KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

UNIA EUROPEJSKA
EUROPEJSKI
FUNDUSZ SPOŁECZNY

ZAGADNIENIA INNOWACYJNOŚCI FUNKCJONOWANIA SYSTEMU BADANIA + ROZWÓJ W NAUCE

Redaktor naukowy
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Projekt: „INNOWACYJNE ZARZĄDZANIE SYSTEMEM B+R W JEDNOSTKACH NAUKOWYCH" jest współfinansowany ze środków Unii Europejskiej w ramach Europejskiego Funduszu Społecznego 4.2. "Rozwój kwalifikacji kadr systemu B+R i wzrost świadomości roli nauki w rozwoju gospodarczym"

Wyższa Szkoła Informatyki Stosowanej i Zarządzania, 01-447 Warszawa, ul. Newelska 6, tel.: 22 3486523

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Projekt Programu Operacyjnego Kapitał Ludzki.

„Innowacyjne zarządzanie systemem B+R w jednostkach naukowych"

Priorytet IV Szkolnictwo Wyższe i Nauka.

Działanie 4.2. Rozwój kwalifikacji kadr systemu B+R i wzrost świadomości roli nauki w rozwoju gospodarczym.

Podnoszenie umiejętności pracowników systemu B+R w zakresie zarządzania badaniami naukowymi i pracami rozwojowymi oraz komercjalizacji rezultatów prac badawczych – w tym również w zakresie ochrony własności intelektualnej i przemysłowej.

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Artykuły gości zagranicznych

Research and innovation in France

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1. Some figures

With 65 millions inhabitants and 64 millions French citizens, France is a medium-sized country with an economy in the EU average (107 % of the EU-27 average GDP per capita in purchasing power standards in 2008).

France spent 37.9 G€ in 2006 in R&D expenditures i.e. 2.1 % of GDP in 2006. It is more than the EU-27 and OECD averages but this share decreased these last years. The last estimation for 2007 is 39.4 G€.

In terms of R&D funding (38.6 G€ in 2006 i.e. 2.14 % of GDP in 2006; 2007 estimation: 40 G€), 0.97 % come from government and not-for-profit organisations and 1.17 % from companies (cf. Table 1).

[1] UPMC is a university dedicated to science and medicine. It was established in 1970 when the government decided to transform the former *facultés de science et de médecine* of *Université de Paris* into modern, independent and stand-alone institutions of higher education.
UPMC was named after the famous two scientists of the beginning of the 20th Century Pierre Curie and Marie Skłodowska born in Warsaw, Poland – then occupied by Russia – who both studied at the *Faculté des Sciences de Paris* before getting married, discovering radioactivity and receiving the Nobel Prize in Physics in 1903 with Henri Becquerel. Pierre Curie died in 1906 but Marie got the Nobel Prize in Chemistry in 1911.
UPMC is mainly located in downtown Paris on the campuses of Jussieu and *Les Cordeliers* but also in associated hospitals (Pitié-Salpêtrière, Saint-Antoine, Quinze-Vingt, Tenon, Trousseau) UPMC also operates 3 *marine stations*: Roscoff in Brittany, Banyuls in French Catalunya and Villefranche on the French Riviera.
Around 30,000 students enrol every year at UPMC, 25 % of them are international students coming from 120 countries. UPMC has a large doctoral institute with more than 3,500 PhD students (1,120 international) and grant 700 PhD in science every year.

Table 1. Research in France (2006).

Research Funding in France	38.6 G€	2.14 % of GDP
Public sector public and not-for-profit	17.5 G€	0.97 %
Companies	21.2 G€	1.17 %
Research Funding coming from abroad	2.7 G€	
Research Expenditures in France	37.9 G€	2.10 % of GDP
Public sector public and not-for-profit	14.0 G€	0.77 %
Companies	23.9 G€	1.32 %
Research Expenditures spent abroad	3.4 G€	

2. France, the Lisbon strategy and the Barcelona target

In the framework of the 2000 Lisbon strategy, as many European state members and as the EU itself, France decided to try to reach the Barcelona target, i.e. to dedicate 3 % of its GDP to R&D activities.

Actually, R&D intensity has not increased since 2000 and France has made hardly any progress towards the Barcelona target. This is not surprising as the share of the GDP of a country dedicated to R&D is largely dependent on the structure of the economy: the larger are the manufacturing and especially high tech sectors, the larger is this share.

With a strong service industry (financial services, retail industry, tourism...), a very well developed agriculture and agro-food business and a powerful energy, construction and material sectors, a large part of the French economy is not research intensive. The automotive and ICT industries depend more on high technologies but their part in the French economy is not as large as in Germany or in Japan. On the other hand, the pharmaceutical industry and the aeronautics and defense business are not as large as in the United States.

A few years after its inception, the Barcelona target does not appear as relevant as initially thought. A higher share of GDP dedicated to research requires an actual structural change in the economy with a strong evolution of some players.

3. The main R&D players in France

Due to its long history in science and technology, France has a large number of distinct R&D players acting at the different levels of the French research and innovation system. If agencies dedicated to research funding only (*programming level*) are indeed quite recent, universities are the oldest players at the *research operation level*. Some « grandes écoles » are also involved in research. National research organisations play a role at different levels: some of them take a central part in the definition of the *national*

research strategy (especially for the nuclear energy and space), act as well as funding agencies and, in the same time, are also direct research operators.

4. Institutions of Higher Education

Universities

French Universities are among the oldest universities in the world. King Philippe-Auguste chartered *Université de Paris* (*La Sorbonne*) in 1214. The School of Medicine in Montpellier created in 1220 is one of first to be created in the Western World. French Universities went through a lot of changes especially since the beginning of the French Revolution when they were simply closed. In 1806, Napoléon created a unified and very centralized national university system and universities had to wait until 1970 to get some autonomy.

There are now 83 universities in France. In large cities with a long-established university tradition, there are generally from 2 to 4 non-comprehensive universities. They were set up in 1970 by taking into account the boundaries between academic disciplines. In smaller cities, there is one single institution, generally a comprehensive university.

There are about 25 actual research universities in France, most of them located in large university cities. Along with CNRS, CEA, INSERM and INRIA (*cf. infra*) they are the main players on the public research scene.

Grands établissements and Grandes écoles

Most famous French *Grands établissements* or *Grandes écoles* were created by the successive French governments outside universities because they considered that these universities were not involved enough in modern or practical science (*Collège de France*, *Observatoire de Paris*, *Museum national d'histoire naturelle*), in engineering as France needed engineers to develop its industry and its infrastructures (*Ecole des Mines*, *Ecole des Ponts et Chaussées*, *Ecole des Arts et Métiers*, *Ecole centrale des Arts et Manufactures*...) or just because universities had been closed by the Revolution and the government wanted to create new institutions (*Ecole Polytechnique*, *Ecole Normale Supérieure*, *Conservatoire national des Arts et Métiers*...).

More recently, larger colleges of engineering or polytechnic institutes have been created either within universities or as stand-alone institutions.

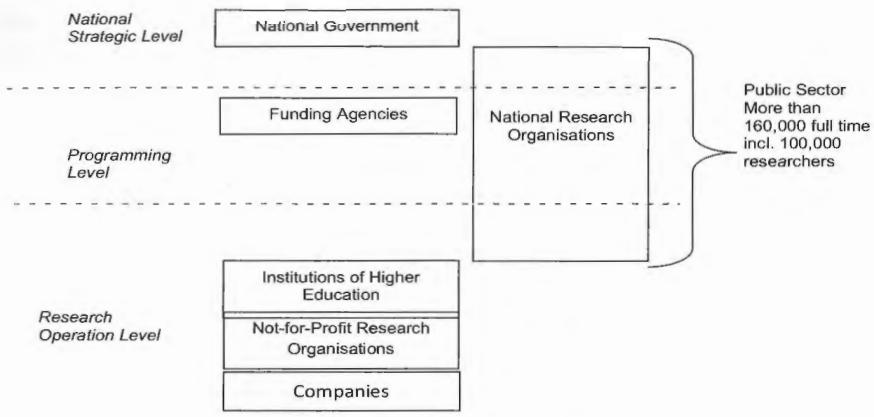

Fig. 1. The main R&D players in France.

5. National Research Organisations

If CNRS was created just before World War II and played a central part in the development of research in some major French universities, the other national research organisations were created after the war and have been since dedicated to specific research domains. Some of these national research organisations (CNRS, INSERM, INRIA) are deeply intermingled with universities and operate with them joint research laboratories. Others have their own in-house research facilities (CEA, INRA, IFREMER, ONERA, IFP...).

Table 2. Largest national research organizations.

	Research domains	Number of employees
Centre national de la recherche scientifique (CNRS)	All scientific domains incl. the humanities and social sciences	26,000 pers.
Commissariat à l'énergie atomique (CEA)	Energy and linked domains or technologies in physics, the life and earth sciences, information and communication	15,600 pers.
Institut national de recherche agronomique (INRA)	Agriculture and agro-food related domains	8,400 pers.
Institut national de la santé et de la recherche médicale (INSERM)	Health and medical sciences	8,000 pers.
Institut national de recherche en informatique et automatique (INRIA)	Applied mathematics and computer science	2,500 pers.

Centre national d'études spatiales (CNES)	Space	2,400 pers.
Office national d'études et de recherches aérospatiales (ONERA)	Aerospace	2,000 pers.
Institut français du pétrole (IFP)	Energy and the environment	1,700 pers.
Institut français de recherche sur la mer (IFREMER)	Exploitation of the sea	1,500 pers.
Cemagref	Science and technologies for the environment	1,400 pers.

6. Not-for-Profit Research Organisations

France has also 2 major not-for-profit research organisations which conduct research in the health and life sciences: *Institut Pasteur* was created in 1888 by Louis Pasteur and *Institut Curie* by Marie Curie in 1920. These two foundations are supported by gifts, the revenues of their endowments, research grants and large and annual block funding from the government.

7. Companies and R&D in France

The business sector is the main R&D player in France. There are 215,000 research staff members in private companies in France including 120,000 researchers.

A high concentration of research activities in a small number of companies

In France, business research and development is highly concentrated in few companies. For example, in 2007, the 100 largest companies spent 61% of business R&D expenditures (BERD) and employ 52 % of industrial researchers and 50 % of all the research staff members.

Moreover, among business and professional organizations involved in R&D activities, less than 3 % of companies employ more than 50 researchers but, in the same time, carry nearly three-quarters of the research and development effort of the business sector. In addition, these same companies received more than 77 % of public funds outside tax credits and employ nearly 70 % of researchers.

In contrast, firms that employ less than 5 researchers spent 8 % of BERD, got 14 % of public funds and employed 8 % of researchers. They represent about 77 % of French companies.

R&D activities in different domains

The distribution of BERD in the main branches of research shows a specialization in high technology sectors and, like the number of companies, a significant concentration.

Four domains represent 50 % of potential research and development firms and 43 % of business R&D staff members (FTE) although these relative shares have gone down steadily since 1992. In 2007, these same four first branches were the pharmaceutical, automotive, aerospace and communications industries.

In 2007, the pharmaceutical industry, which runs 15 % of BERD (3,563 M€), becomes the first branch of research. After three years of strong growth (+ 5.4 % in volume per year between 2000 and 2003) and two years of stagnation between 2003 and 2005, this branch of research knows a new increase in 2006 (+ 4.7 % annual growth average between 2005 and 2007).

By achieving 14 % of BERD (3,490 M€), the automotive industry in 2007 is second while it had been in the lead since 1999. The investment in this branch of research is in sharp decline since 2005: — 3.4 % on average per year (in volume). Among the first four branches of research, the automotive industry is the only one not defined as high-tech sector but plays a very important part in the national industrial base.

The aerospace industry has moved from fourth to third place in 2007. With 2,661 M€, it represents 11 % of BERD in 2007. After declining from 12.4% in 2006, this branch of BERD increases again in 2007 of 3.5 % (in volume).

Communications equipment, including telephone and electronic components industry, occupied in 2007 the fourth place while they were in third position in 2006. This industry is experiencing a period of steady decline since 2002 (– 4.9 % by volume on average per year), which becomes steeper in 2007 (– 6.9 % by volume). With 2,461 M€, this industry represents 10 % of BERD.

Research spending in services has been continuing to increase since 2005 (+9.5 % average increase in volume) when they had experienced a sharp decline between 2002 and 2004 (– 9.9 % by volume on average per year). In 2007, they amounted to 2,702 M€ and represent 11 % of BERD.

Funding of business R&D

In 2007, BERD is financed at 35 % by external resources (8,524 M€), the complement coming from the own resources of the companies. These funds come mainly from the holding group, when there is one (48 % of all external funding), and government (33 % in the form of research contracts or grants). The complement comes from companies outside the group (13 %), with

resources from international organizations and foreign (4 %) and by funds from the European Union (2 %).

Table 3. Examples of large companies located in France and involved in R&D activities.

Pharmaceutics, Cosmetics, Health and Food	Sanofi (#1), L'Oréal, Pierre Fabre, Servier, Essilor, Danone
Automotive and Transportation	Peugeot-Citroën (#2), Renault (#4), Michelin, Valéo, Alstom
Aerospace and defence	EADS (#3), Thales (#5) Dassault, SAFRAN
Electronics and Communications	Alcatel (#6), ST Microelectronics (#7), Thomson, Philips, Orange, Vivendi
Energy end Environment	Total, Areva, Schneider, EDF, GdF-Suez, Véolia
Chemicals, Materials and Construction	Air Liquide, Arkema, Lafarge, Saint-Gobain, Arcelor-Mittal, Vinci, Bouygue, Eiffage

8. Competitive clusters

In 2004, the French national government decided to launch a new initiative to support the emergence and development of competitive clusters in France. The basic idea was to improve the relationship and the cooperation between different players in one technical or economic domain *and* in one city. These players may be active in higher education, research and, naturally, business.

This initiative was something really new in France, as our country was not used to deal with scientific, technological and economic development on a regional basis. As a matter of fact, the tradition was rather to act at the national level without taking into account local effects (*think globally, act locally...*).

However, the government was able to make this important shift towards the acknowledgement of clusters. Local governments were naturally very supportive of this initiative. The first step was to identify and/or select the most active or potentially active clusters and to have them labelled through a national process. Calls for proposals were launched in 2 rounds (2004 and 2006) and more than one hundred applications were filed.

The selection criteria were mainly the research potential (public and private), human resources (local job market place and education) and potential market size for the core technology or business of the applicant cluster.

At the end of the selection process, 15 « world class » clusters were labelled. They are active, in ICT, Health, Finance, Nanotechnology, Space and Aeronautics, Automotive industry, Food, Agro-Resources and Marine Technologies. Beside these 15 clusters, 56 smaller clusters with a supposed lower potential were as well labelled.

In addition to this labelling, the competitive clusters initiative included a specific funding scheme for each of these clusters in order to make them more active (internal networking, export development, technological roadmaps...) and the creation of a new fund to support R&D projects emerging from these clusters. The management of this fund was eventually given to Oséo in 2008 (see later).

Table 4. World class clusters.

Name of the Cluster	Technological Domains or Main Economic Activity	Location
Aerospace Valley	Space and Aeronautics	Toulouse, Bordeaux
Finance Innovation	Financial Services	Paris
Lyon biopôle	Life and Health Sciences	Lyon
Medicen Paris Region	Life and Health Sciences	Paris
Minalogic	Micro, Nanotechnologies and ICT	Grenoble
Solutions communicantes sécurisées	ICT	Marseille, Nice
System@tic Paris Region	ICT	Paris
Alsace BioValley	Life and Health Sciences	Alsace
Axelera	Chemistry	Lyon
Cap Digital Paris Region	ICT	Paris
Images et Réseaux	ICT	Brittany
i-Trans	Ground Transportation	Northern France
Industries et Agro-Ressources	Biomass Industry and Agro-Resources	Champagne, Picardie
Mer Bretagne	Marine Technologies	Brittany
Mer PACA	Marine Technologies	Provence and French Riviera
Mov'éo	Automotive Industry	Paris, Normandy
Végépolys	Seed Industry	Lower Loire Valley

9. Funding agencies and R&D incentives

Agence nationale de la recherche (ANR)

Funding of research projects can foster scientific excellence by providing special support to best teams and to the most innovative and ambitious scientists. It is a widespread practice in many countries and a factor of dynamism to explore the frontier of science. This type of funding is adapted to basic research as well as to targeted research, whether conducted in the public sphere or through a public private partnership.

This mode of funding, relatively new in France, has known a strong evolution over the last 10 years at least as regards to the budget appropriations, both at national and EU level. However, a deep quantitative and qualitative shift occurred in France with the creation of *Agence nationale de la recherche* (ANR) in 2005.

The mission of ANR is to boost the French system of research and innovation. It supports two major categories of operations:

- Calls for proposals on the criteria of scientific excellence and economic relevance,
- More focused measures support for instance the development of public-private partnerships and local dynamics in research and development.

The calls for proposals aims at:

- Facilitating the emergence of new concepts ("white" bottom-up programs whose content is determined by the scientists who file a grant application),
- Increasing research efforts on national priorities (thematic projects),
- Intensifying the cooperation between public research and the industry (partnership projects).

ANR supports research projects selected after a competitive peer-reviewed process according to criteria of scientific excellence.

Projects are funded for an average period of time of 3 years. Since 2005, the average aid per project has increased significantly over the years from 383,000 € in 2006 to 483,000 € in 2008.

In little more than four years (2005-2008), more than 4,500 projects involving 16,000 research teams, public and private, were funded by ANR, for a total of about 2,300 M€. In 2008, ANR has supported research projects – whether thematic or not, opened or in partnership – for more than 640 M€. Laboratories depending on national research organisations received 42 % of these allocations, institutions of higher education 38 % and industry 15 %.

Oséo

Oséo was created in 2005, after the merge between ANVAR (French innovation agency) and BDPME (SMBs development bank), in order to implement the regional and national policies for SMBs. Its mission is to provide assistance and financial support to French SMBs in the most critical phases of their life cycle: creation, innovation, development, business transfer / buy out. By sharing the risk, it facilitates their access to financing by banking partners and capital investors.

OSEO provides SMBs with three types of support:

- Innovation support and funding: for technology transfer and innovative technology-based projects with real marketing prospects,
- Guaranteeing funding granted by banks and equity capital investors,
- Funding investments and operating cycle with a bank.

As an agency funding innovation in SMBs, Oséo uses budget appropriations from the French national government as well as funds coming from local governments. Altogether, Oséo brought 365 M€ to SMBs in 2007 and 450 M€ in 2008. This funding is provided as subsidies or as zero-interest loans.

Strategic Industrial Innovation (ISI) Programme

This programme was introduced in 2008. It is designed to fund projects presented by a consortium of players willing to develop breakthrough technologies: large companies, SMBs, start ups, public labs... Large companies do not receive any direct support but others do. Generally, the leader is a company from the French *Mittelstand* (companies between 250 and 5 000 employees).

Each project may get up to 10 M€ of funding.

In 2008 Oséo invested 273 M€ in 18 projects supported by this programme and involving 89 companies and 46 public labs.

Funding R&D projects emerging from competitive clusters

Since 2008, Oséo has been the operator of the fund dedicated to R&D projects presented by competitive clusters. This fund was created in 2005. During the three first years, 332 projects have been supported for a total amount of 469 M€. In 2007 and 2008, 406 projects were supported for 472 M€.

10. Research Tax Credit (crédit d'impôt recherche – CIR)

Since 2008, the major incentive to support business R&D activities in France is the research tax credit.

A major evolution

As a matter of fact, a reform introduced in 2008 enhances this tax credit in depth by simplifying and multiplying by 3 its volume, which rose from 1.7 billion Euros in 2007 to about 4 billion in 2008. Furthermore, this reform has two goals: increase the support offered by CIR to companies contracting with public research and also strengthen the legal security of the incentive.

The rate of the tax credit to businesses has been increased to 30 % for a first slice of R&D expenditures up to 100 M€. For companies seeking to take advantage of this scheme for the first time or which have not benefited from it for five years, the rate of this adoption is 50 % for the first year and 40 % for the second year. Beyond the threshold of 100 M€, the rate of the tax credit goes down to 5 %. Substituting the former ceiling of the measure with the second slice at 5 % aimed at enhancing the attractiveness of France for R&D of large firms in France and abroad.

An incentive for small and medium-sized business

Within the policy mix for R&D, CIR is traditionally very favourable to SMBs. In 2007, independent SMBs received 16 % of CIR although they represented only 14 % of R&D expenditures. This is a major difference with direct subsidies. As a matter of fact, in 2007 SMBs received only 11 % of direct aid for the same share of 14 % in R&D. The 2008 reform makes CIR relatively more favourable to big business and big R&D budgets, but this incentive remains very attractive for SMBs.

Strengthening the incentives for cooperation with public research

Generally, tax incentives focusing on R&D activities are most likely to generate externalities for society. In OECD countries, they take into account R&D expenditures, which generally correspond to the definition of R&D set in the OECD Frascati Manual. This definition ensures that the expenditures under consideration had positive externalities for the community. Are thus excluded from the base expenditures related to "work aimed at increasing productivity, reliability, usability or portability matter the computer, or adaptation of the basic software and applications".

In several countries, the R&D fiscal incentives favour cooperative research, which tends to be more efficient, particularly because it involves a sharing of knowledge For example, some tax provisions provide for an income tax relief for R&D cooperation with public research, without making it a condition first. This is the case, for example, in France where, since 2004, the R&D carried out by public research institutions or universities are taken into account for twice the amount in the base of CIR, at the condition that no arm's length relationship exists between the company and the contractor.

Table 5. Research Tax Credit in figures.

1994-2003	465 M€ (average per year)
2005	982 M€
2007	1,700 M€
2008	4,000 M€

The ceiling for the inclusion of these expenditures rose from 10 to 12 € in 2008. Thus, from this statement, expenditures on R&D carried out by research institutions or universities are funded at 60 % by the CIR (in the limit of 12 M€ R&D and outsourced to the first slice of up to 100 M€ expenses). Moreover, the list of research institutions eligible for the doubling of the invoice has been made larger.

11. Public/private partnerships in research and innovation in France

In France as in many developed countries, public/private partnerships are considered as key elements for innovation and economic development. It is the reason why technology transfer is one of the missions of public institutions of higher education and research. It is also for this reason that sponsored research and collaborative research are strongly supported by national and local governments. Furthermore, since the end of the 90's, the emphasis has been on the creation of new innovative and technological companies but more recently, the government decided to support specifically other ways of transferring technology from public labs to companies.

12. Facts and figures

In terms of performance in tech transfer and sponsored and collaborative research, there are large differences between French institutions. Some institutions are well advanced: CEA, Institut Pasteur, INRA, CNRS, INSERM, INRIA, a few universities (incl. Université Pierre et Marie Curie) and few « Grandes écoles ». At the other end of the spectrum, other institutions are clearly new players in this type of activities.

International benchmark are difficult to set up as a lot of data bases strongly depend on the type of organisation existing in each country. For instance, in a lot of countries, the intellectual property owned by institutions is slightly different from the intellectual property coming from the same institutions because some faculty members are allowed to keep ownership of their inventions or are/were used to transfer it to a partner company.

But on an average basis, it is generally considered that French institutions should perform better to match their counterparts in the US, in the UK or in northern Europe.

Around 1 000 patent applications are filed by public institutions every year with CEA, CNRS and IFP being in the top ten applicants in France with private companies. Licensing revenues coming back to public research reach 130 M€ per year. Approximately 120 new companies are created from or with technologies developed in public labs.

Private industry sponsored research represent a share of about 5% of the total public R&D expenditures.

13. Policy and incentives to develop public/private partnerships in research and innovation

Incentives for researchers

There is an incentive which is supposed to be very strong in France: since 2001, scientists working in most public labs have been given by the law 50 % of revenues coming from their inventions. This share is generally considered as one of the highest rate used in the world.

But this incentive is not generally considered as sufficient. In most public institutions, there is still a lack of awareness of scientists to intellectual property protection and technology transfer. One of the most important missions of technology transfer offices is therefore the development of this awareness among faculty members and students.

Incentives for the creation of new companies

In 1999 and 2004, new incentives were set up to support the creation and development of new innovative companies. A national contest for the "Creation of innovative technology companies" has been launched every year since 1999 to select the best projects. More than 15,000 applications have been filed and more than 2,200 projects were supported with subsidies from 4,500 € to 450,000 €. Oséo also coached these projects and 1,100 companies were created as well as almost 6,000 jobs.

In 1999 also, a new public incubation programme was launched in order to help people who want to create a new company linked with public labs, i.e. taking advantage of technology developed in these public labs or investing in joint research projects with these labs.

Since 1999, 30 incubators have been operating for 8 to 10 years of activity experience. More than 2,300 projects have been coached in this incubation programme, more than 1,500 companies were created as well as and 5,700 jobs.

But creating a new company is one thing, developing it to convert this creation into a mature, long lasting and, hopefully, a growing business is another thing. It is the reason why a specific social and fiscal status for new innovative companies was introduced in 2004. It is a very interesting scheme as the companies, which take advantage of it, do not pay any corporate tax for 4 years and no social benefits for research staff for 8 years (actually, these benefits are paid by the government).

More than 1,600 companies take advantage of this status in 2008 for 100 M€ of benefits reduction for 7,500 research jobs.

All these incentives help jump-start a very strong new process of creation of innovative technology companies. A large share of them manages to raise money from the venture capital industry and the number of them that went public is increasing.

Supporting sponsored research: Instituts Carnot

In order to enhance sponsored research, a new initiative was decided in 2005. Inspired by the German Fraunhofer Gesellschaft functional scheme, it consists in labelling and supporting public labs – so called *Institut Carnot* named after the French scientist of the beginning of the 19th Century – which are considered as very active in technological research conducted in cooperation with companies.

Two calls for proposals were launched in 2005 and 2006 and 33 Institutes Carnot were labelled. They get a specific support under the form of a bonus proportional to research contracts signed with industry (60 M€ in 2008).

A Bayh Dole Act in France ?

This question is often raised in France as soon as the global performance of public research in technology transfer is discussed.

One the one hand, it is not necessary because the government does not claim ownership of the intellectual property coming from the research activities it funds in universities, public labs (national research organisations are legally distinct from the government) not-for-profit organisations or companies. As a matter of fact, the law leaves this intellectual property to the research operator.

But the Bayh Dole Act was introduced in the United States to make technology transfer simpler and faster and technology transfer in France is not simple and fast.

The French basic public research component is the joint research unit generally set up by one or several institutions of higher education and one or several national or not-for-profit research organisations. This public lab hosts

scientists and staff members with a very divers status: faculty members, tenured research scientists, permanent or non-permanent staff paid by both types of institutions, post-docs and PhD or Master students. In terms of financial resources, money may comes from block funding coming from both types of institution, public research grants (Europe, national or regional) and research contracts signed with companies or charities. This public lab is generally located on a university campus but is managed by each type of institutions. Very often, there are several managers.

Intellectual property is co-owned by the different type of institution. As a result, most patents coming from public labs have more than 2 owners. In the worst cases, there may be several technology transfer officers dealing with the same project. Under those conditions, tech transfer and negotiations may be difficult.

As a result, if a Bayh Dole Act is not, one the one hand, strictly necessary in France, on the other hand, the same kind of simplification is necessary.

The government introduced a new regulation in order to have more frequently a comprehensive mandate given to one single institution by the others. Another solution would have been to enforce the principle of *one and only one owner* but it required a direct change in the IP law and was given up.

Bayh Dole Act does not only grant new rights to research institutions. It also assigns duties. These institutions have to perform technology transfer. But this activity requires a large investment. Money matters ! Bayh Dole Act does not include any funding scheme based on taxpayer money but American research universities, i.e. the ones that are the more inclined to do technology transfer, are wealthy institutions.

That is not the case for French universities that have had the right and the duty to do technology transfer but lack the means to do it. It is the reason why, they need an additional support to protect and commercialise the intellectual property coming from their research activities.

A new initiative to support the development of joint technology transfer offices shared by several institutions was launched in 2005. In order to go further, the French government is setting up a new programme for the creation of technology transfer accelerators in the second part of 2010.

14. A National Strategy for Research and Innovation

Since 2005, the French system for research and innovation has been going through deep reforms: creation of competitiveness clusters, fostering public and private partnerships, trying to use human and financial resources more

efficiently. The general objective is to increase the performance, the visibility and the international outreach of French R&D and innovation.

Two very important texts were passed by the French Parliament: first, the program law of 2006 for research, and the act of 2007 on the freedom and responsibility of universities, significantly enhancing the capabilities of university initiatives and improving their visibility on the European and international scene. Other decisions were made in 2008 to improve a system too complex and too fragmented and to support business R&D at a so far unknown level, in a time when the society claims for research and innovation capacity building.

However, the need for clear priorities defined at the national level was also urgently felt to complete this new configuration of the French system for research and innovation.

It is the reason why the government decided to develop a national strategy for research and innovation (SNRI).

This national strategy is actually something completely new in France. Previously, the choice of priorities was made implicitly as the result of actions taken by the different R&D national players and by a succession of hedging decisions made by the national government. This set of decisions frequently lacked consistency and, consequently, resources were often scattered throughout the system.

This new strategy aims to increase the readability of the French scientific policy, to shape a favourable environment for creativity and innovation, to mobilize the human potential in a more efficient way and to consider the European research area as the natural framework for action.

The national strategy of research and innovation does not intend to replace the mission of research organizations including programming or the intelligence work conducted continuously by the research community. It was intended to provide a strategic tool and a global roadmap to support decision and meet the major societal and economic issues. SNRI is also an opportunity to address the issue of changing the environment and modes of knowledge production and innovation. It is finally the opportunity to discuss openly about research and innovation and the part they have to play in our society.

This exercise required a process of elaboration and consensus building on the viewpoints of scientists, socio-economic and other stakeholders, through a steering committee, working groups, and an Internet consultation open to the public.

The analysis has been conducted from a definition of fields including socio-economics, whether the expectations of our fellow citizens of the world's economic needs. The reflection has incorporated the strengths of

public research, private research and opportunities for participation in European networks and international, taking into consideration not only our strengths (excellence of our laboratories and our scientists), but also our weaknesses (results and actual positions in international competition) and taking into account the key success factors, especially the critical size and coordination of public and private.

An initial report has been submitted to the Parliament science committee, the national Academy of sciences and other bodies.

The result of this collective exercise presents an overview of the challenges in the field of research and innovation, to stimulate and coordinate efforts around the guidance set out across the country.

It is intended to help define national research budget appropriations, programming ANR calls for proposals and four-year contracts signed by the national research organizations with the government.

But this strategy is not static. This is clearly the first step in a new and continuing process, leading to a new report every four years. These developments will build on the results of the implementation of the national strategy of research and innovation, with solicitation of stakeholders on the evolution of knowledge and issues.

Conclusions

If France has been a major player in science, medicine, technology and innovation for more than 500 years, the new challenges coming with world globalization required some important changes in the organization of our research and innovation system. As a matter of fact, some of the features of this system that have been defined and set up during the last 50 years are not adapted any more to meet these new challenges.

All the players whatever their nature – public or private; institution of higher education and organizations dedicated to research – have to move. Universities become more autonomous, define and develop their own scientific and technological strategy. Some industrial sectors invested more in R&D.

Some players which didn't exist so far – ANR for instance on the public side; more technological start-ups – are now developing their activities.

Moreover, the game played by these different players is changing. It becomes more collective, each player interacting more and more with the others in the new scheme of open innovation. Sponsored research, scientific partnerships and technology transfer are made easier and are developing. The field where this game is played is also considered as more important than in the past; now, in France also, geography matters. Clusters involved

in higher education, in research and in business are identified and specifically supported.

The process of discussing and defining a national strategy for research and innovation, which was deeply needed, has been launched. A first sketch of this strategy has emerged from a large set of meetings and workshops.

These changes – at any level: nation, region, institution, laboratory but also individual scientist or staff member – are difficult to drive. To be successful, they need time, patience, explications, continuity and consistency.

Program Operacyjny Kapitał Ludzki **Priorytet IV Szk**

Działanie 4.2: Rozwój kwalifikacji kadr systemu B+R i wzrost świadomoś
gospodarczym. Podniesienie umiejętności pracowników systemu B+R w zakres
naukowymi i pracami rozwojowymi oraz komercjalizacji rezultatów prac bada
w zakresie ochrony własności intelektualnej i przemysłowej.

Projekt POKL.04.02.00-00-059/08:
Innowacyjne zarządzanie systemem B+R w jednostkach naukowych.
Projekt wpisuje się w realizację unijnej strategii wzrostu Europa 2020.

W zmieniającym się świecie UE potrzebna jest inteligentna i zrównoważona gospodarka sprzyjająca włączeniu społecznemu.

Inteligentny rozwój oznacza uzyskanie lepszych wyników w dziedzinie:

- **edukacji** (zachęcanie do nauki, studiów i podnoszenia kwalifikacji),
- **badań naukowych/innowacji** (stworzenie nowych produktów i usług, które wpłynęłyby na zwiększenie wzrostu gospodarczego i zatrudnienia oraz pomogłyby w rozwiązywaniu problemów społecznych),
- **społeczeństwa cyfrowego** (wykorzystanie technologii informacyjnych i komunikacyjnych).

Unijne cele służące zapewnieniu inteligentnego rozwoju obejmują:

1. zwiększenie łącznego poziomu **inwestycji publicznych i prywatnych do wysokości 3 proc. unijnego PKB**, a także zapewnienie lepszych warunków dla badań i rozwoju oraz innowacji,
2. **podwyższenie wskaźnika zatrudnienia kobiet i mężczyzn w wieku 20–64 lat do 75 proc.** do 2020 r. poprzez wprowadzenie większej liczby osób na rynek pracy, zwłaszcza kobiet, młodzieży, osób starszych, pracowników niskowykwalifikowanych i legalnych imigrantów,
3. zapewnienie lepszego poziomu wykształcenia – zwłaszcza:

- sprowadzenie **odsetka młodych ludzi przedwcześnie porzucających naukę do poziomu poniżej 10 proc.,**
- dążenie do tego, by co najmniej 40 **proc. osób w wieku 30–34 lat miało wykształcenie wyższe** (lub równoważne).

Wniosek z artykułu K. Lityńskiego (Tom 1, str. 67):

Polityka zwiększania innowacyjności, która decyduje o konkurencyjności całej gospodarki, nie może podlegać nieskoordynowanym, a często wykluczającym się inicjatywom poszczególnych ministerstw.

Polityka proinnowacyjna nie polega jedynie na szybkim wydatkowaniu wszystkich dostępnych środków unijnych pod hasłem „innowacja", lecz także na wytyczaniu i monitorowaniu kierunków i problemów, które powinny być rozwiązane w skali kraju i poszczególnych regionów.

Idea utworzenia platformy koordynującej działania proinnowacyjne rządu i jego agend nie jest nowa, jako koncepcja Krajowego Systemu Innowacji wydaje się obecnie ze wszech miar na czasie.

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