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PROMOTION OF PUBLIC RESEARCH: INTERVENTIONS BY THE FRENCH STATE TO PROMOTE HIGH-TECH VENTURE START-UPS BY RESEARCHERS

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Promotion of public research: interventions by the French State to promote high-tech venture start-ups by researchers

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In the last few years, the French public authorities have sought to support the development of research and innovation and to facilitate exchanges between the scientific and industrial communities. An Act (Act 99-587) passed on July 12, 1999, concerning innovation and research, reinforced the existing mechanism with a view to facilitating the transfer of technology produced by public research to the private sector, thus enhancing the country's ability to innovate and create wealth through and as a result of public research. The various components of the Act promote venture creation as a method of disseminating innovation. This appears to be a major change from the mechanisms used in the past.

France is characterized by its high level of centralization of power in the hands of the State and by a significant political voluntarism in economic issues. In this paper we describe the features of the French model and consider the difficulties it encounters in a globalized economic context (1). For example, the idea that innovation is a vital element of competitive capacity does not appear to be held unanimously, even in an era marked by market globalization. We present the issues of innovation at the international level (2). In France, structures promoting the development of research first appeared in the late 1960s. After reviewing actions since that time, we show that the relationship between the public research and economic communities continue to be difficult (3). Yet, recent reports have pointed out the importance of establishing a true policy for innovation and technology, and especially of promoting spin-offs and venture creation. In such a context, the 1999 Act provides a legislative framework for entrepreneurial researchers (4). However, while it has some undeniable benefits, it also brings with it a number of pitfalls. For example, the dual status of civil servant and entrepreneur is ambiguous and may generate legal difficulties as well as raising certain cultural questions. Early studies of research development through venture creation (spin-offs) have revealed some cultural barriers that hinder the phenomenon's advancement, especially compared with the United States (5)¹.

1. Some features of French industrial policy

Changes in the behaviour underlying public policies, regardless of the related circumstances and issues, cannot be considered independently of the country of origin. As Hayward (1985) said, there is a relatively stable set that forms the normative framework within which authority is supposed to operate in a given country, reflecting that country's own institutional heritage and specific combination of social and cultural features, and structuring its political process. As a result, many of these institutional, social and cultural differences may be related to the country's own perception of relations between State and society. In terms of economic and industrial policy, France is often described as being controlling and interventionist compared, for example, to Great Britain, which is more market oriented (Shonfield, 1965; Zysman, 1977). Dyson (1983) goes even further, proposing that industrial culture differs from one country to the next. There are a number of different conceptions of business and its

¹ This paper was taken from a broader study supported by the CNRS (Centre pour la Recherche Scientifique) concerning venture creation by university researchers. The research program involves 11 researchers from ADREG (<http://www.adreg.net>) and CLAREE (<http://www.iuniv-lille1.fr/claree>), namely Thierry Verstraete (responsible for the scientific aspects of the program), Valérie François-Noyer, Stéphane Marion, Pascal Philippart, Pascale Faber, Philippe Pailot, Olivier Torrès, Frédéric Sauvage, Stéphane Duez, Philippe Vaesken and Bertrand Tortellier.

connection to the global capitalist society. Countries such as France and Germany are State-oriented, whereas Great Britain and the United States are society-oriented. This leads to the notion of economic nationalism, characterized in countries such as France or Japan by the use of government authority to overcome a profound sense of economic delay. Moreover, France is marked by decision-making voluntarism in its public policies. Its political players have long felt themselves to be relatively independent of the constraints faced by the country. However, the idea that the government has control over economic events both inside and outside the country is untenable in view of the growing overlaps between world economies.

These major characteristics, although somewhat schematically presented, explain the trends that emerge when we observe the economic and industrial policies of different countries. In addition, the increasingly international context is forcing observers and politicians to make inter-country comparisons. The economic policies of a country form part of a tradition, but they are increasingly established on the basis of comparisons with other countries, in an attempt to follow the leaders in a given field. The 1999 Act illustrates this trend – in other words, the need to remain competitive internationally (in terms of innovation) through the use of government authority (the law).

Before examining the 1999 Act in further detail, we will begin by presenting the issues of innovation at the international level, together with a historical overview of government interventions aimed at developing research.

2. The issues of research at the international level

The Guillaume Report (1998) on technology and innovation, published in 1998, placed considerable emphasis on the issues of innovation at the international level and on France's technological position. One of the Report's conclusions was that "France does not make sufficiently effective use of its research potential to dynamize its economic fabric or to create new businesses in sectors where its specialization is weaker"². The analyses made in the report show that, while French scientific production measured on the basis of scientific publications and similar indicators has undoubtedly progressed, technological production by the country's businesses, measured by the filing of patents, has declined. With regard to scientific publications, the world share held by French laboratories increased from 4.3% to 5.1% in the period 1983-1995, representing a growth of 16% over twelve years. With regard to technological production, however, France's share of the European patent system declined significantly between 1987 and 1996, from 8.5% to 7% (-17%), and its share of the American patent system (even more important, given the weight of the American market in the technology field) fell in the same period from 3.8% to 3.1% (-18%).

Together, these observations show that, despite high human potential and substantial research and development efforts, the main problem encountered by France is that of translating its scientific performances into at least comparable technological performances. In a globalized economy characterized by an acceleration of technical progress, competition between the main industrialized countries is based on technological performance. This, through the dissemination of innovation, leads to increased competitive capacity for businesses, promotes the creation of new wealth and hence supports the development of economic activity.

The differences revealed by the report between the scientific and industrial performances of the main industrialized countries illustrate the complexity of the links that may exist between scientific and/or technological research, innovation and growth. This suggests that other factors (especially cultural) are also involved. The Majoie Report, for example, suggests

² *Ibid.*, p.18.

promoting an entrepreneurial culture at every level of the education system to “counter the intrinsic weakness of the French system, namely the fact that discoveries rarely lead to patents or applications”. The author also points out that “these are long-term investments that demand persistence and continuity, but that are also a major condition if France is to be able to compete with the Anglo-Saxon world”³. On another level, a study of some very clear instances of the ability to forge links between the scientific and industrial communities, such as those seen in Silicon Valley in California, Route 128 near Boston, Massachusetts, where MIT (the Massachusetts Institute of Technology) is located, and in Tsukuba (near Tokyo) and the Osaka region of Japan, clearly shows that their success is due to a concentration of researchers at the same place combined with a research development network, the presence of innovative firms and appropriate financial mechanisms (Wackermann, 1992). This is illustrated by the following excerpt (quoted by Aurelle) from a text published in French by *La Nouvelle Technologie*, on the synergy between research and innovation:

"Silicon Valley has the greatest concentration of innovative firms anywhere in the world; more than 2000 firms in the electronics, computing and information technology sectors, and 440 biotechnology firms. It was the creation of the Stanford industrial estate, based on the university's research and training capabilities, which laid the foundations for Silicon Valley. Technology transfer is based on the policy developed by the university, and on the excellence of its technology licensing bureau that helps file and then develop patents. Another explanation of its success is that the university organizes links between basic research and the development of new products. It sends its academics to work part-time, one day a week, in private firms. The success of Silicon Valley, achieved without State support, is due first and foremost to the proximity of research laboratories favourable to the development of research findings, and to the network of innovative firms. In the USA, the percentage of firms generated by the best scientific universities is higher than in France. A recent study by the Boston Bank shows that more than a million people currently work in the 4000 companies created around MIT. In France, however, of the 10,000 students who obtain doctoral degrees, only five will go on to create their own businesses".⁴

The public authorities, aware of the issues emerging from the relationship that should exist between scientific performance and technological performance, have sought over the years to introduce mechanisms that would create favourable conditions for the emergence of an environment conducive to the development of exchanges and cross-fertilization between the scientific and industrial communities.

2. The framework for the development of public research

In response to the question “Do the universities create businesses?”, Guy Bertholon (1993) identified three separate periods in the evolution of the framework establishing the conditions for this activity.

Until the early 1980s, action in the field was characterized by an almost total absence of policy. As stated in a report by the Accounts Court in July 1997, on the development of research in public scientific or technological institutions: “Development has long been considered by France's public research community as a secondary activity consisting in persuading private companies to exploit discoveries made in public laboratories, through the issuing of licence contracts” (Accounts Court report, 1997, our translation from the original French). It was not until 1967, with the creation of ANVAR (the national research development association) that the first measures were introduced to promote the development

³ *Ibid.*, p.26, our translation from the original French.

⁴ Soutenir la synergie entre recherche et innovation, *La Technique Nouvelle*, No. 3-4, 1998. Our translation from the original French.

of France's scientific and technical heritage. ANVAR was given the mission of "working towards the development of the results of scientific and technical research carried out by public laboratories and services, especially the university and CNRS laboratories"⁵. In fact, when research findings were thought to be suitable for industrial application, ANVAR, with financial support from the National Education Ministry, was available to help researchers develop those findings by filing patents. The patent was considered to be the starting point for development and potential marketing of an invention, or as a bridge from the scientific community to the industrial community. However, the results observed by the end of the 1970s were somewhat disappointing. Indeed, given the amount of money invested in patents, the returns in the form of royalties were very poor.

According to Berthelon, we then entered a second period characterized by a multiplication of new industrial relations services with the mission of acting as an interface between research institutions and economic stakeholders. It was also at this time that the research institutions began to introduce standardized contract management, and that an industrial property policy was first established.

The Act respecting policy and programming for technological research and development, passed on July 15, 1982, and the Act respecting higher education, passed on January 26, 1984, represented a further step forward and took the country into an era directed towards greater development of scientific and technological research findings. The 1982 Act led to significant changes in traditional relationships between public research and development thanks in large part to section 5, stipulating that the technological research and development policy is designed not only to enrich knowledge, but also to develop research findings. Section 4 of the 1984 Act defined the mission of higher education institutions to include the development of their research findings. From the period 1985-1988 onwards, this new legislative framework allowed a certain line of thought to take root in educational and research institutions. They gradually abandoned the classical development model that no longer corresponded to the innovative process or the practice of the various players, in which the transfer of results achieved upstream (in the laboratories) to downstream organizations (businesses) would be achieved through preferential arrangements such as licences and patents. However, progress was hindered by the existence of a juridical and administrative framework that was by no means conducive to development. Given the rigidity of the public accounting system and the rules imposed on the universities, the players had to create more suitable structures. As the Guillaume Report points out, "the most involved institutions, aware of the level of professionalism needed to develop research and finding it impossible to hire industrial property specialists, jurists, marketing analysts and contractual staff able to take part in partnership research, developed external structures based on the Act 1901 partnership model or subsidiaries in the form of business corporations"⁶. These structures were given the mission of liaising with the economic community, and offered skills, research findings and consulting services to businesses. In addition to this, the 1982 and 1984 Acts led to the introduction of a more general policy governing transfers and partnerships, covering issues such as the development of non-contractual research through the preparation of an industrial property policy, the possibility for firms to appoint young researchers to work on research projects of interest to their employers, in partnership with a public laboratory, as well as consulting, contractual research, the creation of cooperative structures, the introduction of technological resource centres adjacent to the laboratories, and the creation of innovative businesses.

⁵ See Act 67-7 of January 3, 1967

⁶ *Ibid.*, p. 57, our translation from the original French.

Despite these efforts, the Guillaume report showed that the public research-economic community combination was not always wholly effective. Priorities were therefore proposed for the definition of an innovation and technology policy, centring on four main points:

- The creation or extension by the higher education institutions of professionalized interface structures with the economic community;
- Restructuring of the national mechanism by the creation of a Technological Research Centre;
- Spinning off and creation of growth companies;
- A policy in favour of scientific and technical employment by businesses.

The spinning off and creation of growth firms was the subject of the July 1999 Act.

3. A legislative framework for entrepreneurial researchers: Act 99-587 of July 12, 1999, on innovation and research

Analysis of various sectors including pharmacy, biotechnology, agro-food, aeronautics, land-based transportation, information technology and so on, has shown that their development owes much to collaboration with public research institutions. In this respect, the 1999 Act, drawing lessons from the Guillaume Report, was designed to facilitate contacts between public research and private enterprise, and at the same time, in the words of Minister Claude Allègre, during his presentation to the National Assembly, “to transform science and technology into growth and jobs”.

The Act is organized around four components forming a set of provisions conducive to the creation of innovative businesses.

The first component, concerning cooperation between research and academic personnel and private enterprise, is designed to lift the statutory restrictions that previously prevented research staff from participating in the creation of a business to develop their findings, or from offering their expertise to such a business⁷. The new Act allows research staff to leave public service temporarily in order to participate in the creation of a business that will develop their findings, for a period of six years. It also allows them to provide scientific support to a business, to own capital stock and to be a member of a board of directors, while continuing to be a public servant.

The second component concerns relations between universities and research institutions and private enterprise. Developed as a complement to the 1982 and 1984 Acts, its goal is to allow for the creation of structures better able to provide support for small and medium-sized high-tech businesses. Under the Act, universities and research institutions can enter into agreements for the provision of services, manage research contracts, exploit patents and licences and market the products of their activities. To do this, they can create industrial and commercial activity departments to manage research contracts within a more flexible budget framework and with more suitable contractual rules. Similarly, to develop research findings in their fields of activity, they can also create incubators to house innovative firms and support their development. These incubators must promote the dissemination of innovation by making premises, equipment, material, knowledge, know-how and public research available to businesses and individuals.

The third component of the Act is concerned with the introduction of a taxation framework favourable to innovative firms. To allow innovative firms to build loyalty among their collaborators, the 1998 Finance Act introduced a system of stock purchase warrants for business collaborators, known by the French acronym BSPCE, which receive favourable tax-related and social treatment. The measure is based on the notion that, in most cases, the employees of innovative firms have implicitly agreed, simply by accepting employment with

⁷ This first component is described in more detail in section 4.1

such firms, also to accept lower salaries and higher risk levels. It is therefore normal that they should share in the hopes for success as well as in the risks of failure. However, the provisions concerning the BSPCEs were poorly adapted to the situation of young growth firms and were, in fact, not available to them in practice. Steps were therefore taken to extend the mechanism to the creation and development of young innovative firms.

At the same time, the Act relaxed the provisions governing innovation mutual funds, known by their French acronym FCPI, by extending the eligibility criteria to cover all innovative firms.

The fourth component of the Act is concerned with the constitution of a juridical framework adapted to the situation of innovative firms. It had become clear that business corporation status was unsuitable for young high-risk firms with a high potential for growth, since it places a number of significant restrictions on creative conditions (capital, number of shareholders and directors, administrative formalities) and on managerial and operating conditions. Innovative firms need broad contractual freedom in their charters. They must be in a position to make quick changes to the geometry of their capital and the relations between their shareholders. They must also be able to issue senior shares without voting rights, so as to attract capital without losing control. The Act, to give innovative firms access to these possibilities, opened up the status of simplified business corporation (or SAS, to use the French acronym), thus allowing them much greater contractual freedom and real juridical flexibility. In a simplified business corporation, the charter defines the corporation's operating method according to the will of its shareholders. For example, the charter may provide that general meetings and boards of directors are held by videoconference or over the Internet, to take into account the use of modern communications technologies. Similarly, it can allow the firm to issue different classes of shares, thus separating control of the firm from the shareholding function and promoting the involvement of investors and venture capitalists.

These four components, although generally well received, nevertheless raise some problems, or at least leave some aspects in need of clarification. The next section of the paper concentrates on the general theme, namely venture creation by researchers who are also civil servants, and examines some of the benefits and pitfalls of the proposed framework. Going to work for an existing firm, consulting and participation in the capital stock and/or management of a firm are not considered here, even though, in some respects, they are manifestations of entrepreneurial involvement by a player who is (a priori) a stranger to the world of private enterprise.

4. Legal aspects of the development of research findings by entrepreneur researchers who are also civil servants: benefits and pitfalls of the legislative framework

All forms of venture creation involve different legal aspects that are often perceived as necessary and restrictive evils, when in fact the rules imposed by the legal framework are neither exclusively restrictive nor exclusively beneficial, but rather a combination of the two. Entrepreneurs must understand this intrinsic dialogue in the legal standard, since the fact of going into business implicitly means doing business with the law.

Some of these legal aspects are fundamental, in the sense that they impact upon the formation and development of the new firm. They are used to manage certain risks related to the business activity, through the firm's legal status and relationship to the private patrimony of the entrepreneur (and his or her spouse), as well as through the guarantees available to the firm's creditors. In addition, they give the firm a viable form of deployment through the use of different configurations that can help facilitate the search for capital, and by encouraging or hindering transfers and transmissions of the activity.

Other aspects have led to an administrative implementation process that remains cumbersome despite repeated efforts at simplification (the Business Formality Centres, the single return form, and so on).

The 1999 Act, while falling within the dual perspective described briefly above, also represents a significant step forward for public researchers (or others in a similar position) who want to develop their research findings by launching a business.

The legal framework is intended to be innovative and to provide incentives. However, it also introduces a number of obstacles that generate more risk than would at first appear to be the case. The legislative framework authorizes public researchers to embark on the venture creation trail, when they were previously prevented from doing so by law; their status as public researchers was intrinsically incompatible with the status of private entrepreneur. The Act has not removed this incompatibility, but has relieved it to some extent, by making the creative path more complex and also more precarious. This statement may appear surprising at first glance, since the goal of the legislation is clearly to promote the building of bridges between private enterprise and public research, in particular by allowing public researchers to apply and hence to exploit “their” findings within private legal structures in which they play an open and leading role.

The next few sections of the paper briefly describe the legal framework and examine its advantages and pitfalls.

4.1 Review of the legal framework available to public researchers

The Act respecting innovation and research allows public researchers to create businesses at the end of a dual constitutive process where each aspect takes place in a separate juridical sphere, namely the public sphere for issues related to the entrepreneur’s special status and the private sphere for entrepreneurial action. Between these two dimensions, a large number of interactions take place.

The administrative aspect includes two key steps, namely authorization and agreement. Researchers must ask their employer organizations for authorization, which is granted following consideration by an ethics committee⁸. At the same time, statements are required on the proposed activity, the proposed administrative arrangement (secondment or release) and a draft charter in the case of a corporation. Authorization is granted for two years, and is renewable twice. The agreement, concluded after the constitution of the business in which the researcher must be a manager or partner, organizes the terms of the cooperation between the public body on whose behalf the research was done, and the firm created to develop it. Possible terms include assignment or licensing of patents, operating agreements for non-patentable results, contracts for the transfer of expertise, and so on. In addition, the entrepreneurial aspect requires the researcher to take a number of (legal) steps common to every venture creation, including the identification of partners, careful consideration of bank guarantees, choice of a legal status for the business (incorporation, type of corporation, and so on), the negotiation and conclusion of basic contracts and also the cooperation agreement without which the firm would have no purpose! These two aspects will subsequently continue to evolve in parallel, first with the renewal of the researcher’s authorization and the choice, at the end of the six-year period, between release for a further period not exceeding three years, renewable once, resignation from his or her position as a researcher, or a return to his or her original job⁹, and second with the growth of the firm (search for additional funding, the manager/shareholder relationship, and so on).

⁸ This commission is now decentralized and organized at the level of each administrative authority.

⁹ This latter choice means ceasing all collaboration with the firm within a year.

4.2 The benefits of the mechanism

The mechanism has some undeniable advantages. For example, it introduces tools to help manage venture creation risks. These tools can be divided into two categories, namely those intended specifically for public researchers, and those common to all venture creators.

Researchers maintain their status as civil servants even as they begin their entrepreneurial adventure. Thus, if the project runs into difficulty or fails, they can go back to their previous positions without loss of seniority. Also, if they are released (or seconded), their salaries are paid by the public body that employs them, and then reimbursed by the new company according to terms agreed by the two organizations. This opens up the possibility of deferred reimbursement, thus providing the new entrepreneur with a source of income without the need for the new company to make immediate disbursements.

The fact that entrepreneur researchers are able to go back to their original jobs and receive salaries paid by their original employers is both an incentive for venture creation and a safety net (in financial terms too) if the project fails.

The other entrepreneurial risk management mechanism, available to all venture creators and not just public researchers, is a form of company structure introduced into French law in 1994 (the January 3 Act) to facilitate joint ventures. Known as the simplified business corporation (referred to by its French acronym SAS, as mentioned in section 3 of this paper), it offers both flexibility and protection. In such corporations, the creators have considerable contractual latitude, and the financial risk is limited to the capital invested when constituting the corporation. This is particularly important because the minimum capital amount of 250,000 FF (38,112.25 Euros) required to avoid the SARL trap (individual or multi-person)¹⁰, generated by a lack of initial equity, is fairly significant (relatively speaking).

With regard to company development, here again the choice of SAS status allows the company's management to contract certain control mechanisms for their capital providers¹¹, and to institute mechanisms to regulate relations between those providers (inalienability, exclusion, buy or sale, etc.), as well as coordination procedures (joint actions, less organizational formalism and consultation of the various stakeholders) and protection for the managers themselves (compensation for dismissal). However, these advantages also bring with them a number of pitfalls that may not be apparent at first glance.

4.3 The pitfalls of the mechanism

The first pitfall concerns the adjustment of the administrative and entrepreneurial aspects of the project. The adjustment process is a source of complexity and, to a certain extent, of fragility for the company. The entrepreneurial risk is compounded by an administrative risk arising from the fact that authorization may not be given or renewed, and that it may be difficult to negotiate or implement the agreement. The legislator has said authorization should only be refused in exceptional cases, but the risk still remains. There is also the childish aspect of this step, which amounts to asking permission to embark on a "dangerous adventure" and then asking for renewed permission to continue. Even more seriously, non-renewal may threaten the company's existence, either because it would lose a key element in its development (the researcher), who would in such cases have to go back to his or her original position, or because the decision would probably have an impact on the continuation of the agreement between the company and the public body, thus compromising the

¹⁰ Not to mention the sacrilege of the open-ended capital SARL that allows for the creation of a corporation with equity of 5,000 FF! A possibility that was refused, for example, by the Aix Court of Appeal (CA Aix, June 14 1996, RJDA 10/96, no. 1216).

¹¹ In compliance with the enterprise government problem.

company's survival. Researchers who do not or who no longer satisfy the conditions for authorization run the risk not only of financial problems if authorization is refused, but also disciplinary and penal measures, as pointed out in the circular of October 7, 1999! But what exactly are these conditions? In reality, they have not been properly explained. Let us look, for example, at the condition which states that the company must not be a subsidiary of an existing company. What happens if, during development, some of the researcher's partners decide to sell their holding to an existing company? Would this automatically place the researcher in an illegal situation?

Beyond all these uncertainties, it is, for the time being, up to the parties, and hence the researcher's employer authority¹², to negotiate the agreement. Given the provision that the product of work done by public researchers in the course of their employment does not, in principle, belong to them, there is a danger that the employer organization will impose conditions that are overly stringent (e.g. disproportionately high royalties) or not stringent enough (e.g. by granting a licence without giving exclusivity). The agreement is of particular importance to the new company because it is entered into after the company has been constituted. Not only that, but problems related to implementation (non-payment of royalties or failure to respect exclusivity) could change the relationship between the partners and thus impact upon the status of the entrepreneur researcher.

The lack of potential for significant additional remuneration for researchers who are seconded or released places them in a medium-term patrimonial logic as opposed to a short-term financial logic, since the risk taken will not produce income if the project succeeds. Hence there is no financial incentive unless the researcher asks to be laid off in order to work for the new company, a step that was possible before the introduction of the mechanism analysed here. In addition, the choice of release (or secondment) could well be available in theory only, since the administrative authority may not have the financial flexibility to pay the researcher and then wait for reimbursement, eventually monitored by the Accounts Court because the funds are from a private source.

Similarly, the choice of SAS status for the new company means that it will be impossible for it to go public, and this is a scenario that now appears to be considered much earlier by start-ups in the information technology sector (indeed, it is common practice in North America). This difficulty could be overcome simply by changing the company's legal status, but at the price of losing the flexibility offered by SAS status. In addition, the company would probably have to comply with the two-year rule stating that business corporations must have been in existence for two years before they change their status (the Act does not address this point).

This dual potential handicap could perhaps be avoided by creating a holding company to go public, thus respecting the letter of the law if not its spirit. Again, however, this may cause the employer authority to refuse renewal of the researcher's secondment or release.

The choice of SAS status involves yet another pitfall, this time due somewhat paradoxically to the main advantage of this particular legal form, namely its considerable organizational freedom. Indeed, when constituting a SAS, the people responsible for drafting the charter¹³ must accurately gauge both the proposed activity and the nature of the relations between the stakeholders, as well as probable future developments.

Lastly, the legal fate of the research done by the entrepreneur researcher for the new company is uncertain, especially if it is based on work carried out before the company was formed. Does it belong to the employer organization or to the new company? Obviously, the question can be settled contractually, but at what price?

¹² On which the ethics board also depends, which creates a potential risk of different (even personalized) treatment of files from one administrative authority to the next.

¹³ The future partners must necessarily obtain assistance from jurists.

This particular case of entrepreneurship, analyzed from the legal standpoint, therefore raises a number of questions, the main one being: How, with (or in spite of) such a mechanism, can an entrepreneur researcher deal with the restrictions and opportunities offered by his or her dual status as a civil servant and as an entrepreneur?

The legal aspects of these two spheres interfere with one another in a number of ways, and this interference not only makes the company's job more difficult but also raises some legitimate questions as to the project's (economic) success. Such questions could be answered first by analysing the implementation laws when they are eventually written¹⁴, which will undoubtedly clarify certain aspects of the situation, and second by an in-depth study of field data showing how the July 1999 Act has contributed to the development of this type of entrepreneurship, and the tools developed by entrepreneur researchers to manage the legal aspects¹⁵, which are sometimes not the only aspects to be considered.

Already, even before the legislative mechanism is examined, early studies have raised two series of questions, one moral in nature, related to university research, and the other cultural in nature, related to the entrepreneurial phenomenon in Europe.

5. Beyond the legislative mechanism

The development of university research through venture creation (spin-offs) has already been studied in both France and Europe. Considered just a few years ago in Europe as sacrilege, spin-off venture creation is now regarded by many political and academic authorities as respectable (Jones-Evans, Klofsten, 1998; Surlemont, Nlemvo, Pirnay, 2000). For the universities, economic development of scientific research results is a new activity for which they are not yet properly prepared (Etzkowitz *et al.*, 1998). In the past, they have always considered commercial operations as being outside their mission. A development policy, however, requires a compromise between two different conceptions of science, the "scientific" conception that considers science as a goal in itself, and the "economic" conception that considers it as a means. The main difficulty of an economic development policy lies in the need to reconcile these two logics which, in terms of goals and methods, bring the university and business communities into opposition (Stankiewicz, 1994; Pirnay, 2000).

Such considerations do have an impact on the spin-off phenomenon in Europe. Pirnay (2000) identified four phases in the economic development of research results by venture creation, and showed that the university culture is one of the greatest obstacles to the emergence of the venture creation idea, for three reasons. First, the goal of most researchers and laboratories is the publication of papers, since it is this that is still, to a large extent, the main factor considered for promotion. Researchers are assessed on their publications, and yet publication is often incompatible with the secrecy required for research findings with significant economic potential. Second, studies have shown that researchers tend to consider money as a means, in contrast to the business community, which considers it as an end. And third, basic research is often considered to be a "noble" activity by the universities, while applied research is sometimes looked upon with disdain.

Early studies in France and Belgium (Surlemont, Nlemvo, Pirnay, 2000) show the interest of the spin-off process but also highlight its somewhat random nature. In France, the work of Mustar (1997, 1998) revealed that only 40 or so businesses had been created every year by researchers since the mid-1980s. French researchers and venture capitalists agree that this

¹⁴ They will probably not be available for several months, or even years, which would directly contradict the legislator's express intentions.

¹⁵ This study is one of the elements of the 'ADREG research program.

performance in no way reflects the true wealth of our scientific and technological potential. Although the figures are not directly comparable, it is interesting to note that more than 1,600 new companies were created in the United States in the period 1980-1996 under licences granted by the universities. Of these, nearly 30% were created in the last two years (1995 and 1996).

Again according to Mustar, the companies created by researchers had a lower than average rate of failure, performed better in terms of growth and turnover, and generally created proportionally more direct and indirect jobs. This clearly confirms their importance in renewing the industrial fabric, and in generating a ripple effect in the regional economy when they grow quickly to reach medium size.

In Belgium, the conclusions are the same. The study to which we refer adds new information on the “centres of excellence” that have developed in Belgium. The authors propose three reasons for the emergence of these centres:

- Lack of opportunities in universities for some high-performance, highly qualified researchers who regard venture creation as a means of obtaining employment;
- The existence of business models in universities to orient spin-off dynamics;
- The existence of faculties that generate spin-offs by teachers and/or researchers who are more open to the entrepreneurial mindset because they have previously worked in an Anglo-Saxon context, considered more entrepreneurial.

Although the first of these reasons is connected more to the career path than to the entrepreneurial logic, the fact remains that, basically, all these reasons are related to the culture that exists or is maintained by the institution (e.g. the university’s willingness to introduce programs aimed at promoting entrepreneurship).

To launch a business, a person must have a minimum level of entrepreneurial spirit, and the entrepreneurial spirit is generally agreed to depend on culture. It is therefore relevant to ask if the legislative framework discussed in this paper encourages the dissemination of an entrepreneurial culture among researchers and teacher-researchers. In other words, are the rules (i.e. the law) able to generate a conventional register (referring to the economic theory of conventions) that is likely to promote entrepreneurship in the public scientific research community? More broadly, is the representation of venture creation (referring to the psychological theory of social representation) able to be shared sufficiently for the stakeholders to agree on the development of entrepreneurship through the proposed framework?

It is possible that differences in representations of entrepreneurship, and also differences in representations of the purposes of research developed in a university’s laboratories, among different types of players (laboratory managers, potentially creative researchers, various social and economic players, etc.) will in fact hinder the development of the phenomenon. For example, the manager of a laboratory known for its basic research may, quite legitimately, find it difficult to understand the interest of developing technology transfers or allowing its researchers to create businesses. *A priori*, he or she will perceive the disadvantages of such initiatives (loss of work, eventual drop in publications, hence fewer citations in major scientific journals, loss of researchers, ethical transgressions¹⁶, etc.). Although the laboratory manager’s role is, to a certain extent, purely managerial, in that he or she must manage a team and a budget, his or her charisma is often the result more of intellectual capital than of managerial skill. If this player is to be receptive to the idea of venture creation by the laboratory’s researchers, then there must be, alongside the legislative framework, a certain

¹⁶ In scientific research in French universities, and regardless of what people say, the researcher’s activity is supposed to be removed from considerations other than the generic consideration of contributing knowledge, and any transgression of this “ethic” may be viewed as perverse.

awareness-raising effort that is not perceived as restrictive. This means looking at things from the players' point of view, and then presenting advantages to which the manager is receptive (such as the problem of employment opportunities for academics with Ph.D. qualifications, increases in operating budgets¹⁷, etc.; these general arguments will, of course, often need to be adapted to local circumstances). There will always be the invincible few, because life experience often generates representation systems that are difficult to mould. On the other hand, if we accept the idea that the entrepreneurial spirit is also a question of culture, among other things, and that the education system is one of the players responsible for disseminating that culture (alongside other entrepreneurial socialization factors such as the family, for example), then clearly the national education system must at least introduce a modicum of awareness into the career paths of its members who go on to become researchers ("valorization" of the entrepreneurial status and evidence that it offers career potential), or perhaps even offer them training in entrepreneurship (Senicourt, Verstraete, 2000).

The universities, however, are not the only players in this system, and it will also be necessary to work on the reference systems of other stakeholders in the development of venture creation by researchers. We know that decision-makers will sometimes select a given type of action because it is more conducive to their own reputation, even though they are aware of another, more effective type of action (Varlet, 1996). In addition, the existing infrastructure also has to be taken into account; in some cases changes are frowned upon, while in others they are encouraged. In France, it is urgent to draw up a clear, visible and accessible map, even if the incubators were, among other things, supposed to facilitate contacts by publicizing the map. In fact, it may well be that the role of the incubators has not yet been clearly established. For example, there is no real agreement on their role of identifying projects, providing pre-expertise, helping with industrial protection, helping entrepreneurs make contact with stakeholders (firms, support institutions, venture capitalists, etc.), providing decision support, providing capital and offering advice, and the consensus is particularly weak for the latter two elements, since other institutions with which the entrepreneur enters into contact are supposed to take over at some point. The incubator is a "facilitator", a developer of the social capital needed to access the various resources required for the project, tending to minimize the risk of failure with the project but never able to eliminate that risk completely (except by the adoption of project evaluation criteria so stringent that only the projects with a very high probability of success would be retained, and in such a case they would be far removed from the notion of risk inherent in entrepreneurship; indeed, an evaluation criterion such as "rate of success", taken alone, is highly questionable).

Failure is punished severely in France. In addition to the financial and psychological impacts, failed individuals often find it difficult to find a new professional position (whether as entrepreneurs or as salaried employees). Researchers and entrepreneurs alike agree that a change in attitude towards failure is needed, for example by recognizing it not as a "sin" but as an experience from which an individual can learn, and that will be useful in any future businesses the individual may create. Failure can be a source of learning; and while it is not a path that entrepreneurs must necessarily take, it can often be regarded as a positive element when studying a business plan.

¹⁷ Hence the possibility of purchasing equipment and not depending exclusively on public funds. But this is not new; laboratories already have opportunities for development in the contracts they enter into with outside firms. Some decision-makers, claiming that this is what other countries do, tend to cite the limited amount of support available to laboratories as a reason for entering into financial contracts with firms. If this idea could be promoted, without exposing the clear contribution of the French state to the quality of the work produced, it would be an excellent way of enhancing current efforts.

In the university community, we do not know what kind of welcome would await a researcher who had tried unsuccessfully to start a business and then returned to the laboratory. It would perhaps be useful to think about what this would mean to the person, above and beyond the comfort of being able to resume his or her previous job, salary and seniority. But many other aspects of research development also deserve attention, and could be the subject of future studies.

Conclusion

Was a legislative framework really needed? This question is especially relevant at a time when the universities are demanding more independence from the State. However, it is not unreasonable to answer in the affirmative, if only for its adaptation of the civil service code.

Will the new framework encourage researchers to create more businesses? It is still too early to answer this question. An affirmative response would presuppose that, alongside the framework itself, other types of action would also be taken, because so far, although there are some ambiguities, it is reasonable to say that the law simply facilitates access to entrepreneurship for people who already want to take this step, but does not yet pay sufficient attention to the others, while a demonstration that entrepreneurship offers potential as a career path could generate much more interest. To some extent, this would mean including entrepreneurship in training programs. We must not expect a revolution in the number of firms created by public researchers; it is the researchers of the future who are more likely to become entrepreneurs. Alongside the very focused discourse on the question of funding for high technology projects, it is important not to forget the discourse, perhaps even more fundamental, on the entrepreneurial culture. The question of culture cannot be separated from the question of value creation in a given area, for example a region or urban community. *A priori*, every region would like to keep within its boundaries the firms created by researchers from its laboratories. The problem is much less serious and perhaps even non-existent in the major American development areas (Silicon Valley, Route 128, etc.), where there is a culture conducive to entrepreneurship, thanks in particular to the existence of shared conventional registers and access to the resources needed to bring projects to fruition. Regional footholds are perhaps more difficult in Europe, where synergies related to resources, qualified staff and infrastructures appear to be more random. Once again, the context will force the public authorities, through their policies, to provide conditions conducive to spin-off development. And we have not even mentioned the tax-related issues.

In the end, although the mechanism is both useful and welcome, we must ask ourselves, somewhat ironically, if it is not paradoxical, in the approach proposed by the French Innovation Act, to encourage people to become entrepreneurs in a slightly “exotic” way compared with what is normally required, i.e. complete commitment. In some ways, the “half measure” aspect introduces the risk that a person in the middle of the process might actually change their mind – with the resulting negative impact this is bound to have on the new company. It seems to us that the law has actually invented a form of “trial entrepreneurship”. To try to reduce the ensuing risks, it appears that mechanisms are now required to help researchers define their own personal entrepreneurial projects.

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