

Technology transfer - premises for valorization of RDI results. The case of Romania

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Abstract

Technology transfer is an important instrument for promoting the economic growth and new jobs creation.

Europe has a strong science and technology base but there is a failure to exploit this potential. There are numerous barriers (structural, economic and legal) which affect the spin-out initiatives at the European Union but the main cause is represented by the lack of the investment funds, especially in the early stages (pre-seed and seed) of business development. Moreover, these deficiencies were increased by the effects of the international financial crisis, felt by majority states in the last period.

Taking into consideration the deficiencies in the field of technology transfer, the EU and national authorities play a key role in developing appropriate financial instruments to support technology transfer.

Some of the factors for a successful technology transfer are the followings: a close academic-business relationship, bridging the funding gap between research and early stage financing through financial scheme, the involvement of potential private sector investors in the process of commercialising an R&D project, promoting an entrepreneurial culture amongst researchers, ensuring a high quality of spin-off management, increasing the role of technology transfer offices in promoting the RDI results.

The efforts to improve technology transfer can only succeed through an approach that combines public-private partnership at a national level with EU-level encouragement where this is likely to demonstrate Community added value.

Keywords: technology transfer, RDI results, valorisation, seed capital, strategy

JEL Classifications: G20, O32, Q55

1. Introduction

The research - development and innovation (RDI) activity is a strategic component and it can become decisive for the economic development and social progress in any society. Closely related to this, the technology transfer refers to the process of trading research, development and innovation results of universities or other research institutes. Technology transfer occurs in many settings: within organizations, between organizations and across international boundaries (Spann and Adams, 1997).

In recent years technology transfer has received a lot of attention and it is considered an important vehicle to promote economic growth and job creation. Europe has a strong science and technology base but there is a failure to exploit this potential. The inadequate provision of seed capital is a major contributing factor in this respect (EC, 2006a).

Transforming R&D and innovation projects into successful business start-ups depends heavily on the early stage finance. In that sense, Europe has a strong science and technology base but this potential is not exploited accordingly.

The shortage of seed capital is related to an untapped economic potential of research results with a large number of ideas in the science sector but also it can be attributed to the high risk associated with early stage financing coupled with relatively low rates of return. Moreover, the international financial crisis has negative effects on the seed financing market (Giurca Vasilescu and Popa, 2009).

Besides the lack of financing resources, there are numerous structural, economic and legal barriers that hinder spin-out initiatives. On the one side, academic institutions often lack management skills linked to business creation; on the other side, they also need to cope with the complex issues of patents and intellectual property rights (IPR).

Therefore, numerous actions and strategies should be adopted at national and international level in order to support the RDI initiatives, IPR and also the financing instruments for this strategic sector.

2. Technology transfer - recent trends

2.1. Academic - business relationship regarding the technology transfer

Technology transfer is generally the process of trading research results of universities or other research institutes. More and more, the technology transfer is considered an important tool to stimulate the economic development.

Successful technology transfer depends on a close academic-business relationship. However, at the same time, the roles of these different partners should not be confused. Ideally, universities should not be directly involved in spin-out activities beyond the R&D phase and once a product is licensed. They do not have the expertise required to successfully commercialise R&D and this function is best left to business.

From a university's perspective, it is also important not to jeopardise academic principles and autonomy in the pursuit of technology transfer. Furthermore, business should be more closely involved in the decision over which R&D projects are worth pursuing and patenting.

At present, academics tend to have too much influence on this process. More business involvement at an earlier stage could also make it

easier to subsequently raise finance because there will be a greater familiarity with the project concerned.

There is also a need to bridge the funding gap between the proof of concept stage in a project's development and commercialization and the establishment of a company. This funding gap partly exists because of the separation between academia and business.

In the early stages of spin-out creation the access to finance is crucial. In fact, a key factor in explaining difficulties of academic spin-out initiatives in Europe is the lack of proper funding resources, especially the seed capital.

Seed capital is the finance provided for research, assess and develop an initial concept before a business has reached the start-up phase. The lack of seed capital can be attributed to the high risk associated with early stage financing coupled with relatively low rates of return. The investors are not interested on funding for academic spin-outs when inventions have not reached the proof-of-concept stage.

Therefore, the involvement of potential private sector investors at an early stage in the process of commercialising an R&D project is likely to contribute to its success by bringing in business expertise for a spin-offs development.

Business angels are an important potential source of seed capital funding that can help to fill the early stage financing gap. However, this is less the case in Europe where the business angel community is not as developed as in the US. There are around 30 business angels per one million inhabitants in Europe, whereas the number is over 1,400 in the US (EIF, 2005).

There is a need to increase the pool of business angel finance in Europe. In particular, consideration should be given to introducing tax incentives to encourage business angel investment which is mostly a task for national authorities.

2.2. Strategies to promote the technology transfer

There are many factors that determine which strategy is the most appropriate for promotion the technology transfer. The decision on whether to pursue a spin-out or licensing route depends partly on the legal framework within which universities operate.

Thus, under the "Professors' Privilege" system the intellectual property was owned by the academic responsible for the R&D, and the only way a university could commercialise a project was through a spin-out company. The ending of this system means that universities now have a greater range of options with regard to commercialization methods.

Although most effort is put into supporting spin-outs, the alternative of focusing on licensing and leaving it to established companies to undertake the commercialisation of R&D is often a more appropriate strategy. This alternative is more common in the US than in Europe.

In fact, both licensing and spin-out options need to be available as a way of promoting technology transfer. This is because there might not be an existing company that is willing to take up a license.

Conversely, although universities may consider the creation of a spin-out preferable, in many circumstances, the licensing route may be more appropriate.

To some extent, the choice also depends on the type of technology a project is based on. The nature of the local economy is also an important consideration - in some regions and countries, there are not enough medium-sized or larger companies to make licensing a feasible option.

The commercialisation records in the US is superior to Europe and this can be explained by the significantly larger R&D budgets and the advantages provided by a large homogeneous market for goods and services. Compared to the US, the European technology transfer infrastructures remain fragmented and suffer from a lack of critical mass.

It also needs to be recognized that many R&D projects do not involve taking out patents, often because there is a reluctance to incur the costs that the procedure involves.

Promoting an entrepreneurial culture amongst researchers is necessary to stimulate an interest in seeking to commercialise R&D. One way of helping to achieve this is to encourage academics to adopt a more commercial approach to their activities by providing potentially large financial incentives to all involved.

Also, the quality of spin-off management is critical and must include people with business skills. Those involved in a spin-out have the necessary technological know-how but the academic spin-offs usually lack the necessary business skills. Recruiting experienced CEOs to manage spin-offs is one way of addressing this problem but they must be brought in at an early stage.

The technology transfer offices play a key role in promoting the RDI results. Developing a successful technology transfer offices depends on being able to exploit economies of scale. One way of achieving this purpose is to establish technology transfer offices that operate on behalf of a number of different universities. At the same time, it is important that technology transfer offices develop specialist know-how in the technology fields that make up their target market.

The professionalism of technology transfer offices needs to be improved. In particular, there is a need to attract more people with business experience and expertise rather than relying on recruits from the academic world or public sector.

One idea would be to introduce schemes to subsidize the technology transfer office costs of taking on people from business. At the same time, people with business experience who join technology transfer offices need to have an understanding of academia.

2.3. Technology transfer - initiatives at the European Union

The EU and national authorities play a key role in helping to develop appropriate financial instruments to support technology transfer. As a guiding principle, the role of public intervention should be to support projects that the private sector is unwilling to invest in

rather than those where the incomes is sufficient to attract private sector investors.

Steps need to be taken at the EU level and by Member States to encourage the development of the business angels market as this is a key source of early stage technology transfer finance. At a national level, there is a need for action to provide tax incentives to help develop the pool of business angels' finance. This should, however, be combined with other measures including the development generally of preseed/seed capital financing schemes for technology transfer, promotion of networking and (on the demand side) investment readiness schemes. In many EU Member States there is scope for actions at both national and regional level where networks are fragmented.

Regarding the intellectual property rights, when an R&D project is EU-supported, there can be complications with the patenting procedures because consortium agreements mean that IPR is shared. In that sense, the partners should automatically be given a license to any pre-existing know-how to help overcome this problem. Another complication is the very large scale of size for many EU programmes which means that they are not very transparent to users. Besides, the cost of obtaining a European patent is also too high.

At EU level, there should also be a continued emphasis on developing new financial instruments to promote technology transfer. The European Investment Fund (EIF) assessed the feasibility and defined the operational modalities of a new type of targeted risk capital and technology transfer investment vehicle linking centres of excellence from different European countries. The aim is to bridge the financing gap between research and early stage financing through a financial scheme called the technology transfer accelerator.

At the EU level, should be supported the development of European networks that bring together those involved in technology transfer. The initiatives should extend their reach beyond those directly involved in operating technology transfer offices and include business angels, venture capitals, and other support organisations such as professional advisers, incubators and organisations involved in providing more specialized advice and assistance to technology based start-ups. These key players can share experience, identify good practices and promote collaboration in this field.

The possibility to support the valorisation of the R&D results can be done through accession of structural funds. One example is the project INTERVALUE (Inter-regional Cooperation for Valorisation of Research Results), under the programme South East Europe Transnational Cooperation coordinated by Aristotle University of Thessaloniki with 12 partners from 6 SEE countries. The main objective of the INTERVALUE project is to set up a mechanism covering most of the SEE area, which allows dissemination of key technologies and help to establish supply chains between the R&D institutions and the business sector.

3. Technology transfer in Romania

Science, technology and innovation represent domains that constantly generate technological progress, ensuring the durability of the development and of the future economic competitiveness in Romania, as in the other countries. Innovation and technological transfer are also

solutions for the economic problems and for the permanent renewal of the necessary technology by connecting the Romanian research to the requirements and pressures of a free, expanding market, in the context of globalization.

At the national level, in the last years there were recorded some progresses in R&D field, consisting in a less fragmented research area; elaboration of the second National Plan for Research and Innovation; the accession of structural funds. Despite the efforts, there are some problems related to the lack of financing resources for research, the lack of a clear partnership with the business environment or the lack of publicity for the R&D results.

The general objectives at the national level regarding the technology transfer are the followings:

- creation and development of entities for technology transfer oriented technologically in order to stimulate the innovative initiatives, to support the innovative firms;
- creation and development of a national network of innovation and technology transfer entities;
- modernization and inclusion of the R&D activity in the process of economic reform;
- efficient use of the human and material resources from the R&D system.

The specific objectives are the followings:

- application and commercialization of the results of R&D activities;
- increasing of the level of using for the material and human resources in the R&D units;
- ensuring the access of SMEs to the technological services and R&D infrastructure;
- supporting the development of innovative SMEs.

The Ministry of Education, Research and Innovation support the development of the infrastructure for innovation and technology transfer at the national, regional and local level, through the followings types of entities:

- centres for technology transfer;
- business and technological incubators;
- centres for technological information;
- connection offices with industry;
- scientific and technological parks.

The financing of the entities is ensured as follows:

- financial support for infrastructure development, at the national, regional and local level is ensured from the funds allocated to the ministers, from the funds of the local public administrations, from their own funds or other funds;
- financial support of the entities from public funds can be achieved from regional, national or international funds;
- the state, through the authority for R&D support logistical and financial, in co-financing system, the establishment and development of the entities.

The main financing sources for the R&D activities and technology transfer in Romania are the state budget and private sources (table nr. 1).

Table 1. Financing sources for RDI in Romania

Year	Financing sources (% from GDP)			
	State Budget	Private sources	FP6/FP7	Structural funds
2004	0,21	0,19	0,01	-
2005	0,27	0,30	0,02	-
2006	0,38	0,40	0,03	-
2007	0,56	0,40	0,04	0,20
2008	0,75	0,60	0,10	0,50

Source: National Institute of Statistics, Annual Report 2008

The main public R&D and innovation funds providers are the Ministry of Education, Research and Innovation, through the National Agency for Scientific Research and the National Scientific Research Council of Higher Education. In addition, the Romanian Academy finance research programmes in natural and socio-humanistic sciences.

In Romania, ensuring the protection of intellectual property is the duty of two specialized institutions: the State Office for Inventions and Trademarks (specialized body of the central public administration, subordinated to the Government, as sole authority for ensuring the protection of industrial property) and the Romanian Copyright Office - in the field of copyright and related rights.

The project of the National Strategy in the Field of Intellectual Property for the period 2009 - 2013 was initiated by the State Office for Inventions and Trademarks (OSIM) in collaboration with other 18 institutions. A series of objectives in accordance with Romania's Governing Program were set up with a view to increasing the creativity and innovation and especially to applying the technical creations as a society development factor, the project also meeting the objectives of the Lisbon Strategy of dealing with the low productivity and stagnation of economic growth, as established by the European Commission.

Also, in cooperation with the European Patent Office (EPO), OSIM elaborated the National Action Plan 2007 - 2010 having the major objective of increasing the efficiency of the office activity and improving the internal and international communication, as well as improving the mechanism of enforcement the industrial property rights.

A total number of 24138 applications for protection titles were filed with OSIM in 2008, registering a total decrease by 3.6% as compared with the previous year (figure 1).

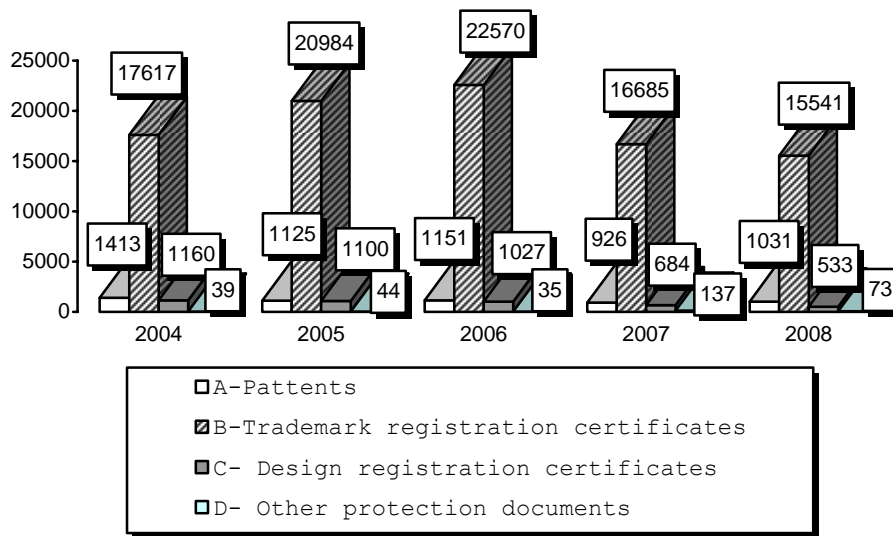


Figure 1. Number of applications for protection titles (2004-2008)
 Source: State Office for Inventions and Trademarks (OSIM), Annual Report, 2008

Although, on the whole, the number of filed applications decreased, it is worth mentioning that an 11.3% increase of the number of filed patent applications and a 5.6% increase of the number of trademark renewal applications as compared with the previous year were registered.

On solicitants categories, more than 51% of the applications were filed by legal entities in 2008 in comparison with 2007 when most of the applications were filled out by individuals (figure 2).

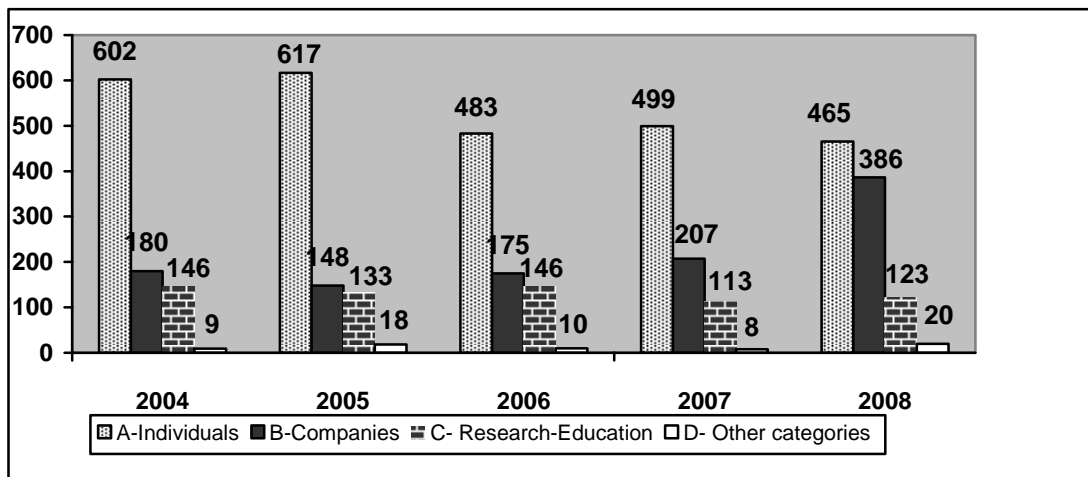


Figure 2. Patent applications - by applicants' categories (2004-2008)
 Source: State Office for Inventions and Trademarks (OSIM), Annual Report, 2008

In 2008, a total number of 14614 protection titles were granted by OSIM, with 28.5% more than in 2007, and almost the double of the number of protection titles issued in 2004 (figure 3).

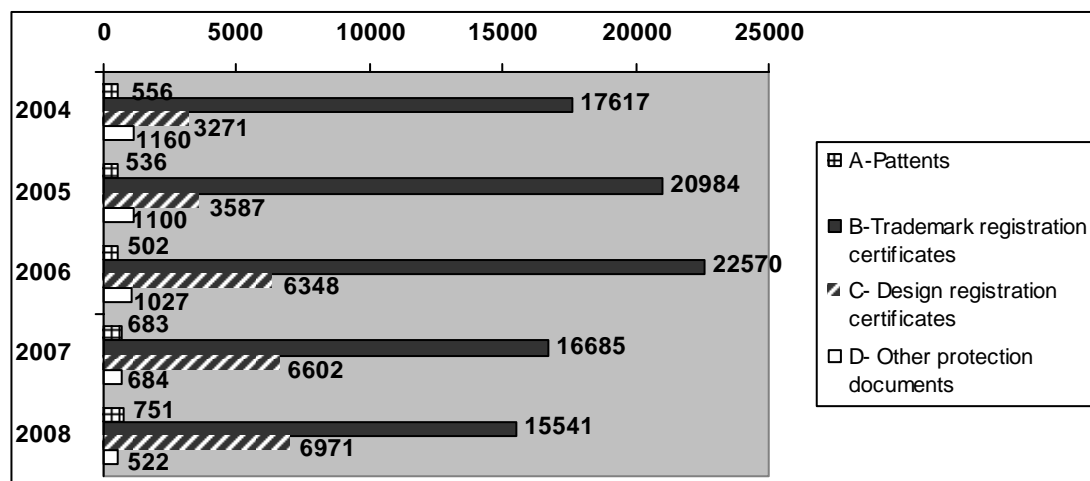


Figure 3. Number of protection titles granted (2004-2008)

Source: State Office for Inventions and Trademarks (OSIM), Annual Report, 2008

The increase concerns both the patents and the trademark or design registration certificates. The growth level ranges between 14.7% in designs, 22.5% in patents and 32% in trademark certificates. The high number of issued protection documents is particularly due to the improvement of the examination quality level.

4. Conclusions

One of the keys to the Lisbon Strategy's aim of promoting a dynamic and entrepreneurial knowledge-based economy is the development of financing methods for technology transfer in Europe. In particular, there are shortcomings in the provision of early stage finance and a need to develop ways of attracting more private sector involvement in the pre-seed and seed capital financing stages of a company's development.

In Romania, in the last years there were recorded some progresses in R&D field, consisting in a less fragmented research area; elaboration of the second National Plan for Research and Innovation and the accession of structural funds. Despite these efforts, there is a lack of financing resources for research, there was not realized a clear partnership with the business environment, there is a lack of publicity for the R&D results and there were not created the real premises for valorisation the R&D results.

Taking into consideration the deficiencies in the field of technology transfer, the EU and national authorities should play a key role in order to develop appropriate financial instruments to support technology transfer.

At the national level this includes developing a favourable fiscal environment for business angel and seed capital financing activities, particularly tax incentives. At both EU and national level, there is scope for additional initiatives to provide public funds for the pre-seed financing of projects and more generally, supporting the

development of business angels networks and/or new seed capital funds (e.g. through co-investment schemes, training of network managers, studies to map out seed capital and business angel provision, etc.).

Publicly-supported co-investment schemes could have an increasingly important role to play in encouraging private sector investors to come forward. Also, the role of the Structural Funds has been critical to stimulating the provision of seed capital in many EU Member States.

The support for early stage financial instruments should be corroborated with loans and other interventions such as guarantees for start-ups. There is considerable support available from the 2007-13 Cohesion and Structural Funds, EIF (Technology Transfer Accelerator), the new Competitiveness and Innovation Framework Programme, and other EU programmes for seed capital schemes.

The development of financing tools for technology transfer needs to be combined with other actions in order to improve the performance of R&D-based start-up companies. This includes strengthening the role of technology transfer offices. Also, various priorities were identified specifically with regard to licensing and spin-off creation. Efforts to improve technology transfer can only succeed through an approach that joins public-private partnership at a national level with EU-level encouragement where this is likely to demonstrate Community added value.

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