THE INNOVATION ACTIVITY IN EUROPE – SMALL COMPARATIVE STUDY

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ABSTRACT
The innovation activity is in a tight relation with the research-development activity and, often, it’s even more important. The innovation represents the basis of the economical progress and the application of its results can bring considerable benefits from a material, social and cultural point of view. Creating new work places in consequence of the technological development can underlie a better education and a social environment less affected by everything that’s noxious in society.

Key words: research-development, innovation, finance, risk capital.

1. INTRODUCTION
The first definition of the technical-economic innovation was given by the British economist Schumpeter in 1941[1], who claimed that innovation represents the action of producing something else or producing in another way. He considered the following activities as innovation activities:
- creating a new product;
- introducing a new manufacture method;
- using new raw materials;
- entering a new market or creating a new market;
- a new organization of the company;
- creating a new image of the company.
The first three activities aims the technological innovation, and the following three the economic innovation. Another definition considers innovation the transformation of an idea in a purchasable, new or improved product, in an industrial or commercial product or in a new social method. Innovation doesn’t always mean a revolutionary process, but it can be realized in small steps. For the materialization of the innovation there are several steps to go through:
- Appealing the source of ideas: imagination, observations, studies.
- Creativity to generate new ideas.
- Polishing the idea in order to establish if the idea is compatible with company’s problems and politics.
- Feasibility to justify technically and economically the utility of the application of the idea.
- Implementing the new idea.
- Obtaining the result: new product, new process, lower costs, etc.[2]
In order to materialize the innovation, different activities are realized, such as:
- horizontal transfer activities: innovating elements → new applications;
- vertical transfer activities: knowledge → research → new product/new technology;
- a new organization of the company → a new image.

2. CAUSES AND FACTORS ENCOURAGING INNOVATION IN A COMPANY
2.1. Causes that influence innovation in companies
The innovation activity in companies is determined by a series of causes, such as:
1. the need to keep or to develop the company’s position on the market in order to keep its clients;
2. the market’s demand for diverse products, with improved performances. In general, companies diversify products more than technological processes. For the diversification of products we appeal to internal resources, but if the company’s profile changes we can also appeal to external acquisitions;
3. the obligatory character to follow the legislation and social demands. Demands concerning the protection of the environment, of the consumers, the introduction of new standards must be respected. Eventual changes in the company’s property or the national policies are also taken into account (for instance, the abortion of custom taxes, etc.);
4. using raw materials and energy resources which can have price fluctuations (for instance, the prices of petroleum and of petroleum products, etc.);
5. the competition, which can enter on the market with new products, cheaper products, etc. The pharmaceutical products’ market is a domain of permanent, sometimes severe competition;
6. development of the company;
7. the position and the strategy of the board of the company. The board can be the conservatory type (focusing on stability), the controller type (following the technical-economic and social aspects), the leader type (encouraging the growth, the optimization), the entrepreneur type (looking for opportunities), the creator type (creating opportunities).

Therefore, the innovation depends on a clear strategy of the company, clearly stated objectives, financing, competent management, the existence of a well prepared team, sometimes a multidisciplinary trained team, the existence of a distinct and correct procedure for work evaluation, a both internal and external competitive climate.

2.2. Factors encouraging innovation in a company
We identify a multitude of factors which encourage innovation in a company:

1. the board of the company directed towards the introduction of innovation with strategy and clear objectives;
2. the correct choice of the personnel, by competence criteria,
3. the existence of a research service which involves all the stages of the activity;
4. forming a multidisciplinary team for the innovation and for the introduction of the innovating elements;
5. acknowledging clients’ opinion concerning products deficiencies, the improvement of the features of the products, the introduction of new products;
6. to appeal to prognosis studies which can allow the correct choice of the policies of the firm, for development, introducing the innovation;
7. concentrating the resources at a limited number of innovation projects in order to achieve them faster.

We cannot omit the fact that in everyday life some companies are more innovative the other companies in the same field of the market. These differences reside as a consequence of the following factors:

- opening the company towards the exterior (although the company’s capacity is to follow exterior information from the exterior environment);
- human resources;
- technological resources: raw materials, material, utilities, energy, information, equipments, machineries;
- financial resources;
- the organization of the company;
- the adopted strategy;
- the board of the company.

The evolution of a product, a technology, etc. on the market, can be described mathematically by a logistic equation with the formula:

\[ y = \frac{p}{1+ae^{-bx}} \]

where:
- \( y \) – represents the performance pursued;
- \( p \) – is the maximum value of \( y \) where the function tends tangentially, when \( x \) tends to infinity
- \( x \) – is the time;
- \( a, b \) – are parameters on which the inclination of the ascending part of logistics from the OX axe regular at origin depends.

![Figure 1. The evolution of a technology after a logistic curve](image)

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On the curve we distinguish the following areas:

- OA = the initiation period, when the technology is emergent or nascent;
- AB = the growth, development period;
- BC = the limited period, when the technology doesn’t develop anymore;
- CD = the decline period;
- DE = the extinction period, when the technology is exceed and needs to be replaced.

Therefore, the logistic curve corresponds to the evolution period of a new technology: the emergent period, the progressive, the maturity and the decline period. In the decline period, a new technology or a new product evolving after its own logistic curve but starting from another origin (performance) can appear on the market. [3]

3. SIMULATION STRATEGIES OF THE INNOVATIONAL PROCESS

The strategies in the research-development-innovation domain evolved after a trajectory represented by the combination in different proportions of two types of politics considerably influenced by the company’s behavior, namely the science and the industry policies. Innovation strategies were based on the explicit recognition of the fact that the success of creating and commercializing new products and technologies result from a set of factors, larger than the research-development activity which received until today these credits. One of these factors is the products and technologies’ market which has a significant role.

In these conditions in which economic competitiveness became a major objective, a bigger attention was given to the research in industry, reflected in the growth of the collaboration between companies and universities, but also in the development of the human resources’ potential for research. Maintaining a high quality in fundamental research remains an important objective, independent of the level of the economic development of different EU country members.

A high importance is given to the participation of international programs in research-development domain (especially the Framework Program for Community R-D) and to the growth of the networks number, formed by public or private participants of EU country members. Another series of objectives in the research-development domain tend to become common in a higher number of country members of the European Union.

The public interest research problem of the developed European countries is treated, lately, both in theory and in practice, more colorful and more flexible, having as a result a sensible mutation from the interest in public or governmental research-development institutions, to strategic domains or research-development programs of public interest. These changes are reflected mostly in the predominance of financing R-D programs in comparison with the institutional financing, a mechanism which was therefore adopted by countries in transition towards the market economy, countries with scientific and technological systems in the middle of the transformation process of the reform.

The experiences of developed countries are remarkably relevant under the term of creation of research inter-institutional networks, which promote the research in collaboration between teams coming from public institutions, on one hand, and from companies and private institutions on the other hand.
Table 1. General objectives of EU country members in the scientific and technological strategies field

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<th>Common objectives of the majority of the country members</th>
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<td>- The development of the training and the mobility of researchers;</td>
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<td>- The promotion of innovation and the transfer of technology (exploiting the results, especially in small and medium companies);</td>
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<td>- The growth of the collaboration and cooperation between industry and superior education and, in general, the improvement of the cooperation between private companies and the public field of research;</td>
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<td>- The support and promotion of the industrial research, from both a financial and execution point of view;</td>
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<td>- The support and development of fundamental research of high quality;</td>
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<td>- The growth of economic competitiveness and the simulation of economic development;</td>
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<td>- The increase of R-D contribution to the regional development;</td>
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<td>- The enhancement of international cooperation, especially in Europe.</td>
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<th>Objectives which tend to become common in the country members</th>
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<td>- The development of programs containing socio-economic objectives of major importance;</td>
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<td>- The promotion of public acceptance of science and technology;</td>
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<td>- The evaluation of ethical and social aspects of technological development;</td>
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<td>- The improvement of program evaluation mechanisms and methods;</td>
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<td>- The development of strategic deliberation abilities in choosing priorities in the field of science and technology.</td>
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In Belgium, between 1987 and 1991, 14 of these networks worked under the “inter-university attraction poles” program in domains as: genetics, raw materials, robotics and optics, being finances for a period of 5 years. In France, starting with 1982 and until 1992 24 “groups of public interest” (Groupement d’intérêt public) worked, and it created a collaboration between research actors involved in national interest projects. A series of “corporations” were created, corporations formed by public R-D institutions (at least one), local authorities and firms that elaborated together programs from primary science fields such as: agronomy, medicine, new materials, computer science. In Holland, public interest programs financed from 1984 until today, had as a research object: the stimulation of small and medium companies; technologies orientated towards business – PBTs; research programs orientates towards innovation IOPs. For the stimulation of private companies in order to collaborate for the realization and implementation of these programs, subventions were granted, representing 50% from the cost of the projects deployed in domains like: materials technology, biotechnologies, informative technologies, environment technology, etc. Regarding the programs orientated towards innovation, it was pursued the creation of research networks in those important fields for the growth of competitiveness of the Holland industry between industry and universities. The programs were financed for 8 years with an intermediary evaluation in 4 years.

In European countries that are recently on the market economy, R-D systems are in more or less advanced stages of profound reforms, aiming the modernization of the legislation, the institutional structures, financing and management mechanisms, in order to adapt more to those west-European.

In Romania, although this process started later than in other countries, the directions of the reform are convergent, aiming: the making permanent the evaluation processes of research programs, of institutions and researchers after the scientific performance’s criteria, the intensification of the relations between the research inside the Romanian Academy and the superior education, the growth of the scientific cooperation and collaboration level, both on an European and international level.

Like in other countries, industrial research encountered, initially, in Romania, serious difficulties due to the absence of financing sources. Today, financing this domain from budgetary sources is based on programs and homework, evaluated by specialty committees which work under a R-D authority of the Minister of Education and Research, especially the National Authority for Scientific Research.
In **Bulgaria**, the main institutions developing the R-D activity are, mainly, like in other eastern European countries, institutions of the Science Academy, superior education institutions and those for industrial research which have a certain tendency to decrease and to transform into service organizations for the R-D activity. Financing the industrial research is granted more and more from special funds replacing the state budget.

In **Hungary**, in 1997, R-D expenses were 0.74% from PIB, in comparison to 2.28% in 1988 and 1.61% in 1990. In different types of financing, meaning: the state budget, the Central Fund for Technological Research (KNUFA) and special state funds, the structure of public expenses had an evolution unfavorable after 1990, especially regarding the weight of the expenses for technological research. In public research unities, like those from the superior education, the Science Academy’s institutes or other governmental unities, they were spent, in 1997, 54.8% from the total R-D funds.

In **Poland**, like in Hungary, where research unities and personnel were reduced, industrial research and the innovation activity encountered the highest difficulties after 1990. The reform of the science and technology financing system, introduced in 1990, aimed the cut of the financing weight from governmental sources and the stimulation of private financing, but also the perfection of the evaluation systems. The volume of the governmental funds received by each institute for an activity of public interest, such as: health, environment, fundamental research, etc. depends on the performance level evaluated by Poland’s State Council for Scientific Research (KBN). The unities from group A have the right to grants that covers 30% of the basic activity’s needs, those from group B – 20%, those from group C – 10%, and those from group D – 0%. The expenses for research-development were in 1995, 0.7% from the PIB, in comparison with 0.9% in 1992.[4]

4. **EUROPE STRATEGY 2020 AND “INNOVATION UNION”**
By other countries’ adherence to the European Union, the creation of common policies assuring the development of the Union was becoming more and more necessary. Therefore, common politics were created, in domains such as agriculture, commerce, fishing, in the fiscal domain, justice, internal affairs etc. The policy in the research domain in the European Union is part of a bigger policy of this European construct called “Science and technology”. Other policies from the informational society domain, regarding the audiovisual and mass-media, space, sciences of life and biotechnology, arise from this policy.

The reason of a policy in the research and innovation domain is due to the satisfaction of two needs. First of all, the need to coordinate state members’ activities concerning the growth of efficacy and the cut of costs, and, second of all, the need to consolidate the international competitiveness of the European economy. Also, by research and development, the economy develops and new work places are created, and, innovating the technology we can fight and reduce social problems such as poverty, some diseases or the degradation of the environment.

4.1. **The research-development and innovation activity in Europe Strategy 2020**
In 2009 the part of PIB allocated by EU countries for research, development and innovation, was about 2%, while SUA au allocated 2.8% and Japan 3.4%. For 2010 the average, in EU countries, was 2.7-2.8%. Also, regarding expenses for RDI, in 2014, China will spend more than the EU.[5]
At the same time, the predominance of persons between 25-34 years old, having a university degree, in 2009, is the following: Europe doesn’t lack potential. It has researchers, entrepreneurs and world class companies, but also higher qualities regarding values, traditions, creativity and diversity. European companies and the civil society, actively engaged in the emergent economies, are developing in the entire world. Many innovations that changed the world took place in Europe.

The biggest challenge for EU and for the country members is, probably, a strategic approach of innovation. An approach in which innovation represents the main political objective, and in which a long and medium term perspective is taken into account, where all the political instruments, measurements and financing are designed in order to contribute to the innovation, where EU politics and national/regional politics are aligned closely and consolidates themselves and, last but not least, where the highest political level determines a strategic program, monitors regularly the progress.

The initiative “Innovation Union” determines this kind of ambitious approach, integrated and strategic, exploiting and increasing our main strengths by using new and productive methods, maintaining, in this way, the economic fundament which sustains our quality of life and the social pattern in the conditions of the aging of the population. Maintaining the
actual situation ("business as usual") is equivalent with the gradually loss of the competitive advantages of which we dispose and the acceptance of the constant decline of Europe.

Practically, to realize the "Innovation Union", among others, the following steps are necessary:

a) In times of budget restrictions, the EU and the country members must continue investing in education, research, development, innovation and TIC. These investments must not only be protected by budget reductions, but benefit from supplementary financing.

b) These must be followed by reforms that increase the profit of these investments and that approach the problem of divisions. The research and innovation systems of the EU and country members must be coordinated better and their performance must be improved.

c) The researchers and the innovators must be able to work and cooperate in the entire EU as easy as on a national level. The European Space of research must be finalized in 4 years, establishing in this way, a space for a true free circulation of knowledge.

d) The access of EU programs must be simplified and their lever effect on investments from the private sector must be intensified, with the support of the Investment European Bank. The contributions of the main program to the development of IMM that grow fast must also be increased. The European Fund of regional development should be exploited at maximum for the development of the research and innovation abilities in the entire Europe, on the basis of intelligent regional stability strategies.

e) The research must produce more innovations. The cooperation between the world of science and the world of companies must be increased, obstacles that appear these cooperations must be removed and the personnel engaged in the research activity must be stimulated.

f) The barriers remained in the way of the entrepreneurs who want to introduce “market ideas” must be eliminated: a better access to financing, especially for IMM, accessible intellectual property rights, regulations and clever and ambitious objectives, faster establishment of interoperable standards and strategic use of budgets allocated for public purchases. As an intermediary step, an agreement should be made regarding the "EU" brand before the year 2010.

4.2. Engagements of the "Innovation Union"

To accomplish the objectives of Strategy Europe 2020 and to realize an innovation Union a series of engagements must be fulfilled:

- The European Commission will elaborate future research and innovation programs of the EU with the purpose to facilitate and consolidate the participation of IMM, especially of those with a high research potential. Partnerships with country members’ agencies should be studied thoroughly, especially on the basis of the experience received from Eureka Eurostars initiative.

- Through the Common Research Centre, the Committee will consolidate the scientific basis for the elaboration of the research policies. The Committee will also created a “European Forum regarding activities orientated towards the future”, to reunite the available data and to regroup public and private interest parties, in order to improve the data base for the elaboration of policies.

- The Committee will consolidate the establishment of trans-frontier connections between innovating companies and adequate investors. The Committee will design a great personality for the coordination of this process. Besides, in the context of the IMM financing Forum, the Committee will concentrate, among others, on specific financing problems encountered by small innovating companies.

- In 2011, the Committee will contribute to the development of an independent system of international multidimensional classification of universities’ results, which will allow the identification of the most performing European universities. Also, new measurements will be imposed under a communication concerning the reform and the modernization of superior education.

- In 2011, the Committee will present solutions to allow future programs to concentrate more on the social challenges, to increase the efficiency of the financing instruments and to simplify, radically, their access, because of a better balance between a system based on control and a system based on trust. The European Research Board’s role should be strengthen in promoting excellence and priorities focused on companies from the research-development program (including partnerships focused on companies in domains such as essential generic technologies) should be also consolidated.

- Until the end of 2011, in tight collaboration with state members and interested parties, the Committee will present proposals in order to create an European knowledge market for certificates and licenses, based on the country members’ experience in term of exchange platforms that correlates the offer and the demand, of some markets that allow financial investments in intangible assets and some other ideas that give a new color to the neglected intellectual properties, such as a group of certificates and brokerage in term of innovation.
Until 2012, the European Union and the country members should implement integrated policies assuring that researchers, university members and top innovators live and work in Europe, but also measurements that lure a sufficient number of citizens with high qualification from the third countries to establish in Europe.

The European Union should enhance the cooperation concerning the development of the global research infrastructure. Until 2012 an agreement with international partners should be made, regarding the development of the research infrastructure, including TIC structures, because, because of the costs, the complexity of the interoperability demands, it can be developed only on a world level.

In 2011, the European Committee will create a European Managing Committee in terms of design, that will be invited to make proposals in term of one year to consolidate the role of design in the innovation policy, for instance, through EU and/or national programs a label “European Design of Excellency” will be established. As a part of the subsequent actions of the green book regarding creative industries, the Committee will create a European Alliance of creative industries, in order to develop new support forms for these industries and to promote a bigger use of creativity in other sectors.[5,6]

5. RISK CAPITAL – RESOURCE FOR INNOVATION FINANCING

The risk capital, as a definition, is the imperfect translation of the American term of “venture capital”. Pierre Battini proposed the following definition of risk capital: “The risk capital is a special financing source offered by over the counter companies that are new or that present an important development”. [7]

Risk capital is a special financing source because of the following characteristics:
- this source of financing is outside the traditional bank circuit;
- the final method of these investors is original, in the sense that it doesn’t structure on traditional criteria of debtors;
- participant-shareholders of risk capital act as such and not as simple spectators.

To make it simple, the risk capital is a contribution of personal funds, made by institutions which involves, more or less, in the operation of the company, with the purpose of obtaining profit by reselling the titles that they own. This purpose explains the orientation towards viable business files that can demonstrate a compatible development with a hope of profit. Unlike the classic banker, who asks patrimonial guarantees, the risk capital investor appears to be a partner who works in a far away horizon, meaning a more uncertain horizon.

Risk capital is invested in one part of the company (actions or other titles), and, therefore, the investors’ profit depends on the growth and the profitability of the business.

After the stage in the existence of a company, where the risk capital interferes, the risk capital can be:
- Starting capital: financing the creation of companies in the first years of existence;
- development capital: participating to the existing capital of the companies that have a potential for development;
- capital of transfer: meant for power transfer operations within the company, to the most motivated associates or to a team of managers.

The criteria after which we can establish types of capital risk investors are:

a. legal and financial status: they can be a risk capital company (SCR), an innovation financial company (SFI) or common placement risk funds (FCPR);

b. specialization on types of investments: usually, risk capital investors specialize on one type of intervention (starting capital, development capital) without excluding a careful diversification;

c. specialization on sectors: about a third of investors present a specialization on sectors, determined by concrete perspectives of value of a specific expertise; the specialization on sectors can be in domains such as system information, biotechnology, health etc.;

d. regional dimension: there can be three categories of investors with regional vocation, those who have, first of all, an economic position, those who replace totally the risk professional independent capital and the structures created by regional financial institutions;

e. the origin of the funds of risk capital organizations: there can be four types of founders of risk capital organizations, namely: public powers or local collectivities, industrial groups, bank groups or other financial institutions and independent teams.

This classification of investments is useful to project bidders in order to optimize the choice of a compatible financial partner. Financing by risk capital is an association, on a medium term, between a team of managers and a team of investors. The initiation and realization of this type of association assumes the following steps:
- preliminary contract;
- the choice of financial instruments;
- active partnership, and
- the withdraw of the financial investor.[8]

6. CONCLUSIONS
The European Union has an extraordinary innovation potential, Europe has a long determined investment traditions. This has a lot of creative talents and can be based on its cultural diversity. It cannot be omitted the fact that Europe put the basis of one of the largest unique marked in the world, under which innovative products and services can be commercialized. The Union also has a strong, responsible tradition of the public sector that needs to be valued. Almost all the EU state members improved their performances in the field of research. Nevertheless, the growth of performances in terms of innovation has decreased, and EU doesn’t cover the persistent gap in relation with world leaders in terms of innovation, USA, Japan and South Korea. For EU-27, the biggest gap remains the one for the innovation from the private sector level. EU still has a clear advance from emergent economies, China, Brazil, India, Russia and South Africa. Nevertheless, China improves its innovation performances and reduces continuously the gap.

At the level of the European Union and developed countries in Europe, innovation is seen from a few years, as an social economic progress engine, and the EU budget for the period 2014-2020 foresees the allocation of some important amount of money to the technological and invention domain, under the program “Horizon 2020”, which will have a budget of over 80 billion Euros.

7. REFERENCES