

TECHNOLOGY TRANSFER – FINANCING OPPORTUNITIES AND LIMITS IN EUROPEAN UNION

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1. Introduction

The technology transfer is the transfer process of research results obtained by universities or research centers to the market but also the transfer of know-how, technology or expertise from one organization to another or the transfer of technology among the industrial sectors.

In recent years, the technology transfer was considered an important tool for promoting economic growth and creating jobs.

Although Europe has a strong scientific and technological basis, this potential is not properly valorized and the main cause is the lack of investment funds, particularly in the early stages of business development. This failure was increased by the effects of international financial crisis, experienced by most countries.

2. Financing in the early stages of the companies

Transforming the research, development and innovation projects in business success depends largely on financing in the early stages of a company. In this phase, a company will use the financing sources (named "seed capital") for research and development, for a prototype of the concept/idea or for a market study.

The "seed" stage is considered as being the first development stage for a company. It can be identified also a "pre-

seed" stage, in which can be just evaluated the concept. Therefore, for the early stages of business development (previous to the start-up), the companies need the pre-seed and seed capital.

The pre-seed capital is necessary for a training period of 2-3 years before the establishment of a new company in order to finance a minimum market analysis, the competitive analysis and to provide access to intellectual property rights.

The seed capital is used for research and development of an initial concept before the business get to the start-up phase.

Therefore, the seed capital financing is required when are created spin-out companies (i.e., a new company created to commercialize the results of research institutes/research centers).

The concept of spin-out has emerged as a feature of the spin-off, the difference between them consists in the fact that a spin-out is completely independent from the entity it has separated. Thus, the spin-out companies will get the intellectual property, the technology or existing products from the parent organization of which they split off and they will turn them into products or services.

The banking credits are a primary source of financing used for business start-ups but the risks and uncertainties hinder the granting of loans for spin-out companies. These companies do not have a history in order to estimate future cash flow and have no assets to provide

guarantees required by the credit institutions. For these reasons, even when can be accessed bank loans, the interest rates are very high.

In these conditions, the start-ups have to find alternative source for financing such as business angels, venture capital, etc.

3. Financing the technology transfer in European Union

3.1. Main barriers in financing technology transfer in EU

Despite the high potential, the level of exploitation for research results is quite low in Europe. The level of trading the research results in the U.S. is superior to the European countries and this may be explained by the existence of significantly higher budgets for research and development and the benefit provided by a homogeneous market of goods and services. As well, compared with U.S. the technology transfer infrastructure is very fragmented in the European countries.

At European level there are many structural barriers, which hinder the economic and legal initiatives of spin-out. Thus, the academic institutions often have managers with business skills and in addition, it must be solved the complex issue of intellectual property rights.

An important factor in explaining the difficulties faced by the research institutions is the lack of appropriate funding sources. In the early stages of business, the access to funding sources is crucial and it is the main barrier to entrepreneurs and academic institutions. The investors are not interested to finance the academic spin-outs if the inventions are not patented.

The lack of seed capital is caused also by the high risk associated with funding in initial phases of the business in parallel with the registration of low profitability ratios.

In addition, the entrepreneurs which intend to create a spin-out do often not have the necessary qualities to present the invention in an attractive way to the investors. The entrepreneurs need to understand the process which lead to a successful investment through the „investment readiness” programs which refers to the ability of the entrepreneur who search the financial resources to understand the specific needs of the investor and to be able to answer them by providing relevant information that can determine the investor to finance the project or the business.

The technology transfer should be a fertile ground for investors as higher education institutions have innovations that can be transformed into successful products. However, the relative lack of funding with venture capital funds for academic spin-out can be explained by the high risks associated with technological transfers. Technologies require financial resources in the early phase where investors are unwilling or unable to provide. The main reasons that lead to this situation are the followings:

- *time gap*. Academic spin-out are often associated with a high degree of uncertainty because they do not have a business idea confirmed by the market and they cover a long period for investors. First, the technology companies should develop and trade the business idea and the market should certify the business. Usually, it takes a long time before the company will achieve sufficient revenue to be redistributed to investors;

- *financial gap*. In general, the venture capital finds seek less risky projects based on proven ideas that promise rapid revenue and focuses particularly on investments in later stages of business development.

These gaps stress the importance of informal investors as business angels.

3.2 Main financing sources for technology transfer

In Europe, the university funds come mainly from public resources, although in function of country or university, they can be supplemented with other income from research, tuition fees or donations. In some countries, public funds were diverted for research projects which present more opportunities for commercial exploitation. However, the impact of public funding initiatives in the field of technology transfer is largely dependent on the management structure and quality.

Also, the technology transfer can be financed from own resources by universities. Trying to solve the financing problem, the academic institutions form alliances with research institutions in an effort to attract resources but also the interest of potential investors.

In order to attract attention of the industrial firms, the universities try to increase the transparency of research results. In some countries, the academic institutions provide the necessary research infrastructure (technological incubators or technology transfer centers) which facilitate the commercialization initiatives.

The informal investors as business angels (individual investors that provide capital for a business managed by another person) can play an important role in financing technology transfer. Thus, the business angels can fill out the lack of investment resources that usually occurs between the personal resources of entrepreneurs and venture capital funds and they are much more willing to invest in the initial phase of development of firms. In addition, they have practical and managerial experience in order to invest in technology transfer projects.

The amounts invested by business angels are much lower than the investment made by venture capital funds and therefore are more suitable for initial funding of a business. Moreover,

the business angels can be a significant source of capital for pre-seed investment. The researchers often need small amounts of money, microcredits of 25,000 euros or less. However there are difficulties in this case because of information asymmetry and the fact that lenders often perceive microcredit as a high-cost activity.

The non-reimbursable grants are a popular form of financing for public programs in order to create new business. In order to facilitate technology transfers, governments can give guarantees, may take some of the risks or use tax reduction mechanisms.

For seed capital, the association of financial resources with assistance may be considered an efficient formula. As those involved in spin-outs have technological knowledge and but do not have the required skills in order to set up an efficient company, providing assistance in this area is often a success factor. For this reason, some seed funding or grant schemes include business counseling as part of the offered package.

Due to the lack of involvement of the private sector, the EU and national authorities play an important role in providing financial resources for seed type.

4. Funding of technology transfer in Romania

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; starting the process of evaluation and accreditation for the R&D institutions started in 2007; the accession of structural funds.

Despite the 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.

Moreover, the international financial crisis had a negative impact on the R&D field, in principal, on the financing resources.

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: centers for technology transfer; business and technological incubators; centers 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 no. 1).

Table no. 1. Financing sources for RDI in Romania

Year	Financing sources (% from GDP)			
	State Budget	Private sources	FP6/FP7	Structural funds
2003	0,20	0,18	0,01	-
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

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 programs in natural, exact and socio-humanistic sciences.

5. Conclusions

In European Union there are numerous constraints (structural, economic and legal) which affect the spin-out initiatives but the main cause is represented by the lack of the financing

sources, especially in the early stages of business development.

Moreover, these deficiencies were increased by the effects of the international financial crisis, felt by majority states in the last period. In this context, at the European and national level should be taken initiatives in order to provide public funds for pre-seed projects and to support the development of business angels' networks or new seed capital funds. The co-investment schemes public supported could have an important role in encouraging the private sector.

The role of structural funds is essential in stimulating type seed capital funding in many Member States.

Thus, there is a permanent commitment to the EU policy to develop

seed capital funds in the period 2007-2013: Structural and Cohesion Funds (including JEREMIE), European Investment Fund (Technology Transfer Accelerator - a new investment instrument for transfer technology), the Competitiveness and Innovation Program and other programs of the European Union for seed capital schemes.

These measures and programs should combine financial instruments necessary in the early stages of business development with other interventions such as guarantees provided for start-ups. As well, the European initiatives should be correlated with the national measures aimed at ensuring a favorable tax environment for business angels and for seed type capital funding.

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