
УПРАВЛІННЯ ЗНАННЯМИ В ОСВІТНІХ ТА НАУКОВИХ ЗАКЛАДАХ ДЛЯ ЗМІНИ І РОЗВИТКУ СОЦІАЛЬНО-ЕКОНОМІЧНИХ СИСТЕМ РІЗНИХ РІВНІВ

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INNOVATION PROCESS IN ITALIAN SMEs: THE UNIVERSITY ROLE

Abstract. Innovation process is a very critical one, both inside the big corporations and for the SMEs which in Italy are 7 million. In Bergamo area there is a SME every 7 inhabitants, particularly in textile, mechanical and electronic industries. SMEs in Italy constitute the 50 % of GDP and 70 % of occupation. Universities and CNR (National Research Center) have promoted in the past more than 30 technological parks and about 300 public institutions should facilitate technology transfer to Italian SMEs, but the dialogue between research centers and enterprises remains very difficult, basically for cultural reasons. In Italy researchers and scientists publish papers for their international colleagues and major reviews, using scientific and technical language impossible to be understood by the entrepreneurs. In given article the features of Italian National Innovation System (INIS) are described, and the role of University of Bergamo in innovative process is shown. The author of the article considers that using of experience of Finland and Israel could be applied as two possible strategies for development of INIS and for implementation of innovation into SMEs. Obviously, collaboration SMEs with universities in R&D gives possibilities of efficient knowledge transfer, resource exchange and organizational learning.

Keywords: University, Technology Transfer, Innovation, SMEs, Business Incubator

Introduction. University researchers are more focused on basic research, algorithms and methods of problem solving, new products, trendy technologies and they get information through international networking with other university particularly from USA, targeting publications to the most important reviews of the various scientific and economic areas. However, the universities could to become a link between the production of research and development and promoter of innovation in enterprises of the local territory. The *aim* of the paper is to evaluate the role of universities in the innovation process.

The *major objectives* to be accomplished are outlined below:

1) Analyze the Italian National Innovation System and its components, from the Public Administration authorities supervising the process, to Universities, Research Centers, Technology Transfer Centers, Technology Parks, until the final SME enterprises, the majority of industrial landscape.

2) Benchmark the System with international excellence cases, focused on Finland and Israel policies and institutions, to understand better the driver factors to be transferred in the Italian context.

3) Describe the innovative approach of Bergamo University Technology Transfer Center (GITT), in order to stimulate and accelerate the innovation process in the local SME enterprises.

The methodology of the research includes a qualitative, theoretical research approach, involving a literature review of international and Italian scientific publications, information analysis and drawing conclusions. For GITT case, also the field activities performed in the first six months has been considered, together with enterprises first feedbacks.

The Innovation Process

Within the innovation word can be collected changes and breaks that occurred in the enterprise management and that is obtained not only with new technologies but also through innovative ways of inducing changes that can generate short-term benefits for the end user. For realising innovation, this procedure is divided by in two distinct parts:

- From idea to patent;
- From patent to commercialization.

In the *first phase*, the entrepreneur has to evaluate attentively the operative feasibility that generates the business opportunity associated with it through the realization of a business plan to submit at hypothetical investor. The *next steps* are the preparation of a project presentation in order to obtain financing.

After start-up realization, it starts prototypes production, after which there is the certification phase at a national or international level in order to protect the intellectual property related to innovation.

What defined above is the procedure at base of innovation and it represents the element of success and enterprise growth and consequently of a nation [1]. In Italy, at contrary, during the last years occurred a trend reversal in the innovation development for different causes:

- Low ratio between Research & Development expense and GDP;
- Low amount of specialized research made by private enterprises, above all due to strong presence in the entrepreneurial territory of small and medium enterprises for which it's difficult realize innovation because they are low-tech business;
- Reduction of employees engaged in the research activities due to minor recognition of this role with the consequence «brain drain» abroad;
- Reduction of graduate number in scientific and technologic subjects with the consequent late in the possibility of innovation creation.
- Small number of patents submitted to the European Patent Office. Italy submitted in the years 2001 to 2004 only 10470 patent demands, half of the United Kingdom and France, seven times less of Germany and 14 times less of USA.

The consequence of the above scenario is the decrease of commercial exchange of highly technological Italian products.

The National Innovation System

After doing a close examination more general, we can now analyze the Italy case and in particular the governance of National Innovation System composed by heterogeneous whole of structures public and private that support and promote innovation and the consequent development of country interacting with enterprises directly or through an intermediary.

The National Innovation System is developed on 5 components:

- Governmental institutions that have the role of fix objectives functional at the economic-social development and the consequent elimination of innovation gap;
- The system group of research that is composed by Universities and Research Centres public and private;
- The Centres of Management Innovation and Technology Transfer focused on the technical support (CITT);
- Category organizations;
- Financial system, in which we can include business angels and venture capital.

The areas covered by CITT Centres are related to information, education and technical assistance, very important for Italian SMEs, that covers about 50 % of activities developed and that identify the major gaps between enterprises and centres CITT same [2]. The support asked by enterprises at CITT centres is pertaining to financial assistance and real technological support that gazes product/service technology but also incubation of new start-up until planning and development of entrepreneurial idea. To this day they aren't the CITT centres that satisfy technological innovation necessities but rather the Scientific and Technological Parks and the Business Innovation Centres. [3]

Like as shown in the description, the national innovation system is very complex and articulate and can present redundancies functional and operatives, that can be considered the cause of inefficiency of Italian innovation system, for which it would suggest the presence of Chief Scientist Officer, like in Israel, or the presence of a unique organism with a strong and authoritative address, like in France. If we analyse more in detail the NIS in Italy, result clearly visible some criticalities related to missed consolidation of some of qualifying principals factors the innovation, debated previously and in particular:

- Access to capitals for innovation;
- Development of human capital;
- Economic incentives, financial and tax and the support to enterprise dimensional growth [4].

Selected sector-based strategies for support and development of innovation are an element very important especially in an entrepreneurial tissue like those in Italy characterized not only SMEs with a productive business but also with a technological innovation rate very contained [5]. In a context like that Italian, the success warrantees in global competition and policies of intervention or support selected come from innovation investments.

Benchmark with the foreign best practices

Analyzing the foreign best practices, two cases have been selected that can be applied at the Italy system for the peculiarities that they have and they identify two possible strategies of development and implementation of innovation.

One of strength point in the Finnish NIS is exactly the collaboration between the different research centres, present in number none so high, that develop studies in the technology and innovation field, in the research and that work without roles overlap with mutual respect and support, like as show in the Figure 2.

The case is of particular interest because replicable in the Italy system, thanks to the presence of industrial districts. The case study is related to technological pole of biotechnology Turku, developed in the namesake Finnish city. The initiative has been developed in this area thanks to greater concentration of companies and research centres in this field.

The project has seen the presence of about 100 actors involved between enterprises, universities, local and governmental organisations and venture capitals with the common objective to make operating, quickly and efficiently, the projects and products technologically innovative [7].

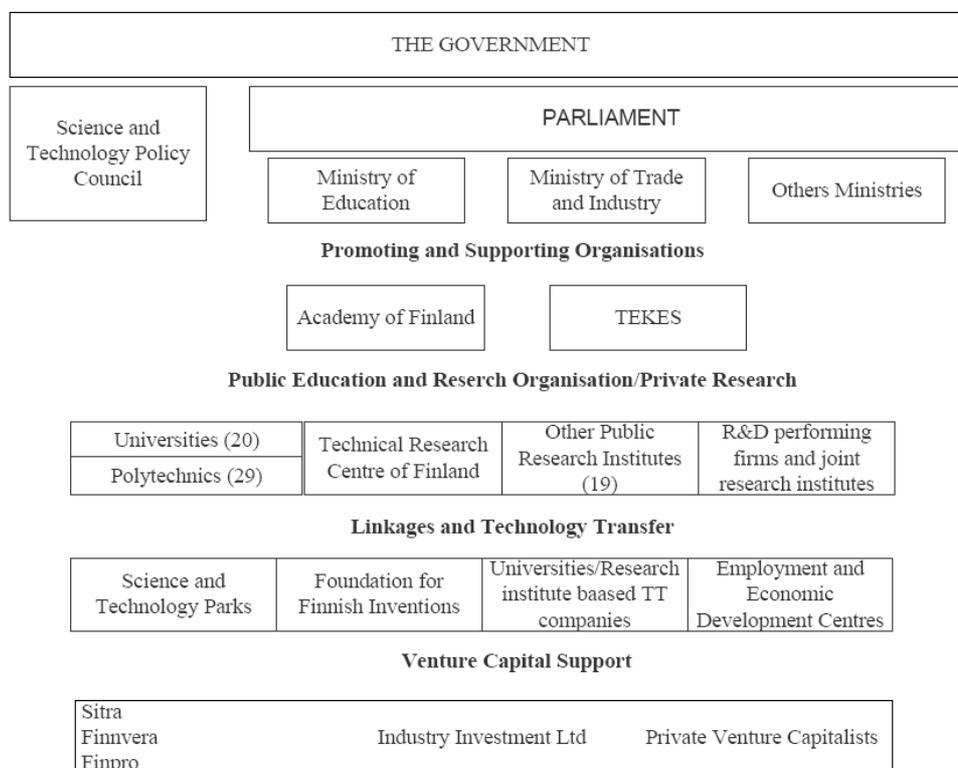


Figure 1. The Finnish NIS [6]

One of most important strength points of Turku project is the geographic concentration of involved actors that leads at a major dialogue between different competences involved in order to satisfy soon the necessities showed during the exploitation of different processes.

The Finnish technological pole success is the tight, fluid and efficient collaboration that has been generated between the different industrial realities and universities facilitated also by the geographical disposition much near and that allows a continuous and simple communication [8].

As mentioned earlier, there are common features between the case of the technological pole of Turku and the Italy system and this would improve the treatment of the complex issue of technology transfer. A first step would be to change the role of the institutions that rather than offer a mere service of disbursement of funds, waiting for the report of their use, acquire a more active role by becoming the primary actors in providing and organize the spaces and creating a network with institutional investors and not [9].

A second example of best practice, of which would like to bring to the attention, is inherent the presence of a venture capital market that in Italy hasn't found its application field. The Israel reality, at contrary, has showed its far-sightedness in the innovation and

support fields, creating, for the first time, a venture capital fund mixed, public and private, named Yozma fund born in 1993. This type of venture capital aims to develop a critical mass in order to create specialized funds with the consequent entry in the market of internationally operators [10]. With the constitution of venture capital mixed fund, public and private, of 100 million of dollars, the Israeli government has been able to operate on two activity addresses:

- Investments in existing funds or rather a kind of fund of funds, that has enabled however in the first activity year to have about ten investments with an amount of 8 million dollars each one and that foresaw, combined with these, an investment of about 12 million dollars by privates and the engagement to attract foreign capitals;
- Creation of a new public fund directly managed by the Yozma Venture Fund with an initial amount of 20 million dollars finalized to finance start-up or early stage [11].

Different were the success factors of this activity first of all the presence of a great component of public resources, that helped lower the risk perception related to projects by private operators, not only, in addition there is also the high return of the private capital compared to the public capital for which is foreseen a symbolic remuneration [12].

The third success element is the possibility for the private to obtain additional performances through the possibility to purchase back the shares held by Yozma at nominal value with a small additional interest after six years by the activity beginning.

Finally the collective learning implementation that allowed Yozma fund managers to participate in collective meetings for allowing and improving the change and sharing of ideas, projects and analysis. During its activity, the Fund Yozma has created a «leverage effect» of 150 million dollars, 250 million dollars if we consider the initial budget, and the creation of 10 funds (Yozma Fund) with investments in more than 200 start-ups [13].

The University Centre for Innovation and Technology Transfer (GITT)

The Centre of Management Innovation and Technology Transfer intend to be as an initiatives promoter able to not limit the University role to only cases where accidents or technical problems have already occurred. Established in 2009, the GITT wants to bring the competencies that are present in the Bergamo University, to excel and to support enterprises allowing the city to become benchmark for the technology transfer, scenario that can summarize with B2T, acronym of Bergamo Transfers Technology. The Centre pursues the following objectives:

- to support and to be the reference point of research and development for institutions and companies;
- to promote collaboration between companies, research institutions, technology parks, government agencies, financial and territorial institutions;
- to support companies in identifying and preparing projects funded by the Lombardia region or by the European Community;
- to operate in local context in favour of provincial enterprises, but maintain a strong vocation for national and international development;
- to support research organisations in order to exploit the results of their work;
- to enhance multidisciplinary services and the cultural diversity that characterises the expertise available in the University of Bergamo.

The University Centre for the Management Innovation and Technology Transfer intends to be as indispensable tool in supporting based and applied research. Though favouring the local territory, this support is also addressed to companies that operate na-

tionally and internationally. The actions and initiatives, on which the Centre intends to lever, are:

- Defining new contractual instruments in accord with the University fields;
- Identifying organizational tools in perfect alignment with the University;
- Research of instruments more efficiencies for the innovation management;
- Creating a direct and bidirectional communication channel between enterprises and Universities;
- Support to the patenting and protection and enhancement of intellectual property;
- Creation of exchanges and coordination systems between enterprises
- Support for entrepreneurship and technology transfer.

Since it was born, the Centre has carried out different research projects which can be divided into three categories:

- Projects of applied research for companies in the local territory;
- Support to institutions for the achievement of sustainable energy plans promoted by the European Community;
- Research projects for the exploitation of local resources.

More in the detail, the first macro category includes projects such as the development of research concerning innovative techniques for the experimental and simulation analysis of multi-phase flows into complex systems and researches concerning drying processes into hot-air ovens, aimed to acquire and to interpret new knowledge about the fundamentals of fluid dynamic phenomena and plan a search and a critical survey essential to acquire new knowledge in order to use for to improve or to design new products.

Has been created also a research project related the reduction pressure pulses generated by an alternative compressor by the use of a flexible mechatronic device, able to adapt itself to the real operative conditions of the machine. The development of this mechatronic project can be divided into three phases:

- An analysis of the experimental behaviour of the system to control, investigating its behaviour in its real operating conditions;
- Analysis of possible solutions for achieving goals with a functional mechanical design of mechatronic device;
- Experimental validation through a performance assessment reached.

In the second macro category there are included projects, which are in the pipeline, that provide local support to public institutions in the realisation of SEAP, Sustainable Energy Action Plan, promoted by the European Community for the reduction of emission produced. These projects aim to create a picture of current emissions of a city and by defining and implementing actions to achieve the target 20-20-20, to be more precise 20 % reduction of CO₂ emissions, increasing energy efficiency by 20 % and increase of renewable energies by 20 %, all by 2020.

The last category, instead, includes a more theoretical research project but with ample opportunity to practical implementation, namely the study, that is in the realisation phase, related to the importance of an asset for us fundamental to be more precise: the water and of all global issues inherent in its management. What this project aims to define is the optimal tariff at local level to cover the investment and operating costs.

Conclusions

By considerations made above, it's necessary that Italy implements selected policies to boost innovation and that have rapid and immediate impacts. In this regard it's important to implement consolidation strategies of enablers factors of the innovation grouped into 5 main categories:

- Interventions and economic incentives, financial and tax through public support directly or indirectly. Directly through investments in areas with high potential for economic fallout (health, energy, defence) or indirectly through financial incentives or tax breaks;

- Access to factors, such as know-how, capital, thanks at which it's possible the biggest diffusion. Innovation is development, exchange and confrontation of ideas;

- Human capital development, resource critical to the economic revival of a nation and system innovation;

- Development and support for enterprises growth that is directly proportional to innovation. It appears necessary trigger actions targeted to the business combination and concentration, in order to increase investment in R&D;

- Potential and improving infrastructures that would allow of have aggregations of system conditions different or the presence of companies, universities and research centres and public sponsorship and financial resources.

The role that the Italian University must develop is to become a link between the production of research and development and promoter of innovation in enterprises of the local territory. The geographical location of SMEs in industrial districts, strongly presents on the Italian territory, would allow a greater concentration of investments by reducing competition between companies to consequently wastage of resources. All this is possible if the institutions are a role like an active supervisor of experiences on R&D transfer but especially if it's creating a continuous dialogue and cooperation between companies of the district.

The role of universities is therefore to become a promoter of a continuous dialogue between technological innovation and SMEs of the local territory in which success is hardly achievable from single than that from the group.

University is also active in promoting the importance of innovation not only in SMEs but especially among potential investors that are very often insurmountable barrier for an entrepreneur to get funding and increase their competitiveness. The Italian University human capital also should specialize primarily in high technology sectors, especially in the various districts in order to capitalize on the skills and perpetuate the continuous growth.

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УПРАВЛІННЯ ЗНАННЯМИ НА ІННОВАЦІЙНІЙ ОСНОВІ

Анотація. Обґрунтовано необхідність розгляду проблематики управління знаннями через призму інноваційного розвитку та формування економіки знань. Висвітлено інституційне забезпечення процесу управління знаннями на етапах створення, набуття, збереження, використання, поширення та передачі знань. Зазначено проблеми, пов'язані із формуванням ключових компетенцій, розвитком та використанням знань. Запропоновано структурно-функціональну схему формування інноваційної моделі поєднання науки, освіти, виробництва - сучасних центрів знань, які повинні стати новою модульною формою організації та координування різних інституцій, пов'язаних із управлінням знаннями.

Ключові слова: економіка знань, управління знаннями, творча експериментальна лабораторія.

Вступ. Сьогодні не викликає сумніву те, що перспективи інноваційного розвитку залежать від ступеня інтелектуалізації суспільства, збагаченого культурними й духовними складовими, а серйозний економічний прорив можливий на основі економіки знань.

Економіка знань є основним фундаментом забезпечення інноваційного розвитку, у механізмі якої задіяні джерела та рушійні сили. Джерелами знань інноваційного розвитку є інституції, які виконують функцію формування і практичного використання знань. Рушійні сили проявляються через суб'єктивні відчуття людини і охоплюють «ментальність, культуру суб'єктів творчості, в т.ч. інноваційну, морально-психологічний клімат, виробничі відносини, менеджмент, організацію