

Ways to intensifying the Romanian participation to the European Research Programs

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The essential role of the RDI activities in sustaining economic performance and convergence represents a key statement of the revised Lisbon Strategy.

These activities are financed and promoted at European level through large Community Programs and Initiatives.

Romania's active participation to these programs represents at the same time a challenge and an opportunity.

The challenge is generated by the need to reduce the gap with the developed countries of the EU.

Some of the opportunities are: better turning to account of the Romanian scientific and technical potential, better integration into the European Research Area, and not least, more efficient absorption of EU's research funds

The present paper is aimed to highlight ways to intensifying Romania's participation to the European Research Programs.

Key words: Knowledge-based economy, European Research Area, Lisbon Strategy, European Framework Programs, national policies of RDI, innovation capacity.

The ERA concept and reality

The topics of the present paper suggests that a short review of the European Research Area concept might be necessary.

In march 2000, the Lisbon European Council defined the goal for the EU to become the “most competitive and dynamic knowledge-based economy in the world by 2010, capable of sustainable economic growth , with more and better jobs and greater social cohesion”.(8)

In order to achieve this goal, the vision of the European Commission to create a European Research Area (ERA) was made the key element of the Lisbon Strategy.

The creation of the ERA is about setting up a genuine European “internal market” for research, to increase pan European co-operation and coordination of national research activities.

The EU has a long tradition of excellence in research and innovation but this excellence is often scattered across the EU, with 80% of public sector research in Europe being conducted at national level, mainly under national and regional research programs. Therefore the scientific and technical potential of the UE are not fully exploited.

To tackle this problem, the Commission proposed in January 2000, the creation of an European Research Area, aimed to contribute to a better integration and organiza-

tion of Europe's scientific and technological area and to the creation of better overall framework conditions for research in Europe.(2)

The Commission initiative(2000) for ERA combines 3 concepts;

- a) The creation of an "internal market" in research- an area of free movement of knowledge, researchers and technology, with the aim of increasing cooperation , stimulating competition and achieving a better allocation of resources;
- b) A restructuring of the European research, in particular by improved coordination of national research activities and policies;
- c) The development of a an European research policy that not only addresses the funding of research activities but also takes account of all the relevant aspects of the EU and national policies.

The main developments expected to occur once ERA is established are:

- material resources and facilities optimized at European level;
- more coherent use of public instruments;
- more dynamic private investment;
- a common system of scientific and technical reference for policy implementation;
- more abundant and mobile human resources;
- an attractive environment to researchers and investments;
- an area of shared values.

Seven years after the ERA launch, the Commission 's Green Paper "The European Research Area: New perspectives"(april 2007) stated that some progress has been made, but there is still much further to do to built ERA, particularly to overcome the fragmentation of research activities, programs and policies across Europe.

As detailed in the supporting Commission Working Document for the Green Paper, many actions have been taken to make ERA a reality: (3)

- a) The funding of the 7 Research Framework Program has been substantially increased and new initiatives have been launched (The European Research Council, The European Institute of Technology etc);
- b) Initiatives have been launched to improve the coordination of research activities and programs. They include the European Technology Platforms, through witch industry and other stakeholders develop strategies research agendas in areas of business interest and the ERA-NET scheme which supports the coordination of national and regional R&D programs;
- c) Policy coordination through the "open method of coordination" and the use of voluntary guidelines and recommendations.

This process resulted in all Member States setting national R&D investment targets in the context of the overall EU 3% of GDP R&D investment objective and taking measures to improve their research and innovation systems;

- d) The adoption of a "broad –based innovation strategy", which will improve the framework conditions for research and innovation. In this context, a new Community framework for State aid for research and innovation and guidance for a

more effective use of tax incentives for R&D were adopted in November 2006; also an European patent strategy is being proposed.

Since the launch of the ERA concept in 2000, major changes have occurred in and outside Europe, three of them being of outstanding importance:

1) The increasing globalization of the knowledge production which raises the question of better access to foreign knowledge and investment.

In 2000 Europe compared itself only to USA and Japan. Countries like China and India or South Asia countries were not mentioned.

Today the main drivers of the internationalization of R&D are the growing S&T capacities of China and India and the expanding global production chains inside MNE's.

China is one of the world's largest spenders on R&D; it produces 3 times more graduates in engineering than the US and has close the same number of full time researchers in all Europe Member States together.(3).

India accounts for almost the same number of engineers as the US and has the largest pool of young university graduates of the world.

2) Since 2000, a sizeable degree of global political consensus has been reached on the approach to take to major global challenges, due to the leadership role played by the EU. Part of this consensus is that S&T has an important role to play;

3) EU enlargement since 2000 has further increased the EU overall R&D capacity but it has also increased the diversity in terms of S&T development gaps, scientific culture and specialization patterns.

The discrepancies between member States in terms of R&D intensities have also grown larger, ranging from 0,4 in Cyprus to 3,86 in Sweden (2005).

It is obvious that, within this changing context, the ERA concept must be subject to gradual changes.

The Green Paper "The European Research Area: New Perspectives" above mentioned raises a number of questions on how to deepen and widen the ERA so that it fully contributes to the revised Lisbon strategy.

The Research Framework Programs

The main financial and legal instruments to implement the ERA are the Research Framework Programs (the first Program was launched in 1984).

They are drawn up and proposed by the Commission and have to be adopted by the Parliament and the Council.

The Framework Programs are instruments based on a competitive approach and they have as main criterion the scientific excellence.

There are no national or regional quotas (in contrast with the Structural Funds).

The FP's organizes calls for proposals for transnational collaborative research projects linked directly to the research "performers", without any interference by national or regional governments.

There are frequently situations of countries with low R&D expenditures doing surprisingly good in FP proposals.(12).

The Frame Programs significant impacts on economy and science & technology can be summarized as follows (6):

- Economic benefits (increased turnover and profitability, enhanced productivity and market share);
- Innovative performance(enterprises participating in FP tend to be more innovative, are more likely to patent and engage in innovative cooperation with other firms and universities);
- Scientific performance(more excellence through EU wide competition);
- Human resource development (thousands of researchers have participated in top transnational teams, benefiting from training and knowledge sharing);
- Integration of ERA (better coordination of national efforts, more cooperation links, concentration of research efforts through larger projects with critical mass, ERA becomes more attractive to researchers worldwide).

On april 2005, the Commission adopted the 7 th Framework Program (FP 7) following FP 6 (2002-2006).

So far the programs have been designed to last for a period of 4 years.

FP 7 will be synchronized with the duration of the EU's financial perspective and thus cover the 7 year period 2007-2013.

FP 7 is organized into 4 specific programs, corresponding to 4 major objectives of the European research policy:

- 1) Cooperation (32,30 bn Euro) refers to gaining leadership in key scientific and technology areas by supporting cooperation between universities, industry, research centers and political authorities across EU and with the rest of the world.
The program consists of 10 thematic research areas;
- 2) Ideas(7,46 bn Euro) refers to the establishment of an autonomous European Research Council which will support and stimulate basic research carried out by individual teams competing at the European level;
- 3) People (4,72 bn Euro) aims at strengthen training, career prospects and mobility of European researchers;
- 4) Capacities (4,29 bn Euro) means developing and fully exploiting the EU's research capacities through large scale research infrastructure, regional cooperation and innovating SME's.

As compared to FP6 the FP7 Program has some new features:

-Duration extended from 4 to 7 years;

- Budget increased to 54,5 bn Euro compared with 17,6 bn Euro for FP6;
- New structure;
- Flexible funding schemes;
- Joint Technology Initiative;
- Simpler procedures.

Romania's participation to the European Research Programs

The first period of the post-accession to EU is marked by the imperative need for Romania to reduce the existing gap with other member states of the EU.

In this respect, the alignment to the recent policies of the EU in the field of the RDI are of outstanding importance.

These policies are generated by the new frame given by the Lisbon Strategy, according to which science and technology are regarded as key instruments to achieve growing economic performance and ensure long term development. Within this context, the government program for 2005-2008 sets some strategic objectives for the RDI field (7):

- strengthening the role of RDI system in assuring the competitive dimension of the Romanian economy;
- a better correlation between the RDI system and the industrial policy and a more tighten link between the RDI system and the economic environment;
- an increased financial support to the RDI field;
- improving the R&D capacity of specific entities, public authorities and researchers.

As regards the unfolding of international R&D activities, there are several options to follow, namely (14)

- Bilateral cooperation;
- Cooperation through European Programs like EUREKA, ESF., COST.
- Cooperation through the 7 th Frame Program;
- Cooperation through other European Programs and Initiatives (the Program for Competition and Innovation, LIFE etc)
- Cooperation in the frame of some international organizations.

EUREKA is a pan-European network for market-oriented industrial R&D.

Created as an inter-governmental initiative in 1985, EUREKA aims to enhance European competitiveness through its support to business, research centers and universities who carry out pan-European projects.(13)

There are 19 projects in course of execution with Romanian participation.

COST (European Cooperation in the field of Scientific and Technical Research) is the oldest European networking system in research, established in 1971. It consists of 34 members and is trying to bring together research teams from different countries working on specific topics. One of the main characteristics of COST is its flexibility: there are not set-areas for cooperation, but scientists themselves put forward proposals for COST.

A number of 87 cooperation actions are on course with Romanian participation. ESF (European Science Foundation) aims at promoting European Research Excellence.

Romania is participating through the National Council of Scientific Research in the High Education, which is one of the 75 th member of ESF.

As regards the Framework Programs, the results of Romania's participation to the last Program (FP6) reflect the limited capacity of the Romanian CDI system to face the challenges of the European Research Area. In terms of costs, the contribution of Romania to FP 6 was 65.mil.Euro, out of which 50% were public financing and 50% from Phare sources for Romania.(13).

Within this Program, the Romanian researchers concluded contracts for only 52.mil.Euro.

Romania's participation to the European Research Programs is deeply marked by the vulnerability of the RDI system, which went a difficult period after 1989.

The underinvestment and delayed restructuring permitted only a weak connection to the global trends in science and technology and the still fragile enterprise sector in Romania could not exert a real innovation demand.

Due to chronic underinvestment the number of researchers decreased drastically from 1990 to 2004, while the average age of scientists increased.

The low attractiveness of the research career determined qualitative losses of the human resources and made it extremely difficult to attract top young people into research.

The brain drain phenomena has accentuated due to a set of factors, mainly: low wages in the RDI system, the delayed institutional reform, the poor quality of the research and development infrastructure, the absence of an evaluation system stimulating and compensating real performance.

With only 2,5 researchers /1000 workforce in 2004, Romania is on the bottom of the European Union hierarchy, outrunning only Malta(1,7) and Cyprus (1,4) but remaining far from other transition countries , for example Poland and Hungary (3,7) (5)

Official European statistics show that the highest level of this indicator is realized by Finland(16,2), Sweden (10,7) and Luxemburg (10,5).

The low funding level had a negative impact on the international cooperation and the participation of Romania to European Research Projects and Networks, disconnecting Romania from the main European research goals and reducing the access to performing products and technologies.

The consequences also refer to the low number of articles in the mainstream scientific publications, low number of citations of the scientific results published by Romanian authors and in the low number of patent applications with Romanian authors.

As regards the last aspect we are witnessing the following paradox: despite the high performance of Romanian participants in the international "fairs" of innovations, the number of patent applications decreased dramatically since 1990.

The Romanian Patents Office statistics show the following evolution of the patent applications from 2001 to 2006:

	2001	2002	2003	2004	2005	2006
Total nr. of applications	1409	1682	1046	1160	1100	1027
Romanians	1128	1477	881	937	916	814
Foreigners	281	205	165	164	68	62

OSIM Annual Report, 2006

The structure of patent applications with respect to the type of applicants is different from the one existing in other developed European countries.(10)

In the European countries, about 70% of the applications originate from companies.

In Romania about 60% of the applications are from individuals , 17% from companies and the rest from universities and research institutes (in the European countries applications from individuals amount to only 20% of the total number of applications). (10)

The universities and research institutes from Romania have a weak activity as regards patent applications, compared with similar entities in the European Union.

The Romanian Patent Office data show that , out of 165 research institutes, 47 have applied in the 1992-2004 period for only one patent, 24 applied for 2 patents. and only 6 institutes (4 from the chemical sector and 2 from electric sector) have applied for over 100 patents.

In the higher education area the situation is similar : out of 100 entities, only 27 had patent applications over the same period.

As it is known, universities are key actors both in the European Higher Education Area and in the European Research Area.

Their importance to ERA is illustrated by their share in total research expenditure which is around 22% in Europe- 25 (10% in Romania), compared to 13,5 % in the US and 13,8 % in Japan (2005).

Research active universities are the main producers of scientific knowledge in Europe today, acting as” knowledge creators” and represent an important training ground for researchers.

In Europe, universities employ 36,6% of researchers(2004) compared to around 14,7% in the US and 25,5% in Japan (2003). (3)

Romania is again below the European average, with a share of only 26,6% researchers employed in the higher education but it is worth mentioning that it doubled the share in a short period of time(from 12,4% in 2000).

The insufficient performance of the high education system in Romania is reflected by the absence or the very low positions of the Romanian universities in the different European or international classifications.

Despite the general statement that the European High Education sector is priority focusing on national goals, the commitment of universities to transnational research is growing .This can be seen from the fact that 33% of the FP6 participants (contracts signed in 2005) were higher education institutions.(In Romania the share of higher education institutions participation in FP6 was 24%).

The level of innovative performance of the companies is another aspect with strong impact on international cooperation.

The 4th edition of the European Innovation Scoreboard (nov.2004) classifies firms in 5 categories accounting their innovation activities (4):

A) **Strategic innovators**: for these firms, innovation is a core component of their competitive strategy. They perform R&D on a continuous basis to develop new products or process innovations;

B) **Intermittent innovators**: the firms perform R&D and develop innovations in-house when necessary or favorable, but innovation is not a core strategic activity;

C) **Technology modifiers** : the firms modify their existing products or processes through non-R&D based activities. Many firms in this group are essentially process innovators;

D) **Technology adapters** : the firms primary innovate by adapting technologies developed by other firms or organizations;

E) **Non-innovators**

Romania's situation versus this classification reflects a weak level of innovation, having in view that more than 70% of firms are non-innovative and the share of strategic innovators in the total number of firms is only 3%.

Ways to intensifying the Romanian participation to the European Research Programs

The above subject will be treated based on a SWOT analyze regarding the Romanian RDI system in the context of extending its participation into European Research Programs :

<p>Strengths: the existence of a R&D strategy for a medium term (2007-2013), an important creative potential in the category of high studies population, a high degree of adaptation of the young people to new technologies, the existence of poles of excellence in the principal fields of science and technology, the experience gained in the pre-accession period in participating into European consortia projects.</p>	<p>Weaknesses : the chronic sub-financing of the National RDI system until the last years, the gap versus other European countries as regards research infrastructure, weak abilities of researchers to start and manage research projects, lack of professional practices in the cooperation direction, low degree of integration between academic and company research, lack of experience in identifying partners in order to promote projects with Romanian coordination.</p>
<p>Opportunities: the Lisbon ambitious targets (mainly the total R&D expenditures objective), increased funding for FP7, simplified procedures for FP7, the existence of European networks of excellence facilitating the interaction with partners from other states of EU, significant collaboration opportunities with Romanian researchers working in other countries.</p>	<p>Threats : potential new knowledge and technological gaps distancing Romania from other European countries in case of insufficient integration to the European Programs, insufficient absorption of the Community funds compared to the Romanian financial contribution, the brain drain phenomena may accentuate, the predominance of Romanian entities as subcontractors or partners in the Euro-</p>

	pean projects and not as project coordination managers.
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The SWOT analysis suggest that the ways to enhance Romanian participation to the European Research programs fall into 2 categories : general and specific actions.

The **general actions** derive from the national policies in the R&D domain, aimed to increase the quality and performances of the RDI system , as a mean to respond to the European targets of the Lisbon Strategy.

A large majority of the EU member states, including Romania have a multi annual and strategic approach to R&D offering a stable and predictable environment to an endeavor which is inherently long term in nature.

These members have put in place specific strategies for stimulating both the quantity and quality of the R&D activity.

Common elements of these strategies are : the long term character and the analytical view based on identifying bottlenecks, formulating challenges and matching the portfolio of policy instruments to address these challenges.

In Romania such a strategy was adopted in February 2007, covering the 2007-2013 period.

The strategy is the result of large dialog exercise between the main actors interested in the RDI system, carried out in the 2005-2006 period, to the initiative of the Romanian Authority for Research and Development (13).

The strategy sets down the objectives of the CDI system, offers the ground for the organization of the RDI system and establishes the principal domains for the public investment in R&D and for stimulating the innovation in the next years.

An important instrument to increase performance in research and to change the attitude regarding the access to resources was the **project-based funding by competition**, which was launched in 1995 and was extended in 1999. The evaluation criteria have been more and more directed towards scientific performance proven by the researchers , towards the novelty and credibility of the proposed research topic and towards the institutional ability to provide the appropriate environment and infrastructure needed for establishing and developing strong research groups with international visibility.

As it is known, the volume of financial resources allocated to R&D is an important element determining a country's scientific and innovative performance.

The **public funding** of the Romanian R&D showed a radical change starting with 2005 together with the first substantial increase in GDP share assigned to this field.

The GDP share of public expenditures allocated to R&D was doubled in 2005-2006, with a subsequent increased target of 1% in 2010, but is still low compared with the EU average.

It is worth mentioning that since 2000 not much progress has been made in the EU towards the 3% objective (GERD/GDP) and the absolute R&D expenditure gap with the US and Japan has not been reduced (the share GERD/GDP is only 1,85% in EU and 2,70 % in US or 3,20% in Japan), while a similar gap is emerging with a small group of Asian economies (China, Taiwan, Singapore, South Korea). (3)

In terms of R&D intensity, one can distinguish between 3 groups of countries inside the EU: a first group with a R&D intensity above 2,4 GDP (Sweden, Finland, Denmark, Germany and Austria), a second group having an intensity close to the EU average, with values between 1,5 and 2,1% (France, Belgium, Netherlands, UK, Luxembourg) and final, a large group of countries with R&D intensity below 1,5% GDP (with significant differences within the group). (5).

The EU is also making little progress towards the 2/3 objective for business financing of R&D and still lag behind Japan and US (the share of GERD financed by business is 53% in EU and 63% in US or 75% in Japan).

Although domestic R&D efforts are largely financed by the business enterprise sector in Europe, US and Japan, the role of government in the financing of R&D should not be underestimated.

The level of government – funded R&D intensity is substantial in many high R&D intensive countries (Nordic countries, Germany, France, Austria, and US), showing that high private involvement in the funding of R&D does not preclude government funding.

Moreover, in low R&D intensive countries, government - funded R&D is higher than business funded R&D. Government –funding of R&D is critical for creating and developing S&T capabilities, a prerequisite for catching up with countries at the technological frontier or for supporting projects with high social benefits.

A strong impact on preparing the Romanian R&D Community for the FP7 is expected from the **CEEX Research of Excellence Program** launched in 2005 by the National Authority for Scientific Research (12)

In the CEEX Program, the priorities of the public R&D funding were those from FP7, and the projects focused on the creation of powerful consortia, the promotion of interdisciplinary research, the development of human resources, the international promotion of the Romanian R&D system. The program provides convergence with the European practices.

Specific measures to enhance Romania's participation in the European Research Programs include:

1) Better information systems referring to the European Programs and the extension of external contact points;

It is expected that the Romanian Office for Science and Technology, recently inaugurated in Brussels resolve some of the above problems.

The Office is aimed to promote the participation of Romanian researchers to European Research programs by facilitating the contacts with European institutions and by offering them better knowledge about the Romanian research policy and potential;

2) Assuring the synergy of the national programs of research with the thematic areas specific to ERA; the National Program for Research is very close in its thematic structure with FP7;

- 3) Increasing the international visibility of the Romanian R&D system by stimulating the exchange of researchers, experiences and results in the reference scientific and technical domains;
- 4) Organizing scientific manifestations with foreign participations including high personalities in different areas of science;
- 5) The formation of consortia/networks of institutions and organizations with visibility at national level, able to cooperate with similar partners in the European Union;
- 6) The development of scientific equipments at European levels.
- 7) More efforts to improve the researchers ability to initiate and manage the research projects.

As regards point 7) there are several critical ways to change the management practices in R&D activities, according to specific problems (11)

The problem	Old practices	Specific practices for the new economy
Training the project promoters	Focus on the current management of the projects	Focus on developing the abilities to initiate new projects
Promoting new projects	Priority accorded to obtain new projects and to attract funds	Priority accorded to the feasibility of the projects, to carry them in the agreed terms and to obtain the expected results
Responsibility in the project management	Individual responsibility	Collective responsibility
Carrying out the project	Execution along with other activities, current modifications of priorities	Concentrated efforts on the project
Dominant type of management approach	Coordination of individual efforts of the project partners	Facilitating cooperation between the project partners
Capitalization of experience	Accumulation of knowledge on an individual basis	Collective accumulation of knowledge

Conclusions:

After a long period of decline in the Romanian capacity to sustain efficient R&D activities, the accession to the EU brings new opportunities and perspectives.

Romania has fully aligned its R&D national policies in the new frame given by the Lisbon Strategy and the consequences are not only a radical change of public R&D funding but also the restructuring of the R&D system.

This new context is expected to have a strong impact on Romania's participation into the large European Research Programs, with great opportunities for the R&D system and its integration into the European Research Area.

However, specific actions are also required to improve the present management practices and to bring them to the European level.

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