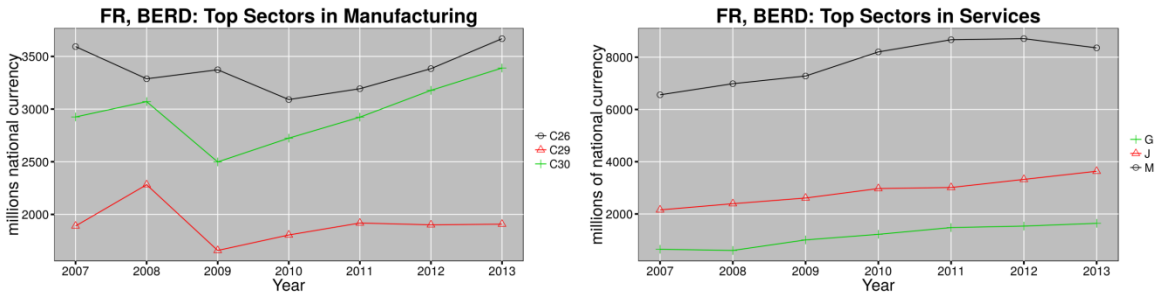

Figure 2 Manufacturing top sectors in manufacturing (C26=manufacture of computer, electronic and optical products; C29=Manufacture of motor vehicles, trailers and semi-trailers; C30=Manufacture of other transport equipment). Services top service sectors (J=info information and communication, G=wholesale and retail trade; repair of motor vehicles and motorcycles, M=professional, scientific and technical activities)

As far as the services are concerned, we notice an upward trend from 2007, in spite of the economic crisis. This can be attributed to the growth of professional, scientific and technical activities that passed from a BERD expenditure of €6.500m in 2007 to €8350m in 2013. A decrease is however observable between 2012 (€8700 M) and 2013.

The two sectors of (1) information and communication and (2) wholesale and retail trade; repair of motor vehicles and motorcycles have also been constantly increasing over the observed period. Their respective BERD expenditures evolved from €2150 million to €3600m and from €648m to €1600m between 2007 and 2013.

4.3 Public sector innovation and civil society engagement

France is together with Hungary the less innovative country regarding public innovation developed in-house (EC, 2013). Simultaneously, the share of human resources specialized in science and technology in the French public administration is one of the weakest in Europe, far behind Scandinavian countries (EC, 2013)

Despite these considerations, France is at a leading position both in Europe and in the world concerning e-government. It stands at the fourth just after Korea, Australia and Singapore (UN, 2014)[7]. Similarly, France is also a leading country regarding the use of internet by citizens or private companies to interact with public authorities (OECD, 2015).

The access and use of public e-services goes along with some efforts to provide a more systematic access to public data (see www.data.gouv.fr) likely to improve the transparency of public projects and outcomes. This initiative is meant to produce spill-over effect and allow the design of novel services and the development of new methods and governance.

The participation of the policy level (including civil society) to scientific debates is primarily done through OPECST (parliamentary office for the evaluation of scientific and technical choices). The participation is particularly developed in some fields such as bioethics where specific public bodies are operating[8]. In addition, during the elaboration of the national research strategy (SNR), a large public consultation was open.

The involvement of civil society in the different debates is generally channeled through the different stakeholders involved in R&I such as research organizations, universities, associations[9], participatory science platforms, science centers and museums. It is worth noting that emerging practices fostering innovation are being developed in "third places"

[7] http://www.unpan.org/egovkb/global_reports/08report.htm
[8] E.g. Le Comité consultatif national d'éthique (CCNE at http://www.ccne-ethique.fr/
[9] E.g. http://sciencescitoyennes.org/ or https://amcsti.fr/fr/

(such as living labs, fab labs, websites, etc.) by mixing different communities of professionals (researchers, artists, industrials, citizens, etc.)[10]

5. Innovation challenges

5.1 Challenge 1 Simplify and improve the efficiency of innovation policy

Description

France implemented a wide range of policy instruments and public organizations to foster innovation. The *Crédit Impôt Recherche*, the R&D tax credit, the Young innovative company scheme, the Investments for the Future Programme or the newly created public investment bank *BPIFrance* (as of November 2013) are the most well-known examples of the 63 policy initiatives designed to support investment in RDI (CNEPI,2016). These instruments have fostered R&D investments but yielded mixed results so far: France shows a relatively low level of employment in knowledge-intensive activities (14thposition in the European Innovation Scoreboard 2016), of knowledge-intensive services export (10th position) and of SMEs introducing product or process innovations (13th position), highlighting limitations in its innovation capacity. French manufacturing firms were 20% less likely to engage in product or process innovation than their German counterparts in 2012 (Council, 2015).

This mismatch between the number and cost of policy instruments to support research and innovation and their actual outputs has raised a number of critics in the last few years (Beylat & Tambourin, 2013; OECD, 2014a; RIO France, 2015; IGF, CGEDD, CGE, 2015; European Commission, 2015c; Berger, 2016; European Commission, 2016a; European Commission, 2016b). This issue has also been recently highlighted by the CNEPI (2016a), in its review of 63 assistances schemes. The fragmentation and overlap of R&I support measures are often pointed out as well as their excessive complexity (Council, 2015, 2014). The French R&D tax credit system is in particular under scrutiny for its high budgetary cost (around 0.26% GDP) (OECD, 2014). Taking steps to simplify and improve the efficiency of innovation policy is widely considered as necessary (Beylat & Tambourin, 2013; CNEPI, 2016; IGF, 2015; OECD, 2014; RIO Report – France 2015).

Policy response

Over the last years, the French government has adopted a set of different organizational strategies to streamline its innovation policy.
A first one has consisted in suppressing some innovation support schemes. The French Small Business Act (launched in 2008) targeting innovating SMEs was stopped in 2013. Similarly, the "plan Gazelle" scheme on fast growing SMEs was suppressed in 2014 and the Strategic Industrial Innovation Program (ISI), stopped in in 2015. These assistance schemes were actually replaced by other policy tools overtime and thus did not represent a net decrease of procedures.
A second practice to improve the coordination of innovation policy consists of concentrating the management of innovation policy measures. Since 2015, most of the new tools were given to the ANR, BPI, CDC and ADEME who are the main actors of the French system today (CNEPI, 2016).
To complement this concentration of management activities, a merge of several managing bodies has been implemented. The two organisations OSEO and BDPME were merged in 2013 to create the public investment bank BPI France in 2013. Similarly, the High Council for Science and Technology (HCST) and the High Council of Research and Technology (CSRT) were replaced by the Strategic Research Council (SRC) in 2013. Another example is the progressive merging of Public Research Organisations into Poles of Excellence (IDEX, e.g. in Bordeaux, Strasbourg or Marseille in 2016). At government level, an inter-ministerial coordination commission for technology transfer and

[10] E.g. http://sciencescitoyennes.org/ or https://amcsti.fr/fr/

innovation (Coordination inter-ministérielle du transfert et de l'innovation or C2IT) was created in 2014. It gathers the different stakeholders representing the main central policy makers[11] plus the Association of French Regions (ARF).

Policy Assessment

Some efforts are being made both to simplify and to improve the efficiency of most RDI support measures. While a substantial number of policy initiatives have recently been taken in this aim, the overall system is however still excessively complex. At the same time, new programmes are developed and implemented on a regular basis[12].

5.2 Challenge 2 Promote R&I evaluation

Description

As presented in challenge 1, France has developed and implemented a high number of policy measures to promote research and innovation activities. While the progressive expansion of these policy schemes has been accompanied by multiple monitoring mechanisms aimed at controlling their legal compliance, the alignment of their achievements with their original objectives and their general consistency, impact evaluations, comparison of policy schemes, counterfactual analysis and benchmarking remain marginal[13]. This prevalence of audit mechanisms over impact assessment evaluations has led the European Commission (2015, 2016e), the Council (2014) and national French experts (e.g. Lauvergeon, 2014; Beylat and Tambouring, 2013) to express a repeated concern for the need of evaluating the complete portfolio of R&I policy instruments. A sound impact assessment of R&I policy schemes would allow to ground future policy developments on evidence related to the effect of previous R&I instruments.

Policy response

Over the past years, the creation of several evaluating organizations highlights a will to tackle the issue both at research and innovation level. The High Council for Research and Higher Education Evaluation (HCERES) was founded in 2013 in substitution of a previous French Evaluation Agency for Research and Higher Education (AERES) to evaluate research and higher education institutions, PROs, research units, higher education programmes and degrees. Regarding innovation, the National Commission for the Evaluation of Innovation Policies (CNEPI) was settled in 2014, as foreseen in the roadmap "A New Deal for Innovation" released one year before.[14] The main purpose of the CNEPI consists of evaluating innovation policies and identifying their economic impact, of analysing their consistency taking into account the rest of innovation support measures, to suggest new ways of increasing innovation policy efficiency and to promote good practices at national and regional level. Two important reports have been already published on the R&I system (e.g. CNEPI, 2016a) and on the PIA initiative (CNEPI, 2016b).

[11] The MENESR - Direction général de la recherche et de l'innovation (or DGRI), the MENESR-Direction générale des entreprises (DGE), the differentministriesdealingwith innovation schemes and the CGI.
[12] For a synthetic presentation of the French support measures to innovation, see CNEPI (2016), p. 28.
[13] A noteworthy recent exception is the IGF-CGEDD-CGE report (2015) in which the economic impacts of different innovation policy expenditures are compared.
[14] http://proxy-pubminefi.diffusion.finances.gouv.fr/pub/document/18/16212.pdf

Policy Assessment

In a context of simplification and downsizing of the number of assistance schemes, impact evaluations are required both ex ante and ex post to select the best tools and improve them. In this respect, a simplification without a sound assessment of innovation policies could be worse than a slow and cogent transformation. The creation of the CNEPI and the HCERES are initiatives aiming to link policy making to analysis and stand thus as a first step forward in the development of an evaluation culture.

5.3 Challenge 3 Increase the quality of the public research base

Description

The French research landscape is traditionally dominated by large Public Research Organizations (the largest of which is the National Centre for Scientific Research). The performance of public research is considered as a factor of continuing concern (EC, 2015). France's scientific output is in a moderate position when compared to similar countries (OECD, 2014). In terms of number of publications, France remains behind the United Kingdom and Germany, but shows better performance than Italy and Spain. This position has not changed in the last decade (OECD, 2014). In terms of research quality, the share of national publications among the top-10% most cited publications is one of the most commonly used impact indicators to compare performance across countries . As of 2012, it has reached 11.9%, but France lags behind the main European scientific countries such as Germany (13.0%), the United Kingdom (13.3%), the Netherlands (15.7%) and Denmark (15.6%). It is slightly ahead of Italy (11.4%) and Spain (10.9%) (OECD, 2014). The share of grants awarded per country by the European Research Council provides comparable results: with percentages around 12% to 13% over the period 2007-2012, France stands behind the UK, Germany and Northern European countries and shows better results than Southern Europe (OECD, 2014). France therefore appears to hold an intermediate position both in terms of quantity and quality of its scientific publications.

Policy response

Many reforms have recently been implemented to modify the public research structure. This is meant to positively affect scientific performance. Successive governments have made substantial efforts to further influence research orientations, to increase the role of universities and foster the use of project funding. One of the most important policy decisions in this regard was the creation of the National Research Agency (ANR) in 2005. Its role consists in allocating competitive funding to PROs and universities, thus complementing their budget allocation. Through this allocation of funding and the management of the Investments for the Future Programme from 2009 onwards, the ANR has been playing a central role in the implementation of the national strategic research priorities. The rise of the ANR and its competitive programs also may have contributed to the reorientation of resources toward best performers. The share of project funding has been increasing, from 7% in 2008 to 12% in 2012 for universities and from 7% in 2008 to 10% in 2012 for PROs (Futuris-ANRT, 2013; OECD, 2014). The rise of thematic calls also orientated the resources toward specific fields were knowledge production is found particularly relevant for the future French competitiveness and welfare. Hence, the policy for quality has also been the opportunity for authorities to orientate best researchers, especially toward environmental questions and the energy transition. In addition, the Investment for Future programme (Plan Investissements d'Avenir) launched in 2010 developed several initiatives aimed to foster research excellence: Excellence Initiative (Idex), Excellence Equipments (Equipex), Excellence Laboratories (Labex), University Hospital Institutes (IHU) dedicated to health research and Institutes of Technological Research (IRT). A professionalization of French doctoral schools can also be observed with a more careful and professional monitoring of PhD candidates. The 2016 reform of the PhD track complemented this evolution. The main change is the introduction of a

PhD committee for each PhD candidate. This committee sets the possibility for candidates not to depend exclusively on a single advisor and to be advised from experts outside the laboratory or the doctoral school.

Policy Assessment

Compared to other EU countries, France's scientific impact has not substantially improved over the last 10 years, indicating that the reforms undertaken to date have had a limited effect on scientific output (OECD, 2014). Several bottlenecks have been identified, among which the low level of competitive funding and the lack of quality related criteria in allocating funds to public institutions (EC, 2015). Although the share of project funding has been increasing, from 7% in 2008 to 12% in 2012 for universities and from 7% in 2008 to 10% in 2012 for PROs (Futuris-ANRT, 2013; OECD, 2014), France is still among the OECD countries with the lowest proportion of this type of funding. The efforts towards merging research organisations tackles an issue related to reaching a critical size and not directly quality concerns. . So far, the process has proven slow, complex and uncertain, with an allocation of resources conducted in a a context of constant budgets for research (CNEPI, 2016a; CNEPI, 2016b). . Finally, the various functions of steering, funding, implementing and evaluating into the PROs are also likely to be suboptimal.

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.

Public procurement in France represents €80b per year (€40b coming from Ministries and State bodies, €20b from hospitals and €20b from local and regional authorities). Five Ministries (Defence, Environment, Home Affairs, Finance and Justice) totalise 90% of Ministries public procurement contracts.

In 2008, the Law on the modernization of the economy included a provision to promote the participation of innovative SMEs in the procurement of high technology, research and development. SMEs obtained a preferential treatment when the amount of their purchase was below the threshold for formal competitive bids. In 2012, the rapport Gallois went further, requiring to assign 2% of all procurements to SMEs.

The scheme was systematized and reinforced through the 2014 EU regulation and its subsequent transposition in the French code on public procurement (Articles 93, 94 and 95 in Decree number 2016-360).

The French policy regarding PPI-related policy actions is managed at national level through two main channels: the launch in 2014 of an internet platform (plateforme des achats d'innovation) dedicated to innovation procurement by SMEs and the use of the centralized public purchasing body (UGAP) to lever public procurement for innovative SMEs. In 2015, innovation procurement represented 52 M€ and only 2.2% of total UGAP procurements.

Private demand stimulation is also supported through direct schemes. The energetic transition is for example actively incentivized through demand subsidies, VAT tax rebates on product and services, zero interest loans and tax incentives. Rewards are provided when old technologies are abandoned and/or a green technology is adopted. Complementary schemes can be found also at regional and city level: in more than 30 cities in France, direct grants to buy electric bikes are offered. The empowerment of users is also done by the administration through crowdsourcing platforms and by the emergence of numerous "fablabs" and "living labs". Whereas some recent schemes such

as the French Tech instrument support some fablabs in digital fields, there is no centralized policy in the specific domain.

Regulation is used to directly influence demand. A law on energetic transition requiring transportation services (e.g. public buses, taxi, rental fleets) to buy at least 50% of low emission vehicles before 2020 and 100% before 2025 was for example adopted in 2015.

References

Berger S., Dorman R., Starbuck, H. (2016). Reforms in the French Industrial Ecosystem. Rapport à Monsieur le Secrétaire d'Etat à l'Enseignement Supérieur et à la Recherche Monsieur le Ministre de l'Economie, de l'Industrie et du Numérique. http://cache.media.enseignementsup-recherche.gouv.fr/file/Actus/73/9/Reforms_in_the_French_Industrial_Ecosystem_(fr)_539739.pdf

Beylat J.L., Tambourin P. (2013), *L'innovation : un enjeu majeur pour la France - Dynamiser la croissance des entreprises innovantes, Mi*nistry for Economic Regeneration, Ministry for Higher Education and Research, April.

Bitard, P., Zacharewicz, T. RIO Country Report 2015: France. EUR 27949 EN; doi:10.2791/20335

Commission Nationale d'Évaluation des Politiques d'Innovation (CNEPI) (2016). Quinze ans de politiques d'innovation en France, Janvier 2016. http://www.strategie.gouv.fr/sites/strategie.gouv.fr/files/atoms/files/fs_rapport_cnepi_21012016_0.pdf

Council of the European Union (2015), COUNCIL RECOMMENDATION of 14 July 2015 on the 2015 National Reform Programme of France and delivering a Council opinion on the 2015 Stability Programme of France

Council of the European Union (2014), COUNCIL RECOMMENDATION of 8 July 2014 on the National Reform Programme 2014 of France and delivering a Council opinion on the Stability Programme of France.

Council of the European Union (2013), COUNCIL RECOMMENDATION of on the national Reform Programme 2012 of France and delivering a Council opinion on the Stability Programme of France, 2012-2016.

CNEPI (2016a). Quinze ans de politiques d'innovation en France. Rapport. Janvier. France Stratégie. http://www.strategie.gouv.fr/sites/strategie.gouv.fr/files/atoms/files/synthese-cnepi.pdf

CNEPI (2016b). Programme D'investissements D'avenir Rapport Du Comité D'examen À Mi-Parcours CNEPI, Rapport. Mars France Stratégie. http://www.strategie.gouv.fr/sites/strategie.gouv.fr/files/atoms/files/29-03-2016-rapport_comite_pia_1.pdf

European Commission (2015). Country Report France 2015 - Including an In-Depth Review on the prevention and correction of macroeconomic imbalances. SWD(2015) 29 final Commission Staff Working Document. http://ec.europa.eu/europe2020/pdf/csr2015/cr2015_france_en.pdf

European Commission (2016a). Country Report France 2016 - Including an In-Depth Review on the prevention and correction of macroeconomic imbalances. SWD(2015) 29 final Commission Staff Working Document. http://ec.europa.eu/europe2020/pdf/csr2016/cr2016_france_en.pdf

European Union, (2016b). Council recommendations on the 2016 national reform programme of France and delivering a Council opinion on the 2016 stability programme of France. Brussels. May.

European Commission (2016c). European Innovation Scoreboard 2016. http://ec.europa.eu/DocsRoom/documents/17822/attachments/1/translations/en/renditions/native

European Commission (2016d). Integration of Digital Technology, Europe's Digital Progress Report 2016. http://ec.europa.eu/newsroom/dae/document.cfm?action=display&doc_id=15811

European Commission (2016e). Country Report France 2016 - Including an In-Depth Review on the prevention and correction of macroeconomic imbalances. SWD(2015) 29 final Commission Staff Working Document. http://ec.europa.eu/europe2020/pdf/csr2016/cr2016_france_en.pdf

European Commission (2015). Commission Staff Working Document 2015. COM (2015) 85 final

European Commission (2013). European Public Sector Innovation Scoreboard 2013, A Pilot Exercise. European Commission. Bruxelles.

IGF, CGEDD, CGE, 2015. Revue de dépenses sur les aides à l'innovation. Rapport, juin.

OECD (2014) Examen de l'OCDE des politiques d'innovation en France. http://www.oecd-ilibrary.org/science-and-technology/oecd-reviews-of-innovation-policy-france-2014_9789264214026-en

OECD (2015), OECD Science, Technology and Industry Scoreboard 2015: Innovation for growth and society, OECD Publishing, Paris.

OECD (2015b). Education at a Glance, 2015. OECD, Paris.

United Nations (2014). United Nations E-Government Survey 2014. E-Government For The Future We Want. Department of Economic and Social Affairs. ST/ESA/PAD/SER.E/188. United Nations. New-York.

World Bank. 2016. *Doing Business 2016: Measuring Regulatory Quality and Efficiency*. Washington, DC: World Bank. DOI: 10.1596/978-1-4648-0667-4. License: Creative Commons Attribution CC BY 3.0 IGO

List of abbreviations and definitions

ADEME	Agency for Environment and Energy Management (Agence pour l'Environnement et la Maîtrise de l'Énergie)
ANR	National Research Agency (Agence Nationale de Recherche)
BERD	Business Expenditures on Research and Development
BPI	Public Investment Bank (Banque Publique d'Investissement)
CDC	Court of Auditors (Cour des Comptes)
CEA	Atomic Energy Commission (Commissariat à l'Énergie Atomique)
CII	Innovation Tax Credit (Crédit Impôt Innovation)
CIR	Research Tax Credit (Crédit Impôt Recherche)
CIS	Community Innovation Survey
CNEPI	National Commission for the Evaluation of Innovation Policies (Commission National d'Évaluation des Politiques d'Innovation)
CNRS	National Centre for Scientific Research (Centre National de la Recherche Scientifique)
CSR	Country Specific Recommendations
DESI	Digital Economy and Society Index
IDEX	Excellence Initiative (Initiative d'Excellence)
EC	European Commission
EU	European Union
EU-28	European Union including 28 Member States
FDI	Foreign Direct Investment
GBAORD	Government Budget Appropriations or Outlays on R&D
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditures on R&D
GOV	Government
HCERES	French Evaluation Agency for Research and Higher Education (Haut Conseil de l'Évaluation de la Recherche et de l'Enseignement Supérieur)
HCST	High Council for Science and Technology (Haut Conseil pour la Science et la Technologie)
INRA	National Institute for Agricultural Research (Institut National de la Recherche Agronomique)

INSERM	National Institute for Health and Medical Research (Institut National de la Santé et de la Recherche Médicale)
KIS	Knowledge Intensive Sectors
MENESR	Ministry for Education, higher Education and Research
NGO	Non-governmental Organization
OECD	Organisation for Economic Cooperation and Development
PCP	Pre-commercial Procurement
PPI	Public Procurement for Innovation
PRO	Public Research Organisation
R&D	Research and development
R&I	Research and innovation

Factsheet

	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
GDP per capita (euro per capita)	30000	30800	31500	31800	32100	32300	32800	
Value added of services as share of the total value added (% of total)	78.49	78.62	78.33	78.49	78.53	78.7	78.76	
Value added of manufacturing as share of the total value added (%)	11.51	11.25	11.37	11.33	11.35	11.14	11.23	
Employment in manufacturing as share of total employment (%)	10.92	10.43	10.25	10.15	10.03	9.89	9.73	
Employment in services as share of total employment (%)	78.01	78.64	78.92	79.08	79.23	79.49	79.83	
Share of Foreign controlled enterprises in the total nb of enterprises (%)	0.76	0.71	0.79	0.69	0.84			
Labour productivity per hour worked (Index, 2010=100)	98.5	100	101.1	101.4	102.9	103.8	104.3	
New doctorate graduates (ISCED 6) per 1000 population aged 25-34					1.25	1.22		
Summary Innovation Index (rank)	13	13	13	13	14	14	14	
Innovative enterprises as a share of total number of enterprises (CIS data 2012) (%)				53.4				
Innovation output indicator (Rank, Intra-EU Comparison)			7	7	8	7		
Turnover from innovation as % of total turnover (Eurostat)		11.3		13.5				
Country position in Doing Business (Ease of doing business index WB)(1=most business-friendly regulations)						27	27	29
Ease of getting credit (WB GII) (Rank)						65	69	
Venture capital investment as % of GDP (seed, start-up and later stage)	0.048	0.042	0.035	0.032	0.037	0.035	0.034	
EC Digital Economy & Society Index (DESI) (Rank)						14	14	16
E-Government Development Index Rank		10				4		10
Online availability of public services – Percentage of individuals having interactions with public authorities via Internet (last 12 months)	47	57	57	61	60	64	63	
GERD (as % of GDP)	2.21	2.18	2.19	2.23	2.24	2.24	2.23	
GBAORD (as % of GDP)	0.9	0.82	0.82	0.73	0.71	0.69	0.65	
R&D funded by GOV (% of GDP)	0.86	0.81	0.77	0.79	0.79	0.77		
BERD (% of GDP)	1.36	1.37	1.4	1.44	1.45	1.45	1.45	
Research excellence composite indicator (Rank)				10				
Number of scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country		10.8	10.86	11.08				
Public-private co-publications per million population	37.56	39.98	42.74	40.67	40.34	39.61		
World Share of PCT applications	4.54	4.34	4.06	4.05	3.88	4.12		

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