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## THE BRIDGE BETWEEN SCIENCE AND THE MARKET – HOW TO BUILD IT?

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### Abstract

We live in a world of constant development, growth, innovation and changing needs and nonetheless cultural habits. How to sustain this constant change and how to adapt to globalisation, technological change and constant creativity and innovativeness of key human resources inside larger corporations as well as knowledge institutions is answering the concept of corporate entrepreneurship, new ventures and academic spin-off creation. Article will show the trend in the field of new venture and academic spin-off creation, involving human and social capital as key success factors. Barriers and innovative solutions will be presented on how to overcome the issue of lacking cooperation between academia and industry. Relevant best practices and experiences will be presented to be discussed as opportunities that can find the place in the region and its entrepreneurial development and regional growth.

**Keywords:** Academic spin-off, Early-Stage Financing, Knowledge-Intensive Regions, Knowledge-Intensive Companies, New venture.

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### 1. INTRODUCTION

We live in a world of constant development, growth, innovation and changing needs and nonetheless cultural habits. How to sustain this constant change and how to adapt to globalization, technological change and constant creativity and innovativeness of key human resources inside larger corporations as well as knowledge institutions is answering the concept of corporate entrepreneurship, new ventures and academic spin-off creation.

Corporate entrepreneurial advantages are ranging from tangible (e.g. physical, financial and labor resources) to intangible resources (e.g. human, social and intellectual capital). Recently the intangible character is becoming the key competitive advantage in entrepreneurial world, encompassing human as well as social capital, whereby an approach based on people is coming to the forefront of success factors. However, speaking about new ventures we can distinguish among those coming from academia and on the other hand those coming from larger corporate. In both cases two main choices need to be considered: spinning off or licensing out/selling off. Management and knowledge are here important key success factors.

Bearing in mind the need of more entrepreneurial attitude of research institutions, transferring knowledge from “producers” (public private research centers, universities) to “users” (potential entrepreneurs, firms, industry), different approaches need to take place.

In the 1990s spinning off new ventures from academic labs gained acceptance in Europe as a valid method of technology transfer. Entrepreneurship was also recognized as a key instrument of technology innovation (European Commission 1998).

Measures to be undertaken in the field of greater research results valorization and new knowledge-based fast growing ventures creation are calling for changing the point of view and introducing more systemic approaches. An approach going from awareness rising and idea generation to research result commercialization and exploitation in global markets is needed in order to reach higher level of knowledge exploitation and high level companies creation. This is a strategic need as the world has become more competitive as such and the market of knowledge has become more competitive as well.

## 2. NEW VENTURE CREATION

In the second half of twentieth century innovation, new technologies and scientific research and development became an important factor in the economy. Both business sector and the non-profit society realized that gaining support for R&D departments and training more and more scientists are essential. Several new research organizations were created, universities enlarged their research abilities and the companies started to pour money into new research projects and established special departments (Raday). Such kind of environment fostered new venture forms which are more capable to utilize the cutting-edge technologies, to convert the scientific results into market success. Spin-off firms became well-known phenomenon both in academic life and in the world of corporate.

### 2.1. Technology transfer

Technology transfer refers to any process by which one party gains access to another's technical information and successfully learns and absorbs it into his production process. Technology may be codified (e.g., in blueprints) or un-codified (e.g., know-how of engineers). It may be embodied in products or disembodied in ideas. Technology ranges from choosing input mixes and output quality to organization of intermediate production stages, management, means of finance, and other elements (Maskus 2003).

The evolution of academic spin-offs took place due to the need for a transformation process. The result of academic research, the evolved knowledge cannot easily put onto the market because its complexity would be an obstacle to be instantly useful for industry. Therefore a special process is needed which is called knowledge transfer or technology transfer. The technology based spin-off firms can proceed this transformation through which the scientific knowledge is being converted into technological knowledge (Raday).

### 2.2. Characteristics needed

Managerial team at the start-up companies is usually the crucial success factor. There is widely accepted that managerial skill of an entrepreneurial team is a decisive point for venture capitalists considering to invest or not to invest, especially in case of new academic spin-off ventures.

But not only is a solid entrepreneurial team enough for success. For investors and for business idea to become a business opportunity further conditions need to be fulfilled:

- ❖ Motivation and trustworthiness of proposes
- ❖ Market potential
- ❖ Sustainability of business model from a financial point of view
- ❖ Technological position compared to the competition (competitive advantages- unique selling points)

The level of evaluative depth regarding these four areas of interest obviously depends on the maturity of the idea. There are two important phases of leading to the creation of businesses which the potential entrepreneur must be able to confront:

- ❖ The first phase of idea definition
- ❖ A second phase in which the idea is structured into a business project.

### 2.3. Investment and financing – Private-Public Partnership as a seed's key success factor and start ups funds

Academic spin-off ventures are usually financed or expected to be financed by venture capitalists. Venture capitalists make the first screening and if interested the more detailed due-diligence afterwards before investment decision.

The difficulties of new companies to getting early stage financing are due to the inability of this category of firms to provide a sound track record to investors, the low level of guarantee and a long wait (some years) before generating a positive cash flow. All these barriers evidently increase with the degree of innovation involved such as strong presence of intangible assets, not previous managerial experiences of the team, business model not well defined (higher the innovation higher the risks associated).

For all these reasons Knowledge based SME's are not appealing for traditional financing operators so new tools aimed at supporting the equity component have been created during last years: Seed funds, Business angels, Venture capital funds.

The creation of innovative companies is a key success factor for European growth and employment. For SME's competing in high-technology sectors, the challenge of accessing growth capital is particularly acute particularly in the early stages of their development.

But a new knowledge based company is not appealing for banks due to the lack of a track record and of portfolio of customers and that their main assets are in the people know how. Over the last years the venture capital markets have been developed but, considering the high risk and the low returns, few venture capitalists decided to enter in the seed/start up stage.

The European commission has been encouraging the setting up of private-public partnership to manage seed funds, in order to better exploit the synergies. To sustain SME's in the death of valley is a typical public aim but its successful achievement depends on the capability to select projects in accordance with market opportunities and business potentials, typically used by private organization, and to accelerate their business. To have an independent private-public partnership is recognized as a key success factor for seed and start ups funds.

#### **2.4. Intellectual property**

Handling of intellectual property rights (IPR) is a sensitive question for both academic and corporate spin-off ventures. While the corporate spin-off can inherit a developed patenting strategy and professional staff from its parent, this process at universities shows some laggard. There are some barriers which Universities or other research institutions can face: some research institutes do not have clear regulation of handling IPR which would cause troubles for potential investors. Another problem that some scientists are not aware of is losing their patenting opportunity if they publicise the results or ideas before filing, since publication invalidates the latter patent.

There are numerous approaches to the exploitation of intellectual property some of which are identified below (University of Toronto):

1. The patenting and eventual commercialization with an industrial partner of the concept/ invention by the researcher either solely, or with the assistance of a third party such as the Innovations Foundation or Centers of Excellence,
2. Patenting, expressly for licensing to an industrial partner,
3. Non-disclosure, but commercialization based on know-how, possibly leading to a spin-off company opportunity,
4. The patenting of the concept and invention followed by the formation of a spin-off company to specifically develop the idea for the marketplace.

#### **2.5. Environment for growing new ventures – What is a KIR?**

For new ventures creation not only research and ideas production is necessary, the local and regional environment is a precondition for development in direction of knowledge creation and market exploitation of potential business opportunities. Regions producing new corporate and academic spin-off ventures are so called "Knowledge Intensive Regions".

Network <sup>[1]</sup> based industrial (economic) system that:

- ❖ encourages openness, learning, information-sharing, co-evolution of ideas, flexibility of both labor and companies, and fast responses to opportunity and challenges.
- ❖ promotes collective learning and flexible adjustment among specialist producers of a complex of related knowledge and technologies and the market

Defining a supportive and knowledge-based environment creating new ventures further characteristic should be taken into regard:

1. *Strong production of endogenous knowledge.* A KIR is characterized by the presence of one or more basins of excellence (industries, universities, etc..) in one or more knowledge domains / research sectors. They represent a point of attraction of a Region, both for skilled people (talents) and companies.
2. *The presence of a high quality highly mobile work force.* It follows from knowledge intensity that a region cannot service a knowledge economy and move up the value-added scale without a high quality workforce. A highly mobile work force contributes to collective learning in a community. Although not allowed to transfer trade secrets, professional employees share tacit knowledge as they move from one company to another.
3. *Ready acceptance of diversity and youth.* Presence of a large number of very young entrepreneurs, as well as many immigrant entrepreneurs. In a KIR the social and economic system emphasizes merit, so talented young people and immigrants are readily accepted.
4. *An environment valuing entrepreneurship.* Talents are highly valued in a culture which promotes and awards risk taking and an entrepreneurial attitude.
5. *An effective habitat to turn research into economic value – Ecosystem.* The regional support system is the "black box", the habitat which turns knowledge into profit (for companies and society). The RSS of a KIR is providing in a strictly selective fashion, a complete and integrated chain of dedicated financial (from proof of concept to mezzanine finance) and non-financial support services, covering every single step from knowledge to market. Most of these services are made available thanks to the strong role of the private sector.

<sup>1</sup> In a network system the functional boundaries within firms are porous, as are the boundaries between firms themselves and between firms and local institutions such as trade associations and universities.

6. *A dynamic economic texture.* The presence of a dynamic and porous eco-system of firms ensures sustainability to the knowledge-based regional economic development path and provides that innovation is widely and rapidly diffused into regional economy and society.
7. *Nexus of relationships.* A KIR is deeply interconnected physically and virtually with the rest of the world. Institutions, businesses, research and education are run and naturally co-operate in an international perspective.
8. *Easily accessible and open.* A successful KIR is easy to be reached. Mobility of people feeds the flow of innovative ideas. Cultural diversity is positively affecting in a strong way the birth rate of knowledge-intensive businesses. A KIR is not defined by administrative boundaries. Anything that could be reached “commuting”<sup>2</sup> can be considered as belonging to a KIR.
9. *Quality of life.* Good schools for the children, good health and recreation facilities, and comfortable housing, rich surroundings.

### 3. OUR BEST PRACTICE: I.TRAS.TE. (INNOVATION & TECHNOLOGY TRANSFER)

I.TRAS.TE. a model developed and experienced by META Group, awarded by MAP (Italian Ministry of Economic Development), supported by IASP, TII and PROTON, has been implemented together with University of Studies of Perugia and Sviluppitalia (the managing Italian organization of the Europe’s largest network of incubators).

The project I.TRAS.TE. has the aim of fostering creative and innovative enterprises in order to strengthen and make more dynamic the economic texture, introducing a “Knowledge based” entrepreneurial drive. The selection of the new ventures, to obtain lasting results, is based on a “market driven” approach that regards the knowledge of the market as central to the process of analysis, closely followed by the peculiarities and motivation of the proposing team.

I.TRAS.TE. foresees the creation of a system of incubator/accelerator based upon the two metropolitan centers of the region that would assure a continuous flow of information and services amongst the levels and within each level, as such:

- ❖ incubation of ideas: a virtual regional incubator that, through “antennas” placed in all the decentralized sites of the University of Perugia, that would make available to “potential entrepreneurs” and creative services devoted to the finalization of the idea;
- ❖ acceleration of enterprise: through the online linking of the incubator of the University of Perugia with the enterprise accelerator of Terni (both with the role of hub).

The mode of access to such mechanism will be represented by either the overcoming of the competition business idea (exclusively for the incubation of ideas) or the overcoming of the evaluation of “idea” in terms of market potentials and growth potentials, carried out by the relevant infrastructures. The operational practice has shown that the fundamental assumption for the valorization of the research’s results is the identification of the most effective valorization form with regard to the market potentials and the competencies/characteristics of the team. It thus follows that in the process of creation of start-ups that activity of Business Shaping”, which is the definition of the entrepreneurial project and of the business model, acquires a crucial relevance together with its validation.

Thorough the mechanism of incubation of ideas, the aspiring entrepreneurs will be supported along such process with consultancy services and technical activity aimed at evaluating/exporting the aspects related to the market, also to the technical realization of the product and to the relative economic/financial aspects.

A distinctive element of the presented approach is the set of services for acceleration. The dynamism of the markets and the speed with which a solution becomes obsolete in creative based sectors make the reduction of the time to market as one of the key factors in the valorization process. The services offered in the acceleration phase foresee solutions to specific problems such as the creation of a network of business contacts, at an international level, the definition of the market entry strategy, the team building and the support as business mentor to integrate creativity and business issues.

Another critical element is represented by the difficulty of obtaining capitals for the support and development of the activity of the new venture. The risks linked to the highly technological sectors and the absence of an historical record, on which the analysis of the business could be based, make rather difficult, or at least expensive, the contacts with the traditional channels of financial broking; on the other hand in order getting in contact with institutional investors, national and international funds,

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<sup>2</sup> Travelling distance or time currently considered acceptable to go to work – In Italy no more than 2 / 2 ½ hours / day.

also private venture capitalists, is almost unthinkable for newborn enterprises especially in creative industry. This activity develops on two levels:

- ❖ A first level destined to prepare the enterprises at encounters with investors (Service of Investor readiness, to evaluate the level of preparation of the enterprise or of the potential entrepreneur to have contacts with capital risk funds or business angels)
- ❖ A second level devoted to accompanying and presents the projects to the network of investors in risk capital.

There are in fact international agreements with some financial operators willing to offer a range of alternative tools, from participation to the risk capital to the participative loans, to the traditional financing instruments supplied by the banking operators, that would fulfil the financial needs of the knowledge based spin-offs.

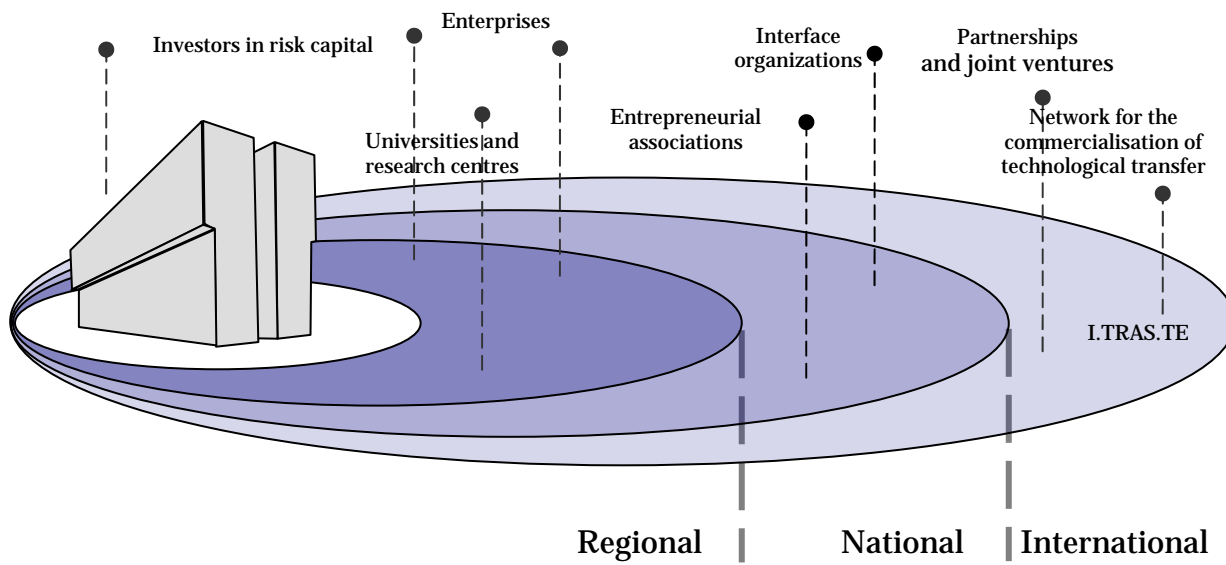


Fig. 1: Own source (META Group)

The modality for accessing such mechanism will revolve around the overcoming of the business idea competition (exclusive for the incubation of ideas) or the surmounting of the evaluation of the "idea" in terms of market and growth potentials, carried out in the dedicated structures.

It is foreseen the creation of a *Knowledge Exploitation Fund*<sup>3</sup> to assure that the accompanying and supporting measures are more effective and clear and to manage in a harmonious way the services dedicated to the ideas and enterprises.

The project is at the base of the course relative to the "valorization of knowledge" that the University of Perugia, in collaboration with META Group, BIC Umbria and other local actors, has undertaken from the 1990s and that has led, amongst other things, to the designing of dedicated financial instruments, in terms of risk capital, for innovative enterprise, to the participation to European networks on innovation, to close collaboration with the other research centers operating in Umbria, to the dialogue with medium/large enterprises on these themes and to the recent creation of the Spin-off Office.

#### 4. CONCLUSIONS

In an economy characterized by a high rate of competition and dynamism, the production of knowledge and innovation are driving forces in economic development. The presence of an adequate base of innovative businesses is recognized as an essential characteristic in fields of high competitiveness. Such businesses are in fact characterized by a strong acceleration, which results in the provision of work opportunities, employment and integration with socio- economic groups at an international level.

<sup>3</sup> Knowledge Exploitation Fund, a fund not conceived in a traditional way, is an "umbrella" containing the totality of actions and services provided by the project I.TRAS.TE.

To conclude, today, to bridge the gap among research and productive world is a priority. However, evidence from Universities and other research institutions in Europe and other countries indicate that the typical volume of knowledge transfer flux and research results valorization from research centers and other knowledge institutions is relatively low.

As such, the starting point for assessing knowledge in the market is to identify and examine achievable impacts and benefits from all the intervention in this area, and in doing so to establish concrete policy recommendations.

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