

THE ROMANIAN INNOVATION PERFORMANCE IN THE EUROPEAN CONTEXT

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Abstract

A main priority of Romania after the accession in the European Union is to stimulate the increase of economic competitiveness by minimizing the technologic lag comparative with the other countries, members of EU.

In these conditions, the main aim of the paper is to analyze the Romanian enterprise's innovation performance. In the same time, the paper makes a comparative analysis of a number of important indicators of innovation between Romanian situation and the other competitive EU countries.

The paper uses the most recent results of a statistical research of National Statistical Institute about the innovation in the Romanian enterprises according to Community Innovation Survey. On the base of this critical analysis of Romania's stage in the development of innovation and competitiveness the paper will give some solutions and ways to reduce the delays of competitiveness of Romanian enterprises comparative with the performances of enterprises from EU.

Key words: innovation performance, competitiveness, Community Innovation Survey

JEL classification: O32

1. Introduction

To the meeting of Lisbon from March 2000 European Council established as the main target for next ten years the transformation of European Union in the best competitive knowledge based economy. The innovation was identified to be the most important tool used to accomplish this objective.

The important role of innovation in the economic performance growth implies the recording of the innovation performance evolution by time. To accomplish the main objective of European Council, in the first stage, it is necessary to reduce the innovation delay between European Union and United States of America.

Important problems that have to be solved are improving the innovation infrastructure and the spreading mechanisms of the research results to the users from the industry and commerce. The growth of economic performance is sustained by stimulating of creativity and technological or managerial competences.

The lags of Romanian companies in the respect of direct resources of competitiveness growth exist especially in innovation, research and development. Another important delay of

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Romania arises in the field of information society, all of the above domains having a crucial role in the development of a powerful industrial basis [Șipoș, 2006, 1-5].

2. The European Innovation Scoreboard 2008

Innovation is a very complex process, which requires a multi criteria indicators system to be characterized. The innovation performance of the European member states is quantifiable using various tools that allow gaining important information regarding the status of innovation and the national innovation system of each member state. The main instruments used for this purpose are the Community Innovation Survey (CIS) and the European Innovation Scoreboard (EIS).

These tools are interconnected: the European Innovation Scoreboard is using data collected by EUROSTAT in the Community Innovation Surveys.

In this context, beginning with year 2000 The European Commission, under the Lisbon Strategy, is developing a European Innovation Scoreboard (EIS) every year. The EIS is an instrument used to evaluate and compare the innovation performance of the EU Member States.

The European Innovation Scoreboard 2008, prepared by the Maastricht Economic and social Research and training centre on Innovation and Technology (MERIT), assisted by the Joint Research Centre of the European Commission, includes innovation indicators and trend analyses for the EU 27 Member States.

In developing the European Innovation Scoreboard 2008 it was used an innovation performance assessment system, improved from that used in previous years. This assessment system includes 29 indicators and provide a high level of importance to service sectors, non-technological innovation and to innovation outputs.

In this innovation performance assessment system, the indicators aims seven dimensions of innovation performance and are grouped in three categories: innovation enablers, firm activities and outputs [EIS, 2008].

The first category, innovation enablers, captures the main external factors that are able to stimulate innovation. This category captures two dimensions of innovation performance:

- Human resources refers to the high-skilled and educated people availability
- Finance and support concerns the availability of finance for innovation projects and the government support for innovation activities.

The second category, firm activities, quantifies the firms innovation effort through three dimensions of innovation performance:

- Firm investments captures different types of investments made by firms for generating innovations
- Linkages and entrepreneurship is referring to entrepreneurial effort and collaboration effort between innovating firms and also between innovating firms and the public sector
- Throughputs concerns the Intellectual Property Rights

Outputs are the third category and it captures two dimensions of innovation performance:

- Innovators is referring to the number of firms that have launched innovations to the market or have used innovations in their organizations

- Economic effects concern the growth of employment rate, exports and sales due to the innovation activities.

All these seven dimensions of innovation performance are considered as forming the essence of the national innovation performance.

Using these indicators and based on countries overall innovation score and their recent historical trend, EIS 2008 grouped the countries into four categories:

- *Innovation leaders* (with national overall innovation scores well above that of the EU 27): Sweden, Switzerland, Finland, UK, Denmark and Germany;
- *Innovation followers* (with national overall innovation scores below of the innovation leaders but equal to or above that of the EU 27): Austria, Luxemburg, Ireland, France, Belgium, Netherlands;
- *Moderate innovators* (with scores below that of the EU 27 , except for Cyprus): Cyprus, Estonia, Slovenia, Iceland, Czech Republic, Norway, Spain, Portugal and Italy;
- *Catching-up countries* (with national overall innovation scores significantly below that of the EU 27, but these scores are increasing over time): Malta, Greece, Hungary, Slovakia, Poland, Lithuania, Romania, Latvia, Bulgaria, and Turkey.

In the past years, the delay between innovation level of the European Union and United States of America is reducing every year. The main explanations for this evolution are the world leader's performances in the innovation field: Sweden, Switzerland, Finland, Denmark, Germany and UK, but the delay still exists.

Favorable developments regarding innovation performances in recent years have been recorded in the following countries:

- UK has been evolved from the *innovation-followers* level to the *innovation leaders*;
- Austria is very close to passing to *innovation leaders*;
- Cyprus, Slovenia, Czech-Republic, Portugal have been advanced from *catching-up countries* to *moderate innovators*;
- Spain, Estonia, Italy have been evolved from *trailing countries* (according to EIS 2006) to *moderate innovators*.

More than that, it is appreciated that due to the innovation performance evolution in the last years Cyprus, Estonia and Slovenia may move soon to *innovation-followers*. This fast improvement of innovation performance in Cyprus is due to that a great majority of companies were involved in innovation through cooperation (69%) and in Estonia it is due to that firms spent a bigger part of their turnover (3,8%) on innovation related activities and also to that many companies were involved in innovation through cooperation (39,5%) [EIS, 2007] [EIS, 2008].

In comparison with United States, the EU 27 main strong points in the innovation performance are [EIS 2008]:

- number of new S&E (science and engineering) graduates per 1000 population aged 20-29;
- employment in medium-high/high-tech manufacturing (% of total workforce);
- number of new community trademarks per million population;
- number of new community designs per million populations.
- The superiority of United States and Japan in the innovation performance field is given by:
- population with tertiary education per 100 population aged 25-64;
- business R&D expenditures (% of GDP);

- exports of high technology products;
- higher number of EPO patents (patents applied for the European Patent Office) per million population than EU;
- higher number of USPTO patents (patents granted by the US Patent and Trademark Office) per million populations than EU.

3. The Romanian innovation performance

Romania international rankings in terms of competitiveness show some weaknesses and innovation is one of them.

The most recent data that refers to Romanian innovation performance are based on results of statistical research for 2004 – 2006 periods harmonized the Community Innovation Survey (CIS). That research has begun in the middle of 2007 and included a selection of 12,232 enterprises with over ten employees, throughout the industry and selected services. Terms of collection, processing, analysis and publication of result data are the same to the all European Union countries. The response rate was 82.9% and the statistical research results are guaranteed with a $\pm 3\%$ probability [INS, 2008].

Next statistical research for innovation activity in the enterprises will be launched in 2009 year and will contain information that refers to Romanian innovation performance in the 2006 – 2008 periods.

The results of statistical research for 2004 – 2006 periods are underlining a low level of innovation performance but with an improved trend. These issues demonstrate the necessity of a stimulating economic and law framework for the innovation in the Romanian enterprises.

The percent of innovative Romanian enterprises in the total number of enterprises is low comparing with EU 27 average, but in the period 2004-2006 it has registered a growth of interest for innovation in the enterprises, compared with the previous period [INS 2008].

Nevertheless the percent of innovative Romanian enterprises in the total number of enterprises is still reduced (in 2004 – 2006, the percent was 21.1 % for Romania and 47% for EU average), the trend registered an increasing evolution (from 17% in 2000 – 2002 to 20% in 2002 – 2004 and to 21.1% in 2004 - 2006) [INS, 2008], [INS, 2006].

That shows an improvement of economic framework in Romania. More than that, one of the main objectives of the RDI National Strategy for 2007 – 2013 periods presumes to double the percent of innovative enterprises in 2013.

This percentage places Romania ranked 23 among the 27 EU Member States, and the first ranked is Germany with 63% of enterprises being innovative [CIS 2004-2006].

From the innovative enterprises, 71.62% had both product innovation and process innovation, 19.58% had only process innovation and 8.80% had only product innovation. This shows that comparing to the previous period, it was a growth of 7% of enterprises which have both product and process innovation to the detriment of other two categories of innovation.

A percent of 46.3% from total number of enterprises have developed organizational innovation or marketing innovation through the implementation of changes in enterprise structure, or in managerial methods, or by implementation of new or improved concepts or methods of selling products.

Regarding the nature of activity, the enterprises from industrial field have proved to be more innovative than those of services. Thus, between 2004-2006 in Romania 63% of all innovative enterprises were from industrial field and only 37% were in services.

By dimension, the most innovative enterprises are the large enterprises. The percentage of large innovative enterprises in the total of their category was 42%, the percentage of medium innovative enterprises in the total of their category was 25% and the percentage of small innovative enterprises in the total of their category was only 16%.

It should be noted that 14.1% of all innovative enterprises belong to a group of companies, more than half of them based abroad.

The innovation expenditures level is still low compared to European average value, although it increased by 40% in 2006 compared to 2004.

The enterprises from services field spend more on research and development than those from industrial. Only a percentage of 13.3% of innovative enterprises received public funding for innovation activities.

Romanian enterprises spent 1.3% of their turnover on innovation activities, while in European countries enterprises spent much more on innovation activities: in Estonia 3.8%, in Sweden 3.3% and in Germany 2.9% [CIS 2004-2006].

In Romania only 18.5% of total turnover was attributed to product innovation activities, while the highest proportion was recorded by Malta (28.6%) [CIS 2004-2006].

The structure of innovation expenditures has the following components:

- the main part of innovation expenditures was allocated to machines, installations, equipments and software (74.9%). This shows an increase by 20% compared to the previous period.
- other destinations for innovation expenditures refers to licenses, patents, unpatented inventions, know-how (2.4%), internal research & development (19.5%) and research&development from other enterprises (3.2%).

The cooperation in innovation between Romanian enterprises is still to a low level. Active participation of Romanian enterprises to commune research and development or innovation projects with another Romanian partners or foreign partners is reduced comparative with European average (17% for Romania and 27% for EU 27, while 68.8% in Cyprus, 57% in Finland, 50.2% in Slovenia and 48% in Poland).

The main way to cooperate between research and production fields is the National RDI programs and direct RDI acquisitions. The provenience country enterprises distribution was: 60% cooperation between Romanian enterprises, 32% cooperation with European enterprises and 8% cooperation with USA and other countries. The cooperation in innovation of Romanian enterprises refers to suppliers in percents of 14% (17% average EU 27), to clients 10% (14% average EU 27), superior education institutions 4% (9% average EU 27) and government or public research institutes 4% (6% average EU 27) [Fourth CIS, 2007].

The most important effects of innovation are the improvements of goods and services quality and the growth of production capacity. From the total amount of innovative enterprises, 41.5% mentioned that the main result of innovation is improved quality of goods and services, 36.6% considered that the main result of innovation is increasing of production capacity and 14.6% believed that the main effects are the reducing of material consumption and energy per unit of product.

The level of financing of research and development activities in Romanian enterprises is reduced. In Romania the level of total research and development expenditures is very low, representing about 25% from average level of EU 27 [INS, 2008].

Financial issues are the main problem of innovation in Romanian enterprises. The results of statistical research in 2004 – 2006 underline that for 30.9% of innovative enterprises the innovative activity blockade was equally caused by lack of own funds and external financing. Non-innovative enterprises have indicated that the main brake on the lack of funding for innovation (30.4%) and enterprise innovation costs too high (26.8%). Another important issue is the economic risk to fail in gaining a new product or service.

Compared to the period 2002-2004 when the region around Bucharest was the most innovative geographical space with the greatest number of innovative enterprises (22% from total), in period 2004-2006 the situation has changed. The largest share of innovative enterprises is held by the North-East and the South-East development regions (34.7%), followed by the North-West and Central regions (20.7%), then by Muntenia South and Bucharest-Ifov regions (16.8%) and by the South-West Oltenia and West region (12.1%) [INS, 2008].

The employee's number implied in research, development and innovation activities in Romania is very low and the average age of these employees is increasing. In 2006 the research and development activities implied 42,220 peoples (a percent of 71.34% was researchers). That means an average number by 49.9 researchers per 10,000 civil employed persons, representing about 58% from average EU 27 [INS, 2007].

In the researcher's category, the main part is certified researchers. In age category distribution, the main part is researchers with age over 45 years old (49%), while the up to 35 years old researchers have a low representation (only 23.60 %). In the last years, the number of persons implied in research, development and innovation activities and the percent of researchers in total number of employees registered a fast growth.

Only 40.3% of all Romanian staff is working in innovative enterprises, while in Germany this proportion is nearly 86% [CIS, 2004-2006].

The Romanian enterprises pay a very low attention to protect the intellectual property rights by patents. According to statistical research results in 2004 – 2006 periods, only 15.3% of innovative enterprises and 2.5% of the non-innovative enterprises have applied for mark registration. In the same period, 6.4% of innovative enterprises and only 1% of non-innovative enterprises asked for invention patents. Most enterprises that ask for protection of intellectual property rights are large ones.

In the last period it is registered an increase of Romanian enterprises interest in these issues but the values are net inferior to average EU 27.

According to EIS 2008, for Romania it has been registered 0.7 patents applied for at the European Patent Office per million populations and in the same time, the average for EU 27 is 105.7 EPO patents.

National Strategy for Research, Development and Innovation for 2007 – 2013 is underlining the increases of intellectual property rights importance through a larger number of registered patents. The main objectives stipulate the growth of number of European patents by ten times in 2013 face to 2003 and the growth of number of Romanian patents registered by OSIM (Patent National Romanian Office) by three times in 2013 face to 2006 .

4. Ways to reduce the delays of Romanian enterprise's competitiveness comparative with the EU enterprises

For Romania, the reformation of the entire research, development and innovation system is the main way to increase the economic competitiveness and to reduce the delays from the other EU members.

The increase of interest in the research, development and innovation activities may be realized through a proper law framework and financial instruments that stimulate the research and the economic application of the research results. A greater level of interest in this important domain means a greater number of innovative enterprises and better results [Șipoș, 2004, 128-140].

At the Romanian government level, it is projected to apply a set of stimulating actions for research, development and innovation activities in the enterprise through three categories of politics:

- *tax policy*: introducing a specific stimulating tax policies for sustaining the research, development and innovation activities in the enterprises;
- *financial policy*: promotion of a proper financial tools and services to sustain the research, development and innovation activities in the enterprises, especially based on venture capital;
- *competition policy*: re-orientation of government funds to innovative enterprises. According to recent European Union recommendations, the percent allocated to research and development from the total government funds will be 20%.

To improve the innovation performance of its enterprises, Romania must give a greater importance to increase the financing of research, development and innovation activities. An important way to accomplish this objective is to stimulate implying of a larger amount of private financial resources. In present, the greater percent of financial resources in the research field are from public funds.

Romania's government projected a financing percent by 3% of GDP to research, development and innovation activities in the 2015 year, mainly from private sources. The intermediate objectives propose the increase of total funds allocated to research, development and innovation activities beginning with 0.75% of GDP in 2006 to 1% of GDP in 2007 and to 1.55% of GDP in 2009 [GR, SOP 2007-2013].

The projected distribution of fund allocated to research, development and innovation activities by sources is:

- public expenditures: 0.5% of GDP in 2007 and 1% of GDP in 2010;
- private expenditures: 2% of GDP until 2013 – 2015 years.

A very important source of financing in the research field in the next years is represented by the Structural European Funds. Romania benefits beginning with accession to the European Union in January 2007 by consistent structural and cohesion funds in the same conditions with the other members of the EU. Romania is, in the same time, eligible in the European Territorial Convergence and Cooperation Programs with large chances to access important funds.

The human capital is also very important for any effort of increasing competitiveness. In the reformation process of research, development and innovation system, Romania has to adapt the superior education system to the new challenges. The technical and scientific domains must be oriented to the newest requirements for developing the scientific careers.

The participation in life-long learning of personnel from high performance research units is also very important. That means big investments in human resources and allocating of important financial resources for performing equipments. All these efforts have to be oriented mainly to universities and research institutes and will be the premises of strong partnerships between academic and business environments.

One of the most significant objectives in the National Strategy for Research, Development and Innovation refers to strongly growth of number of research involved people until year of 2013 and to decrease the average age in the research field less than 40 years.

A way of increasing the enterprise's competitiveness is encouraging the cooperation and internationalization of research activity [Wiethaus, 2006]. Romania has to promote the partnerships between universities/research institutes and Romanian and European enterprises. The efforts to integrate the Romanian Research Area to European Research and Innovation Area – ERIA – have to continue based on participation to Framework Programs and CIP sustained by European Union.

To facilitate the collaboration relations between researchers and business people a series of programs that promote the excellence research in research–industry consortiums are running. In the same time, there are operational a number of 15 programs in the National Strategy for Research, Development and Innovation that works based on partnerships between research institutes, universities and enterprises. The most of these programs are specialized on specific fields of technologic development.

In the National Strategy for Research, Development and Innovation 2007 – 2013 the research projects in cooperation systems are sustained. The priority domains are selected to be compatible with industrial development policy. The enterprise level research and transfer of the cooperation results in the research projects is encouraged.

In present, the most of Romanian enterprises gives a special attention to obtain competitive advantages based on low cost production factors. They neglect the competitive strategies sustained by increased productivity. In the very next future, the market success will appear in the case of products with a high level of added value. That supplementary added value is obtained only applying the results of research, development and innovation activity.

5. Conclusions

Beginning with 1990 year, the Romanian research, development and innovation system has crossed a very difficult period. The under-financing and the delays in reorganization of the research, development and innovation system did not allow its connection to the scientific and technologic latest evolution in the world. In this context, the Romanian enterprises could not exert a real demand for innovation.

Although the Romanian overall innovation performance is still below the EU average, due to the improvement of innovation performance, at present it is considered to be one of the growth leaders among the “catching-up” countries.

In the last years, the Romanian enterprises scored a positive trend of research, development and innovation activities [EIS 2006], [EIS, 2007], [EIS, 2008]. The main advantage of the Romanian innovation system refers to both dimensions of innovation performance captured by OUTPUTS: Innovators and Economic effects. Thus, the main Romanian strengths relate to [CIS 2004-2006], [EIS, 2008]:

- the share of innovating firms who's product or process innovation had a highly important effect on reducing labour costs per unit of output in total number of innovating firms;
- the rate of innovating firms who's product or process innovation had an important effect on reducing materials and energy per unit of output in total number of innovating firms;

- a greater than EU average value sales of new-to-firm products (percent of turnover) and also a fast growth of new to firm sales.

The favorable Romanian innovation performance evolution was also supported by other factors such as:

- a fast increasing in the last few years of the number of new S&E (science and engineering) and SSH (social sciences and humanities) graduates per 1000 population aged 20-29;
- the growth rate of the percentage of persons involved in life-long learning per 100 population aged 25-64;
- the human resources implied in the research & development activity have a good level of knowledge;
- a favorable rate of firm renewal;
- a strong increase of the public R&D expenditures and innovation expenditures (% of GDP), private credit, broadband access by firms, Community trademarks and Community designs.

Nevertheless, the Romanian innovation system still has many weaknesses. The main weaknesses of the Romanian innovation system are [CIS 2004-2006], [EIS 2008]:

- the participation in life-long learning per 100 population aged 25 – 64 is still low;
- the level of public R&D expenditures (%of GDP), the venture capital (%of GDP), the private credit (relative to GDP) and broadband access by firms (% of firms) are still is very low;
- the level of business R&D expenditures (percents of GDP) and IT expenditures are very low comparative with the average European level;
- the indicators for intellectual property are still low;
- the level of investments for technologic improvements and modernizations is reduced;
- the production is concentrated to low level added value domains;
- the export is mainly based on low level added value products;
- the enterprise's productivity is reduced (the Romanian labour productivity per person employed represents 41% of EU 27 average);
- the enterprises are focused on gaining competitiveness by low costs rather than by innovation;
- the innovation level of the Romanian enterprises is still low;
- the cooperation between research institutes/universities and enterprises is reduced;
- the technologic transfer and innovation infrastructure and services are insufficiently developed and diversified.

It is appreciated that the most critical weaknesses in Romanian innovation performance are in the field of Finance and support and Throughputs [INNO-Policy Trend chart, 2008].

At present, Romania has for the first time an integrated national strategic document for research, development and innovation activities: National Strategy for Research, Development and Innovation Activities for 2007 – 2013 periods. That is the reference document for all research, development and innovation programs on the specified period.

This strategy integrates both the Romanian and European priorities which are stipulated in the Lisbon Strategy. The National Strategy for Research, Development and Innovation Activities contributes to reducing the economic growth lags between European Union and the United States.

The National Strategy for Research, Development and Innovation Activities implementation is an important part of Romania's development efforts to connect to Lisbon Strategy main objectives: the transformation of research, development and innovation areas in the engine of the European competitiveness growing.

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