

Encouraging Protection of Public Research Results in Spain

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Received 26 July 2005

Although one of the goals of research at universities and public research bodies is to contribute to the advancement of knowledge, these bodies are also expected to contribute to the innovations being developed in their own respective national or regional systems. The only way to satisfy both the industrial application of scientific results and their necessary dissemination throughout the scientific community at the same time is to previously protect the research activity under the various systems of industrial and intellectual property rights. Unfortunately, this precautionary step is quite uncommon amongst research groups in many countries, and specific action is therefore required of their umbrella institutions in order to ensure that such protection is implemented in an effective way.

This article describes results of the experience since 1986 to promote the industrial protection of research at Spanish universities. To achieve this goal, a range of science policy initiatives were undertaken: training in processing patents for technicians involved in universities interface structures, cooperation with the Spanish Patents Office and other related bodies, encouragement for research groups to ensure the industrial protection of their results and support for researchers and public bodies in the patent registration procedure.

Keywords: IPR management, public research, technology transfer offices

In the linear model of the innovation process, the essential role of universities consists of creating science, originality, quality and interest, which is assessed by their own scientific community. This model considers that the mission of a scientist is firstly to make progress towards the frontiers of knowledge, given that such useful knowledge for industrial production rests on scientific principles. The publication of research results is a substantial part of the scientific method, given that science makes tangible progress through the dissemination of the activities, methodologies and results of all scientists. However, this dissemination process places their new knowledge in the public domain.

The interactive approach of the innovation processes affects the role of universities: if they wish to play an active role, they must interact with the business community and thus ensure that their capacities and knowledge can help to create wealth when they are integrated into the development and

marketing process of a new product or the development of a new industrial process. More recently, studies of knowledge-based economies have established that the role of universities is to contribute to three key functions: Knowledge production (through R&D activities), knowledge transmission (through training), and knowledge transfer (through its dissemination in the society that needs it and by providing solutions to specific problems). The first two are the classic functions of this type of institution, however, until relatively recently, these basic functions were not linked to the economy or the employment of experts who were trained there. The third function has become more relevant in universities during the last 30 years. This 'third mission' requires more specialized management given the greater and faster demand for knowledge in innovation systems (in other words, the time between gaining the knowledge and its practical application has to be reduced for the simple reason that companies are under competitive pressure to do so) and the increasingly demanding rules of the game. In this context, universities have become essential

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components of the regional innovation system, increasing the quantity and quality of their relationships with the other agents involved in the system and promoting relations with a greater social interest in generating a model of a 'learning region', through a coordinated regional government policy on research, innovation and learning that can conveniently articulate the system. This requires the university to develop new legislative channels that facilitate their insertion in the socio-economic environment.

There is, however, a solution that can overcome the apparent dichotomy faced by university researchers between the results of dissemination process, so necessary for their contribution to the advancement of knowledge, and on the other hand, their protection, also indispensable for the exclusive exploitation of those with potential industrial applications: to protect the results for their industrial application *prior to* their publication. By taking advantage of this procedure, universities may continue to fulfil their social role of contributing to the advancement of science while at the same time permitting and promoting the commercial exploitation of the scientific results. In addition, universities and scientists may become more or less involved in the commercial exploitation of their scientific results, and may even decide to become majority shareholders in the technology-based spin-off companies set up for the purpose.

If a university is well integrated into its socio-economic environment, the systematic protection of its R&D results will undoubtedly ensure its impact on this environment, provided that it develops an appropriate interaction policy aimed at enhancing its active role in the innovation system. Moreover, patents and other such ownership rights are part of the university's assets and hence should be afforded a level of management befitting the financial importance that they may acquire. This 'financial value' of the knowledge generated at universities and its potential contribution to national development has led to the creation of active policies in many countries, even in advanced nations like the USA.

This article describes the experience in Spain since 1986, primarily the initiatives aimed at promoting science-industry cooperation, including the first relevant steps in policy and technology, with a special focus on the side-effects in universities, which have contributed more than 55% of the researchers involved in the Spanish innovation system at an

equivalent level to full-time work, and around 30% of national expenditure on R&D activities.

Initiatives Aimed at Promoting Protection of Results of Public Research in Spain

Legal basis for the Protection of Research Results in Spain

The country's accession to the European Union in 1986 brought with it a wide range of political initiatives of great impact for the Spanish innovation system. The national market could be opened up to the other EU member states without having the undesirable effect of a massive closure of national industries only if the country was capable of encouraging the necessary modernization of its basic infrastructure and the adaptation of its legal framework to the new rules of the market. With a view to this foreseeable context, a few years before, the University Reform Act (Act 11/1983, 25 August, usually known by the acronym LRU) was passed by Parliament in 1983, followed in 1986 by a further two decisive Acts in the same field: Act for the Promotion and General Coordination of Scientific and Technical Research (Act 13/1986 of 14 April, usually called 'the Science Act') and the Patents Act (Act 11/1986 of 20 March 1986).

The University Reform Act gave Spanish universities independence to manage their budget and assets, amongst other things, patents and other industrial property rights. Another transcendental possibility introduced by the LRU was the ability to enter into contracts with third parties for scientific, technical and artistic work (Article 11). Spanish universities thus moved from situations, which did not have legal sanction to a more independent one, wherein there has been an increase in contracts with other socio-economic sectors that continue to remain. The Science Act gives public research bodies a similar right to outsource R&D activities and transfer the results (Article 18).

The Patents Act, in its Article 20 focuses specifically on researchers working for the public administration system and university lecturers. Section 2 of Article 20 of the same Act bestows ownership of lecturers' inventions on the university, establishing in Sections 3 to 6 of the same Article, a special framework for the distribution of the profits accruing from their exploitation, and recognising their right to participate in them. Sections 8 and 9 open up the possibility of applying the same privileges for lecturers to researchers in public bodies, an aspect regulated later under Royal Decree 55/2002, of

18 January, on the exploitation and transfer of inventions discovered at public research bodies. The Act, however, does not discuss the issue of profit distribution, and instead leaves the issue of possible participation by lecturers in accrued profits and the amounts to be dealt with by each university to their respective statutes.

All of these apply to the results obtained by lecturers and researchers under self-funding, at universities, or via government subsidies, categorised as 'internal results'. Under the Patents Act, in such cases, university lecturers must report to their institution on the existence of results potentially worthy of protection, and the institution should in turn decide whether or not to apply for a patent via the procedures established by the institution, in order to prevent the publication of the scientific work leading to the loss of potential property rights by the university.

Another important aspect covers the identity of the titleholder of the research contracts between companies and universities. Section 7, Article 20 of the Patents Act states that this aspect has to be covered in the corresponding contract, thus giving the contractual parties the right to establish the regime they deem most appropriate. In the case of projects funded by the EU's R&D framework programmes, ownership lies in the hands of those who have signed the corresponding consortium agreements.

Initiatives on Scientific and Technological Policy under the National R&D Plan (1988-1996)

Within the legal framework described in the previous section, the first National R&D Plan (1988-1991) saw the establishment of Technology Transfer Offices (OTRI) in all universities, designed as units that would facilitate the necessary R&D cooperation between universities and the business world. The OTRIs were coordinated and backed by the Technology Transfer Office (OTT), a unit under the auspices of the Secretariat-General of the National R&D Plan. From the outset, the protection of research results at universities was one of the main thrusts of this network, considered to be an indispensable condition for the successful transfer of public research results to the industrial sector, which was brought to fruition through a number of initiatives.

The initial situation envisaged two circumstances: in the first place, protection of scientific results prior to their publication in scientific journals was not a common step taken by Spanish scientists. Secondly,

universities did not regard knowledge as a financial asset and thus did not have on hand any qualified services to deal with it in their management structures. The initiatives taken by the Secretariat-General of the National R&D Plan therefore consisted of the following actions:

Basic Training of OTRI Technicians in Industrial and Intellectual Property Rights

When the establishment process of OTRI began, the technicians who joined the organisation to provide their services were senior university graduates contracted specifically for this activity or university lecturers. Training in the various university degree courses (science, technology and business) did not include issues linked to industrial and intellectual property rights, with the exception of law, and thus these technicians had little or no training in the field. Since 1988, it has therefore been deemed essential to provide new technicians joining the OTRI with supplementary training on the courses organised annually by the Secretariat-General of the National R&D Plan. In this respect, the organisation was able to use the experience of the Technology Evaluation and Transfer Office under the national Scientific Research Council (CSIC), which had been processing groups under this body for some considerable time.

The OTT also organised several monographic courses to deal with this material in further depth, where invaluable assistance was given by the Spanish Patents and Trade Marks Office, and some pre-doctoral grants were provided as supplementary training to specialist personnel in industrial property issues.

Specialised Services Related to Industrial Property Rights Provided by the OTT of the National R&D Plan Secretariat

The design of the OTRI/OTT network was partly based on the supposition that the OTRIs would consist of small, highly specialised structures focusing on the establishment of contacts and management of contracts, while for highly specific aspects such as the drafting and processing of different types of industrial property, they were expected to have the assistance of the OTT.

From the outset, OTT provided advice to the OTRIs on the various types of research results protection, both in relation to the most appropriate solution for each case (patent, applicable model, plant strain, legal protection of semiconductor products, computer programs, etc.), and also the required levels of protection (duration, countries covered, etc.),

depending on the type of results obtained, their originality, technological importance, cost, etc. In certain cases, the proposal involved the combination of several systems.

In the OTT, there were also a number of experts in different technological areas helping researchers to draft the descriptive summaries for the patents, and the claims, since drafting played a key role in determining whether or not the invention was given the optimum level of protection.

Raising Awareness Amongst University Researchers about the Importance of Protection and Basic Information on Requirements

In 1989, a number of initiatives were taken by the OTT and various OTRIs aimed at raising the awareness of researchers about the importance of envisaging the protection of their results before they are published, within the general context of a dynamization of public researchers towards innovation. For this purpose, a large number of seminars and courses were organised over the years at many universities and research centres. These seminars have been held at many universities, in some cases organized by the OTT of the Secretariat-General of the National R&D Plan in collaboration with university OTRIs and in other cases directly by the academic institutions themselves. They have generally received assistance from the Spanish Patents and Trademark Office.

Other Initiatives

In addition to the above-mentioned initiatives, other related activities have helped to promote the protection of university industrial property rights:

Fee Exemption

Following a study by the OTT, the Secretariat-General of the National R&D Plan interpreted Article 53 of the University Reform Act in such a way that permitted the exemption of certain fees in applications for and maintenance of Spanish patents for university bodies. Although the financial implications of exemption from these low fees are not particularly great, the move facilitated processing of the patents and their annual maintenance, and meant one less hurdle to overcome in the campaign for intellectual property rights on university campuses.

Reports on Technological Monitoring

One of the pre-requisites of patent acceptance, is that the applications must describe the invention in such a way that it can be reproduced by an expert in the field. This is therefore information that should be

taken into account by researchers before they begin any research project, in addition to their contribution to the dissemination of knowledge about technological trends and movements. This led the Secretariat-General of the National R&D Plan to ask the Patents and Trademark Office to draft a number of Technological Monitoring Reports, which subsequently became quarterly publications on the same issue.

Initiatives by the Spanish University OTRI Network (1997-actual)

Since 1996, the National R&D Plan (CICYT, 1995) has been running a programme to promote the cooperation in the Spanish Innovation System (PACTI), including financial support for the development of the OTRI in two modes: one that provides basic funding for the OTRI and another for joint initiatives by several of these units.

This expansion of financial assistance for OTRIs coincided with the establishment in 1997 of the Spanish University Technology Transfer Office Network (University OTRI Network) under the auspices of the General Assembly of the Spanish University Chancellors' Conference (CRUE), which was aimed at dynamising and facilitating the orientation of university R&D activities towards convergence and complementarity with the technological interests of their social and economic environment, while at the same time value-adding and disseminating the role of universities as essential components in the national innovation system. One of the objectives of the university OTRI network is to encourage the development and professionalization of OTRIs as specialized structures in the promotion and management of technological supply and knowledge, as well as the relations between universities and business. In order to achieve its objectives, the university OTRI network is organized into task groups, selected on the basis of themes identified as being of general interest. In order to advance the activities of these task groups, the university OTRIs are provided with financial backing from a number of sources: the National R&D Plan, Regional Government programmes for the promotion of research, etc. One of the four groups currently in operation is concerned with the protection and evaluation of research results. Initially, this task group has developed an evaluation methodology known as T-TRIP, and also an overall model for contracting technology transfer and another for joint invention

ownership. More recently, it has set up a network of market-oriented technology evaluators (RED VALOR).

During the first stage, work focused on encouraging the protection of results, however since 2000 it has been primarily aimed at encouraging the marketing of patents by means of several initiatives, some aimed at improving the professional capacity of the OTRI technicians in value-adding and marketing of technologies and generating procedures and documents that are helpful for the improvement of management, while others are aimed at facilitating the technological and economic evaluation of patents and the dissemination of technological resources via regional and international mechanisms.

Results: Overview of Initiatives

The above-mentioned initiatives taken along with the evolution of Spanish universities towards a more favourable attitude to innovation and cooperation with the business sector soon yielded positive results. Prior to 1989, Spanish universities had no defined policies on industrial property rights because their institutional objectives simply did not contemplate the possibility of the transfer of research results to industry. In the decade from 1969 to 1978, Spanish universities only registered 5 patents, with 34 in the following decade. After 1989, however, there was a notable increase in

the number of patents registered by universities, and in a single year they surpassed all those registered in the previous decade (Figure 1). Since 1999, there has been a further increase in applications for patents as a result of the consolidation of the above-mentioned initiatives.

Now more than 50% of Spanish universities have established regulations and procedures for the protection of research results, including guideline documents on the procedures to follow for reporting inventions to the OTRI, handbooks for drafting patents, models for contracts on joint ownership, cession of rights by scholarship holders, licences, etc. To a large degree, these procedures have been the result of the activities of the task group described before.

As expected, R&D indicators at Spanish universities in the survey period have shown remarkable growth. Figure 2 shows figures on patents in terms of numbers of researchers working under equivalent conditions to full-time employment, and also annual expenditure on R&D activities. There has also been a considerable increase in protection in relative terms, i.e., it has not been due to growth in expenditure on R&D activities at Spanish universities, but rather to the effects of the scientific and technological policy initiatives.

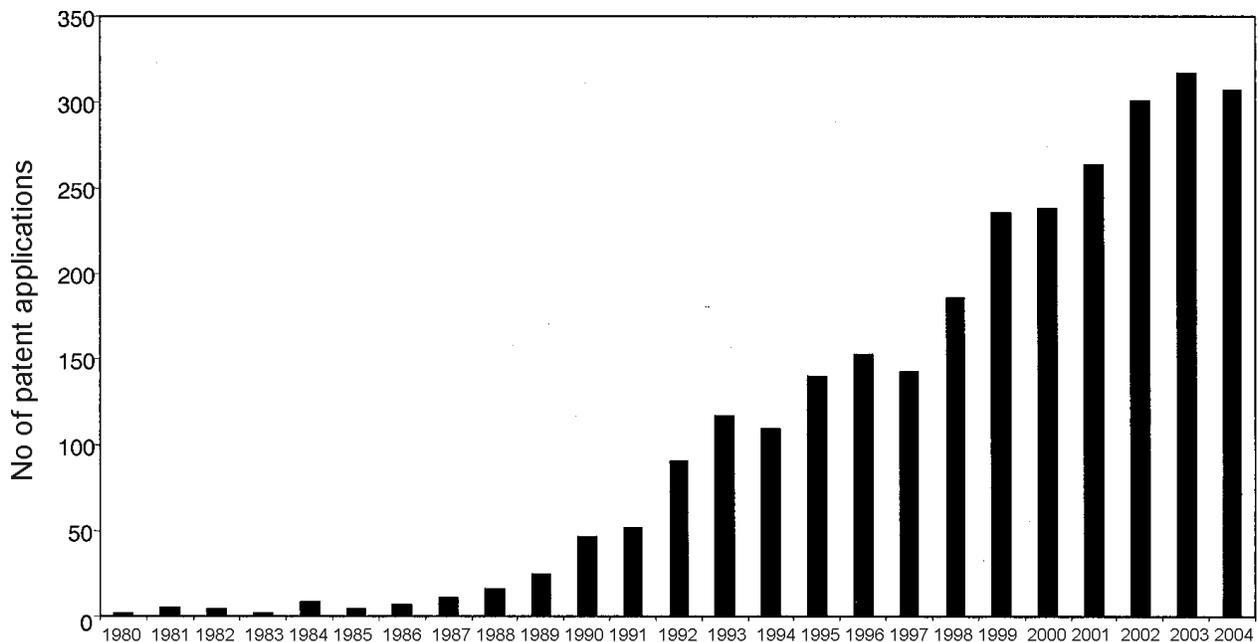


Fig. 1 — Trends in Spanish University patent applications

(Source: OEPM, 2005)

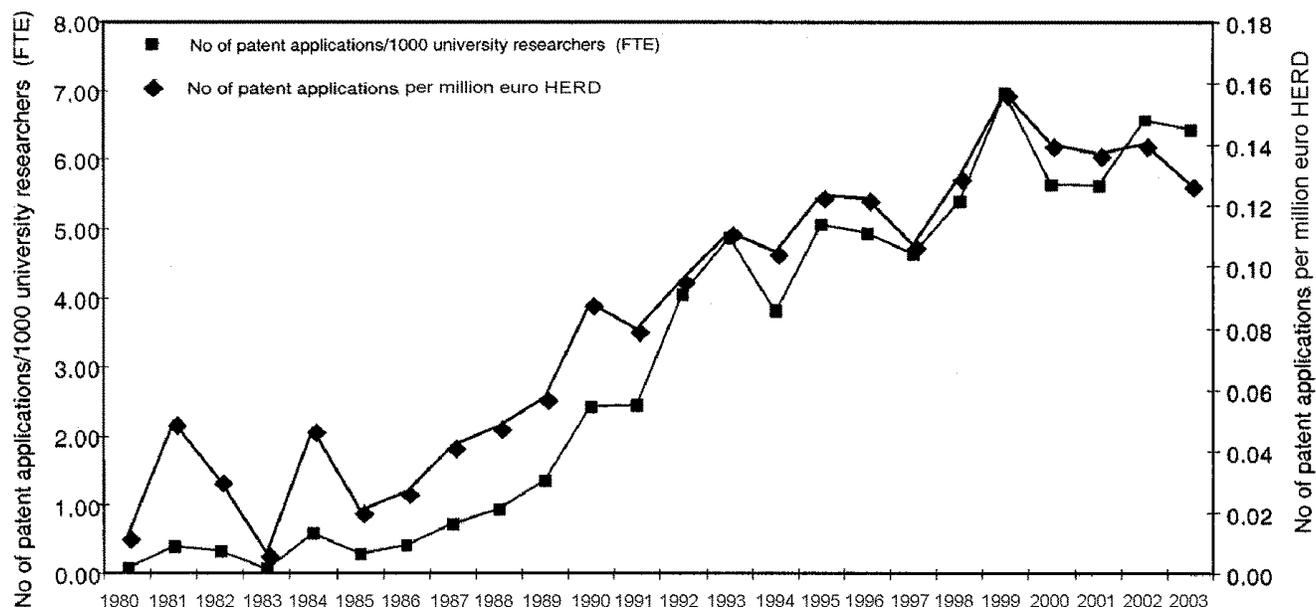


Fig. 2 — Trends in Spanish university patent applications with respect to higher education R&D indicators

(Source: Spanish Patent and Trade Marks Office and National Statistics Institute)

In 2004, the Spanish university OTRIs had a portfolio of 1,270 patents and between 2003 and 2004 had subscribed 136 licensing contracts and obtained over €130 million in royalties from licences granted up to that time.

Conclusions

The knowledge generated as a result of R&D activities at universities should not only contribute to the advancement of science, but also be regarded as a financial commodity that should be managed and marketed properly by universities and included as part of their assets.

In order to make the marketing of the results compatible with their necessary dissemination via the usual channels (publications, lectures, theses, etc.), they must be given the protection afforded by industrial property rights prior to their publication. This makes it necessary for universities to draft explicit policies on the protection and marketing of research results and set up a management system that is professional and appropriate to the potential financial value of these assets. Creating solid invention protection laws, developing scientific and technological policies that facilitate cooperation between science and industry, establishing well-defined, clear, public policies on the issue, inculcating the required knowledge among the researchers will

facilitate efficient and broad-scale protection of research results at universities. These practices in the long run will clearly establish a culture of industrial research and protection at the university level.

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