

ENGINEERING AND CREATIVITY. ROMANIAN POLICY REGARDING INNOVATION AND SCIENTIFIC RESEARCH DEVELOPMENT

Assoc. Prof. Dr. Eng. Nicusor DRAGAN
MECMET – The Research Center of Machines,
Mechanic and Technological Equipments
"Dunarea de Jos" University of Galati

ABSTRACT

The goal of Lisbon Agenda is to make the EU "the most dynamic and competitive knowledge-based economy in the world, capable of sustainable economic growth improving skills for more and better jobs and greater social cohesion and respect for the environment by 2010". Enhancing translation of this process into concrete measures led to the extension of the Framework Programmes for Research and Technological Development (FPs) into FP7 and the Joint Technology Initiatives (JTI). This article presents a comparison between the concepts of CREATIVITY and INNOVATION and the Romanian policy concerning the scientific research and innovation taking into consideration the necessity to retrieve the lagging in comparison with western Europe.

KEYWORDS: engineering, innovation and creativity, scientific research

1. Creativity and Innovation

What innovation is? It's a bit abstract competency. Usually, it is disguised in the word "creativity". Innovation is more than an idea. It's not a flash. The first definition of innovation with a high degree of generalization, was done in 1941 by the economist Schumpeter: "innovation is the action that results in producing something else, or producing in a different way". According to this, innovation can include the following types of activities: to make a new product or/and to introduce a new manufacturing method or/and to access a new market (or to open a new market) or/and to resort to a new raw material a new organization of company or/and to create a new image of the company.

An innovative person has to sum up all the following criteria:

- ▶ has ideas
- ▶ is not afraid to combine them into surprising, break-through formulas
- ▶ knows how to put them into practice
- ▶ dares to lucidly select those that are viable indeed
- ▶ dares to develop them

▶ has the ability to attract others to the innovative project.

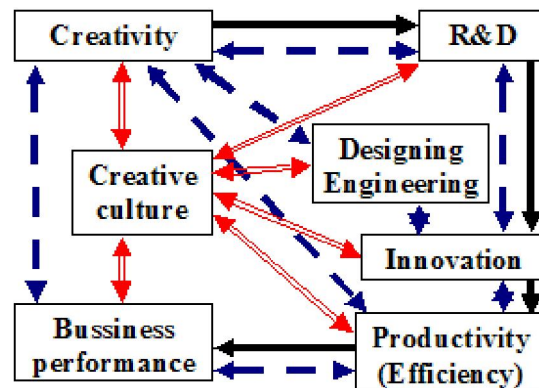


Fig.1 Links between Innovation, Creativity, Research and Development, Engineering and their Economic impact

Figure 1 shows a diagram with the model between creativity, design and economic performance. Creativity and design can be linked to innovation as the first contributes to

the expansion of available ideas and the second to an increased chance of successfully commercializing these ideas. According to [1], three different models are identified linking creativity and design to innovation. In the linear model, creativity has a positive effect on R&D which its turn has a positive effect in innovation (cf. the one-headed black arrows in fig. 1). The interactive model not only includes feedback effects between the different elements of the linear model (cf. the two-headed red arrows in fig. 1) but also acknowledges the importance of design. Creativity relates directly with design and design relates directly with innovation. In the third and most complete model the creative climate takes a central position (cf. the two-headed blue dotted arrows in fig. 1). Innovation, as an attempt to introduce new elements, unknown or not tested so far, destabilizes the system. Even though the objective is to improve the system, destabilization is in contradiction with the need to have all the things running smoothly, so that most often the innovation will be adopted through internal pressures. It must be mentioned that, while the invention represents simultaneously the creative act and the creation result, the psychological concept of creativity represents the innovative power or the creative capacity from the point of view of efficiency.

2. Innovation in EU

The board of results on innovation at European level (European Innovation

Scoreboard, EIS) 2008 shows that, prior to the financial crisis, the EU achieved important progress in the field of innovation. The relative discrepancy compared with the US and Japan in the innovation field decreased, especially due to the significant achievements of the new member states, such as Cyprus, Romania and Bulgaria. EU achieved progress especially in the field of human resources and funds available for innovation. “A period of crisis is not the right time to give up the investments in research and innovation. They are vital if Europe wants to get through the economic crisis even stronger and to approach the challenge of climate changes and globalization”, as pointed out by Günter Verheugen, European Commissioner for Enterprise and Industry.

Figure 2 shows the innovation rankings of the countries in Europe according to [2]. The European countries are divided in 4 groups of innovation ranking, and all countries improved the performances, even though the progress rate varies:

1)Leaders in innovation (ranking far over the EU average – fig. 3): Switzerland (CH), Sweden (SE), Finland (FI), Germany (DE), Denmark (DK), and the UK; out of them, CH and DE have the highest rate of improving the performance.

2)Innovation followers (over the EU level – fig. 4): Austria (AT), Ireland (IE), Luxembourg (LU), Belgium (BE), France (FR) and Netherlands (NL). The ranking of IE moved up in this group, followed by AT.

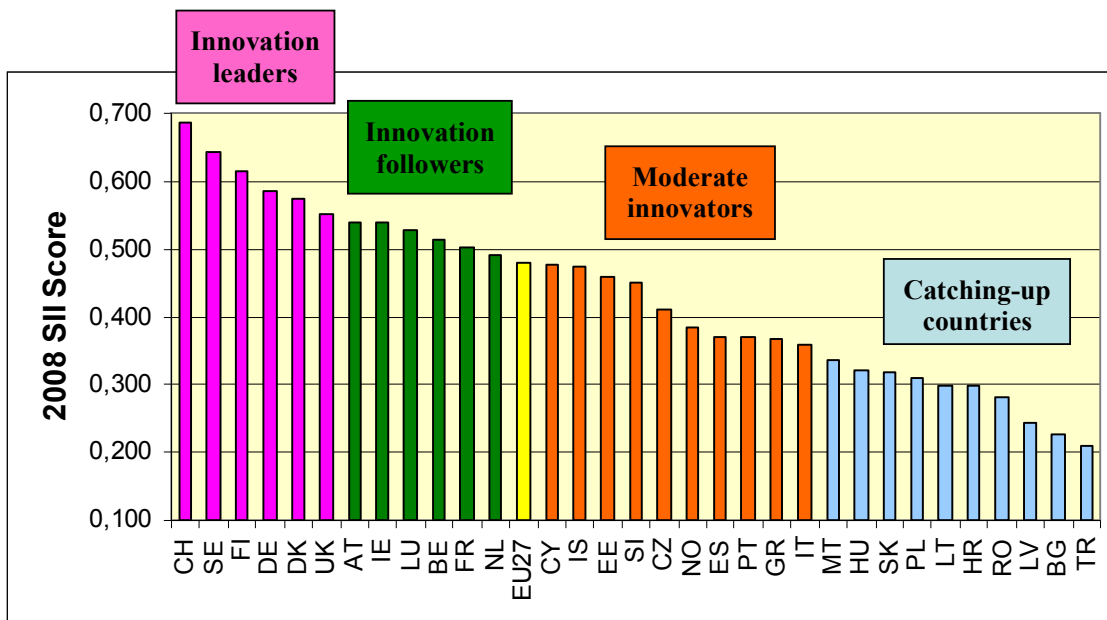


Fig.2 Summary Innovation Index Score

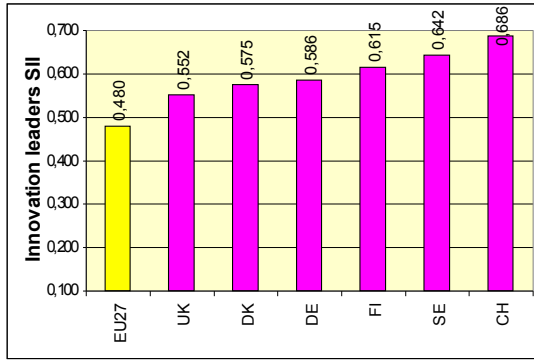


Fig.3 Leaders in innovation - SII Score 2008

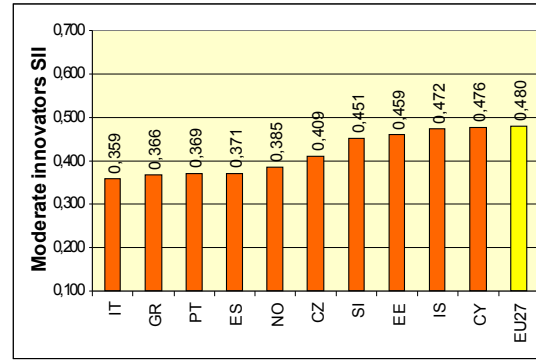


Fig.5 Moderate innovators - SII Score 2008

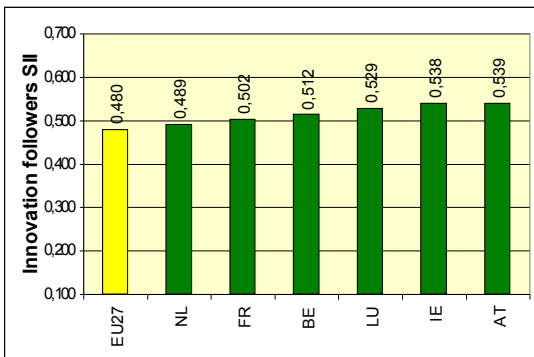


Fig.4 Innovation followers - SII Score 2008

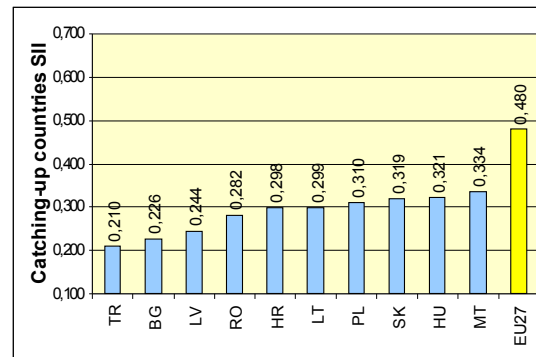


Fig.6 Low innovative Countries- SII Score 2008

3) Moderate innovators (below the EU average – fig. 5): Cyprus (CY), Iceland (IS), Estonia (EE), Slovenia (SI), Czech Republic (CZ), Norway (NO), Spain (ES), Portugal (PT),

Greece (GR), and Italy (IT); from those, CY ranks over the average followed by PT.

4) Low innovative (far below the EU average – fig. 6): Malta (MT), Hungary (HU), Slovakia

(SK), and Bulgaria (BG). The lowest SII score is recorded by Turkey (TR).

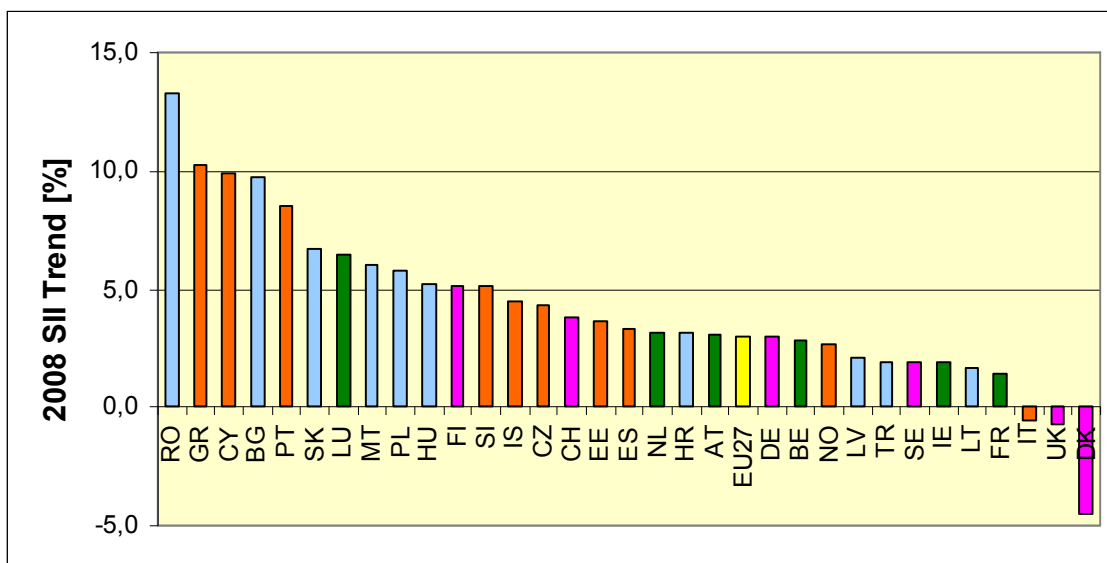


Fig.7 Summary Innovation Index Score 2008- RATE OF GROWTH

(SK), Poland (PL), Lithuania (LT), Croatia (HR), Romania (RO), Latvia (LV), Bulgaria (BG) and Turkey (TR); these countries are in process of covering the gaps, BG and RO having the highest rate of improving the performances.

Within the four identified country groups growth performance is very different and fig. 1 identifies the growth leaders within each group. Within the Innovation leaders, CH is the growth leader and all other countries in this group show a rate of improvement that is below that of the EU27. For the Innovation followers we observe that only IE and AT have managed to grow faster than the EU27. These countries are the growth leaders within the Innovation followers. Of the Moderate innovators seven countries have grown faster than the EU27, but three countries have shown a slower progress: Italy, Norway and Spain. The growths leaders here are Cyprus and Portugal. Of the Catching-up countries two countries have actually grown at a slower pace than the EU27: Lithuania and Croatia. Bulgaria and Romania are the growth leaders also showing the overall fastest rate of improvement in innovation performance.

The average growth rates for the four country groups (fig.8, fig. 9, fig. 10, fig. 11) show that there is between group convergence with the Moderate innovators and the Low innovative countries growing at a faster rate

than the Innovation leaders and Innovation followers. This overall process of catching up, where countries with below average performance have faster growth rates than those with above average performance, can also be observed at the level of most individual countries. Notable exceptions include CY which combines a close to average level of performance with a high growth rate; IT, ES, NO, LT and HR which combine below average levels of performance with below average growth rates; and CH which is combining a high level of innovation performance and an above average rate of improvement.

The analysis of information at EU level [3] shows the important progress that has been achieved, both in absolute terms (compared with the level of 5 years ago) and in comparison with the US and Japan. Comparison with a larger group of countries shows that EU also had a relatively good evolution in relation to the emergent economies. Progress was achieved in the field of human resources involved in the innovation process (licentiates, colleges), access to the broadband internet, availability of risk capital. Nevertheless, weaknesses continue to exist with regard to private investments, where the EU comes after the US and Japan, from the point of view of spending for research, development and informatics. Also, despite the report showing the important role of the non-

Table 1. Innovation growth leaders

GROUP	Growth rate [%]	Growth leaders	Moderate growers	Slow growers
Innovation leaders	1.6	CH	DE, FI	DK, SE, UK
Innovation followers	2.0	IE, AT	BE	FR, LU, NL
Moderate innovators	3.6	CY, PT	CZ, EE, GR, IS, SI	IT, NO, ES
Low innovators	4.1	BG, RO	LV, HU, MT, PL, SK, TR	HR, LT

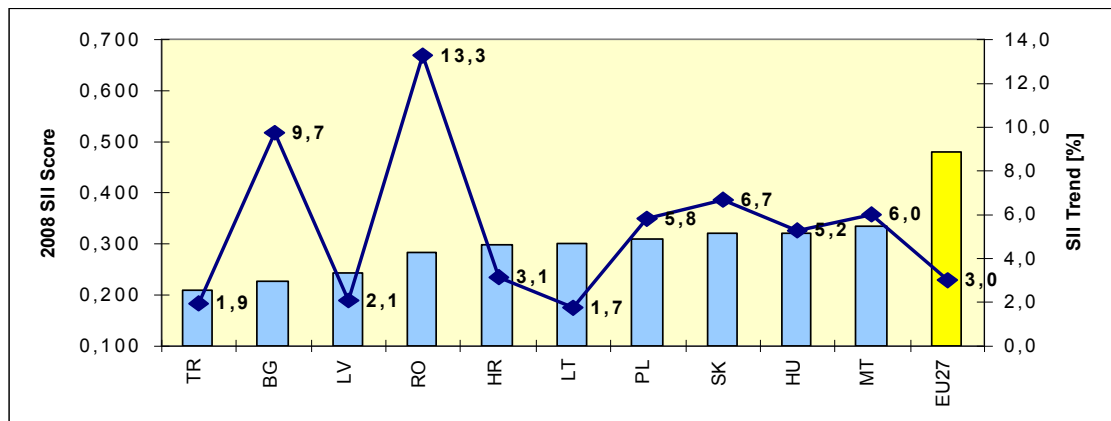


Fig.8 SII Score and rate of growth 2008 – Low innovative countries

technological innovation, the spending of EU companies for such innovation activities

(professional training, design, marketing, new equipment) decreased.

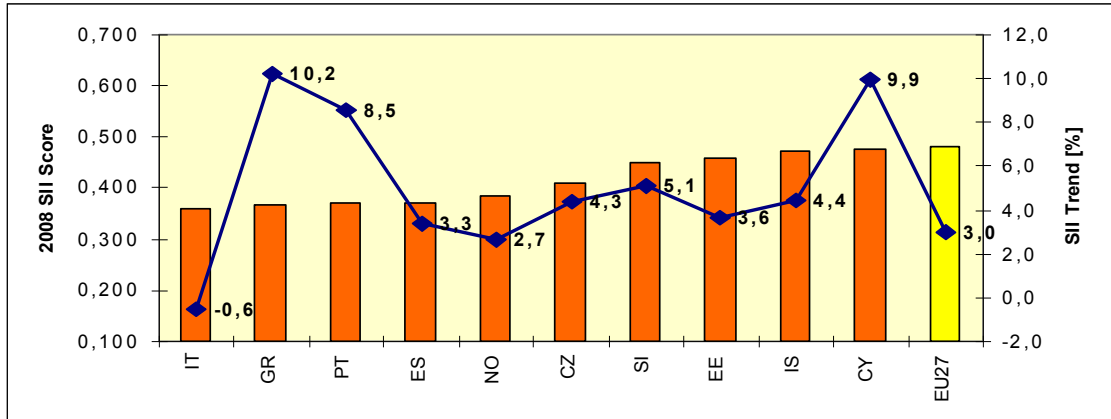


Fig.9 SII Score and rate of growth in 2008 – Moderate innovators

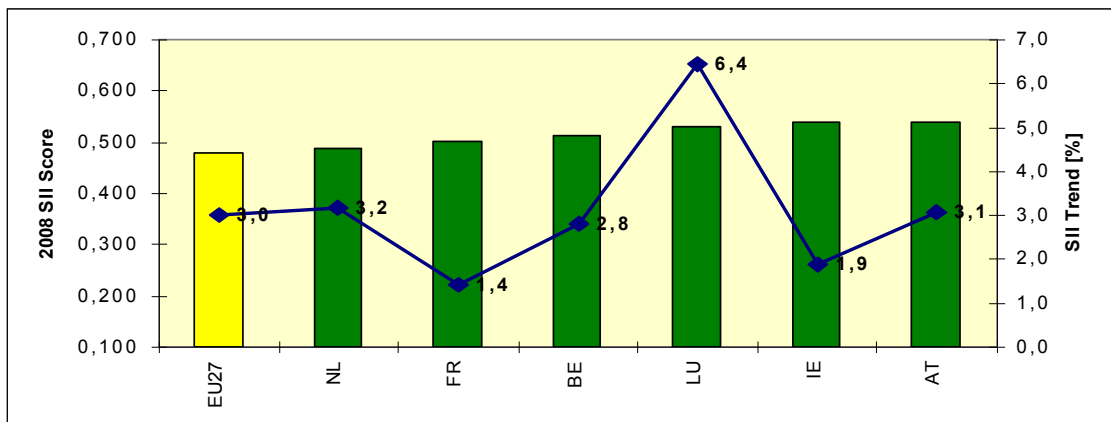


Fig.10 SII Score and rate of growth in 2008 – Innovation followers

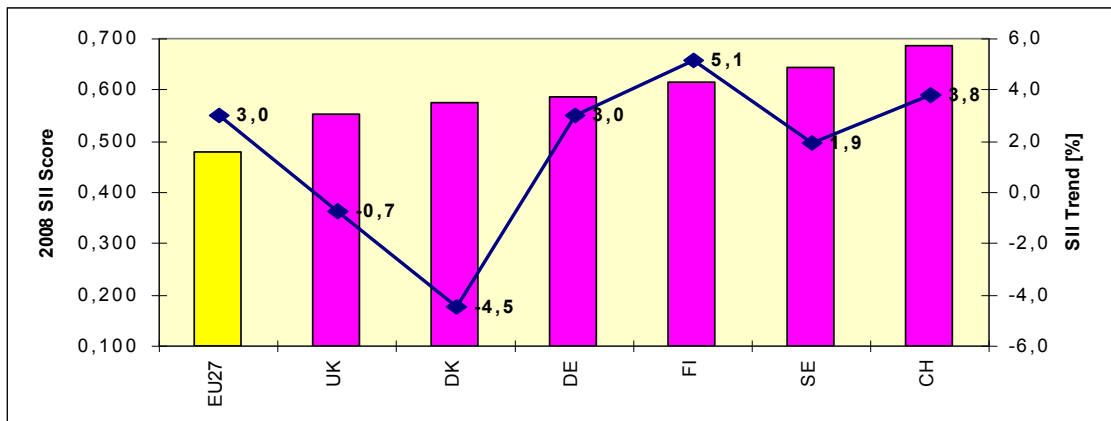


Fig.11 SII Score and rate of growth in 2008 – Innovation leaders

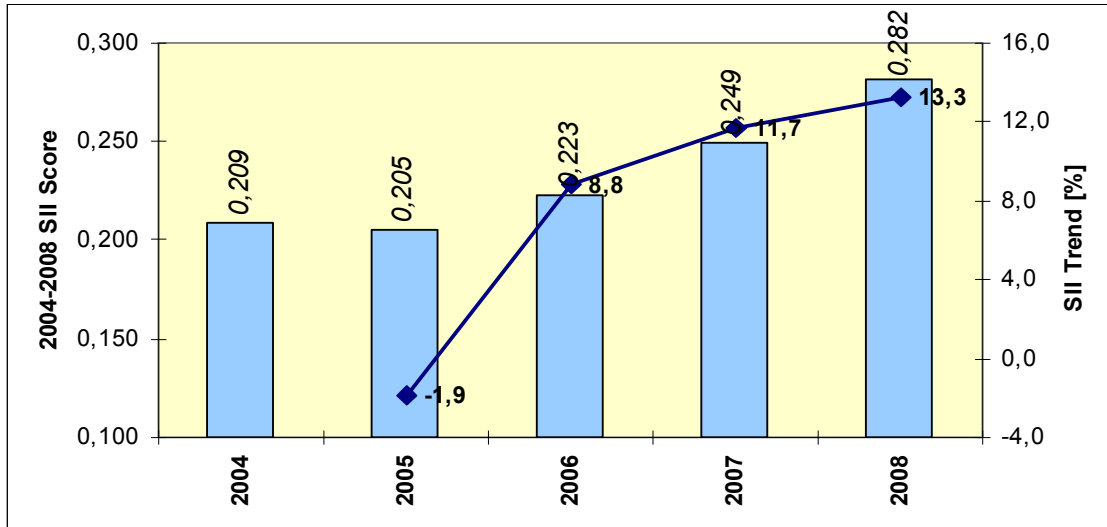


Fig.12 Evolution of SII Score and rate of growth in Romania, 2004-2008

EU has an extraordinary innovation potential. Europe has a long standing tradition of break-through inventions. It has laid the basis for one of the largest single markets in the world, where innovative products and services can be commercialized on a large scale. It has also a tradition of a strong and responsible public sector, which should be capitalized on.

The communication from the European Commission [4], mentions that the agreement on financial framework for 2007-2013, including cohesion policy, the 7th Research and Development Framework Programme and the Competitiveness and Innovation Framework Programme are significant financial packages innovation friendly.

The Commission's communication "More research and innovation" of Oct. 2005, sets out a programme of 19 fields of action for both community and the member states, which are being implemented as planned. The member states are taking action in favor of innovation in the framework of the National Reform Programmes, based on the integrated guidelines of the renewed Lisbon Strategy for Growth and Jobs. The European Trend Chart on innovation has given a clear picture of the European innovation performance and of the national innovation systems of the EU member states and of their strengths and weaknesses. It enables progress to be closely monitored.

Despite this already strong policy focus on innovation, the EU deficiencies have not been sufficiently tackled, and its economy has not yet become the comprehensively innovative economy that it needs to be.

The report on "Creating an innovative Europe" (the Aho report) identified the main reasons

explaining why this potential has so far not been fully exploited and called for urgent action 'before it is too late'.

It identified the need to make the business environment more innovation-friendly as a core concern.

The Commission is convinced that even more is needed – Europe has to become a truly knowledge based and innovation-friendly society where innovation is not feared by the public but welcomed, is not hindered but encouraged, and where it is part of the core societal values and understood to work for the benefit of all its citizens. That is why the European Council called on the European Commission to present 'a broad based innovation strategy for Europe that translates the investments in knowledge into products and services.

3. Innovation in Romania

The Lisbon strategy proposes the level of spending on products and processes innovation to reach the objective of 3% of the European GDP. The need to carefully watch the innovation evolution has led to a system of statistical research with 2 year periodicity, harmonized throughout all the EU member states, to which the Romanian National Institute of Statistics joined. Consequently, a study of the Romanian National Institute of Statistics (INS) [6] shows that the main target of the EU, the economic growth, is achieved by stimulating the creativity and technological and organizing performances, through innovation.

The most recent data on the innovation level in Romania are based on the results of

statistical research on the innovation activity over the period 2002-2004, harmonized with the Community study “Community Innovation Survey – CIS 4”. This statistical research was carried out in June 2005, on a sample of 11542 companies with more than 10 employees. The results are guaranteed with 5% precision. The results of statistical research on innovation in Romania over the period 2002-2004 show that:

- 1 of 5 companies innovated products or/and processes
- there are more innovative companies in industry than in the service sector
- the large companies are more innovative than the small and medium ones
- of the total spending for innovation, the spending on machines, equipment and software has the biggest weight
- out of all number of innovative companies, 19% declared the innovation has been achieved through co-operation.

The main effects on innovation are the improvement in quality of goods and services and the increase in manufacturing capacity.

According to [2], in 2008 Romania was a “low innovative country” and is a “growth leader” in innovative matter. Figure 12 shows the growth rate of SII Score for Romania in the last reported years.

4. Romanian policy regarding RDI. Prospects for the period 2009-2013

According to Chapter 4 of “The National Plan for Research, Development and Innovation for the period 2007-2013 (PNII)” [5], the total amount of financial resources planned to be allocated by the State Budget for RDI (Research, Development and Innovation) is 15,000 mill. RON (abt. 4,285 mill. EUR for the 2007 exchange rate), out of which 2,025 mill RON (abt. 580 mill. EUR) is specially designated for the Programme no. 5 “Innovation”. At the same time, chapter no. 7 “Innovative materials, processes and products” of the Programme no. 4 “Partnerships in Priority S&T Domains” has a total budget of 810 mill. RON (230 mill. EUR).

Pursuant to the principles of Romanian National Strategy for RDI, the following institutions and organisms are in charge for carrying out the monitoring and assessment of the implementation of the actions provided:

- ▶ CNCSIS - National Council for Scientific Research in Higher Education Institutions for the Programme no. 4
- ▶ AMCSIT Politehnica - Managerial Agency for Scientific Research, Innovation and Technological Transfer for the Programme no. 5 “Innovation”

Figure 13 shows the scheme of the

Romanian state budget financing for innovative projects. The budget funds are designated to support innovative projects of the universities, research institutes and private companies in order to raise the level of innovation and the international visibility of Romanian RDI.

5. Conclusions

The participants at the debate “Research, Development and Innovation in Romania – prospects for the period 2009–2013” held by the Chamber of Commerce of Bucharest, Romania, representatives of the Romanian Academy, employers in research field and economic operators (including the research, development, innovation activity) analyzed in pragmatic and responsible manner in which RDI potential could get involved more actively in counteracting the effects of the global crisis on the Romanian economy and society. In this context, an important and sustainable on medium and long-term means to overcome the economic difficult period at national level is economy reorientation and competitivization, renewing the production of goods and services through the absorption of innovation, as a direct result of research and development.

In the present conditions, the Romanian RDI declares its entire availability to get involved directly in identification and solving the economic challenges of the moment, by offering technological solutions and also by adjusting the activities within ongoing projects to the new requirements, so that the results to better answer the challenges the economic operators have to cope with. The main proposals are:

- ▶ the study of ongoing projects package, to assess their direct impact on renewal of production of goods and services. The



Fig.13 The scheme of Romanian state budget financing for Innovation Programme

evaluation is made in a pragmatic way and not emotionally, which may result in cancelling some of the programmes and replacing them with some new ones in the field of Durable Development, such as: Environment, Information, Food and Energy

- ▶ more extensive involvement of RDI in the identification of solutions for challenges the economic operators cope with, in conditions of global crisis, by co-operation between employers associations, professional associations and economy ministries
- ▶ amplification of assistance to specialists in RDI in making the documentation needed to access the European funds
- ▶ putting into agreement the scientific research funding volume from public money provided in the State Budget on 2009, with the amount necessary to materialize the presented Offer, by increasing the Chapter 5301 "Scientific research and research – development" – Annex 1, in the State Budget for 2009, Title 20 "Goods and Services", from 710,778,000 RON (abt. 180 million EUR) to 1,510,778,000 RON (abt. 380

million EUR). This means an allocation on Chapter 5301 of abt. 1% of GDP, that is 0,37% instead of 0,61% in 2008, which means a decrease of the budgetary effort of 0,24% of GDP, as provided by the Gov't emergency ordinance no 88/2006, to ensure a yearly increase of budgetary allocation to reach 1% of GDP in 2010.

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