

## NEW CHALLENGES FOR R&D AND INNOVATION IN ROMANIA

Steliana Sandu<sup>1</sup>  
Irina Anghel<sup>2</sup>

*ABSTRACT: Romania is currently facing many difficulties in order to cope with financial and economic crisis as well as to reach the Europe 2020 targets. This paper presents the new challenges faced by Romanian Research, Development and Innovation (RDI) system during the economic recession, its weaknesses and barriers that have hindered the implementation of the R&D structural reforms and delineate some benchmarks for overcoming them. Based on the most recent data and information about the Romanian RDI system, it attempted a qualitative analysis of the main aspects that may delay or stall its effective integration within European Research Area and may diminishing the R&D contribution to a quickly economic recovery. Ignoring the challenges confronting the Romanian research and innovation system, neglecting them in the prioritization of public funds allotment and overlooking effective incentives for increasing the private sector contribution to the RDI funding will keep labeling Romania as “modest innovator”, ranking it among the least in the EU regarding the performance indicators of the field.*

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### Introduction

Over the last 22 years, the Romanian RDI system has gone through successive reforms, as it has faced, for several times, the great difficulties inherent to the constraining radical transformation processes needed for higher convergence with the more viable research and innovation systems of the developed countries. The results have not always met the expectations, due to: insufficient R&D management experience; “trial and error” strategies; lack of promptitude in errors correction, insufficient funding or poor management of available funds, lack of incentive for support of R&D within private sector, low absorptive capacity of EU funds through Framework Programs. The current R&D and innovation system seems to have become compatible with those of the developed European countries with regard to its general structures and mechanisms. But, the policy makers have sometimes chosen to develop formal compliance with the structures and patterns of EU requirements, despite incompatible and inadequate internal circumstances and conditions (Sandu, Anghel, 2010c).

The current status of the Romanian RDI system, which ranks among the least successful countries regarding most of the performance indicators (PRO INNO, 2011), is a relevant expression of the inconsistency and incoherence in implementation of some R&D strategies, of the incompatibility between the R&D policy and the policies of other economic sectors that support, interfere, complement or contribute in different ways to increasing efficiency of the research and innovation activity.

The integration of Romania within EU, in 2007, involved, as well, the integration of the Romanian RDI system within the European Research Area. These required new exigencies were,

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<sup>1</sup> The Institute of National Economy - Romanian Academy, Bucharest, Romania, e-mail: sandu.steliana55@yahoo.com

<sup>2</sup> PhD student, Romanian Academy, Bucharest, Romania, e-mail: irina\_c\_anghel@yahoo.com

apparently, a too high standard compared to the potential and circumstances of the status of the national R&D and innovation system. Therefore, the reports drafted by foreign experts who evaluated this field in Romania were often negative and critical, pointing out to specific weaknesses and challenges (Technopolis Group, 2012).

Under aegis of international and national institutions or as team member of various European projects, the authors of this paper have published themselves many studies along the last 20 years clearly expressing their opinion regarding the strengths and, also, frailties of the Romanian RDI system, its opportunities and risks and providing solutions based on the best practices of the developed countries, but adapted to the specific Romanian context (Sandu et al., 2008; Sandu, Anghel, 2010a; Sandu, Anghel 2010 b; ).

Reviewing a vast literature on the matter, we analyzed the congruence between the Europe 2020 R&D target and the real chances to reach it, the sectoral R&D intensity and main determinants of the low level of public and private RDI funding, the factors that might help Romania to surpass the gap between its R&D performance and that of developed countries. The conclusions of this paper confirm the objectivity and pertinence of the previous analyses and remarks. The paper also confers a new vision over the need for the reinvigoration of the RDI system, so that it may be effectively integrated in the European Research Area and Innovation Union, able to contribute to economic recovery and growth.

### **Recent challenges for the Romanian R&D system, derived from the Europe 2020 Strategy**

Romania is currently facing multiple challenges stemming not only from coping with the financial and economic crisis aftermath, but also from the necessity to meet the Europe 2020 Strategy goals. There is a dire need for appropriate solutions to solve the present economic and social problems and to ensure smart economic growth, to which the Romanian research and innovation system is expected to bring special contribution.

Under current circumstances, the research community, individuals and institutions, are required to prove efficiency and responsibility in employing financial public resources, providing results consistent with the socio-economic priorities, high-quality management of human and financial resources, tight connectivity with the business environment for continuous outflows of research results.

A most important challenge for enhancing the RDI system is the identification and elimination of the barriers to the scientific, financial and human flows within the system. Many of them, decades-old, have not been yet properly managed: low cooperation between university and industry; insufficient research activity initiated and performed within companies; low interest of the business sector for the research outcomes provided by universities and research institutes, associated with a low contribution of this sector to the RDI financing, often, given to lack of adequate incentives for private research and development. Valid answers to these issues are expected until 2020.

The European Research Area Board (ERAB), with a key role in promoting the European Research Area objectives, presented in a recent study published by Joint Institute for Innovation policy in 2010 (ERAB, 2010), the great challenges that all European national RDI systems, included Romania, should address with reference to the European Research Area (ERA). Thus, the ERA should be guided by the "great needs" of the nowadays society, derived from climate changes, sustainable energetic sources, water resources, demographic ageing. It should be based on shared responsibility among science, policy and society, on a public policy reflecting a social contract between science and society, on responsibility for action and freedom of thought. ERA should promote open innovation among all public and private stakeholders that could, thus, contribute to knowledge base consolidation and to increase its role in economy. It should encourage excellent scientific works and a risk friendly attitude in performing public and private research. Romanian

officials must keep these challenges as important guidelines of their future R&D policy. Unfortunately, even if these challenges were generally acknowledged in European and national policies, they are not yet consistently answered with concrete practical solutions, as it is mentioned in another, more recent ERAB report, published in January 2012 (ERAB, 2012).

As the authors of these reports stated, the great challenges cannot be defined, assessed or solved by one sole scientific or technologic field, or within a sole sector, as they are intrinsically complex, interdependent, global, as well as local. For instance, challenges such as healthy aging, climate changes, and workforce migration require new theoretical approaches as well as innovative strategies and policies, new governing models, new investment models. Scientific research performed in the economic and social research area is of the greatest interest for solving these problems, but it has to be correlated with other scientific fields in interdisciplinary projects.

Appropriate approaches require highly specialised as well as multidimensional, trans-disciplinary, systemic research work, nourished by new thinking patterns, beyond traditional field of research. They involve multiple different and often antagonistic stakeholders that have to get involved, to cooperate and become responsible for a best possible outcome. At the same time, they rely on the reconsideration of research and innovation policies and radical transformation of governmental action.

The 2010 Lisbon strategy, the ambitious plan adopted in 2000 year aiming at turning the European Union in the most developed economy in the world until 2010, has failed regarding R&D target of reaching 3% of GDP for R&D. The same target has been reinserted within 2020 Europe Strategy, but differently among the EU members. Romania has set an ambitious, but, in opinion of Romanian authorities, achievable target for 2020: R&D intensity is expected to account for 2.0% of GDP, 1% from public sources and 1% from business sector.

In our opinion, given current economic difficulties, structural malfunctions of the Romanian economy, the barriers on EU labor market, etc, issues unsolved by previous R&D and Innovation Strategies, it is highly improbable that this objective may be attained. In the last decade, the R&D intensity in Romania increased from 0.37% in 2000 to 0.58% in 2008 and then, decreased to 0.47% in 2010. Despite the fact that the Romanian 2007-2013 Strategy for Research, Development and Innovation has foreseen a gradual increase of the R&D public budget, but the further planned increase of the R&D public budget has not been attained, mainly due to the economic crisis. Consequent to this moderate trend, Romania still scores among the countries with the lowest R&D intensity in the European Union (EC, 2012d).

A recent Report of the European Commission (EU, 2012c) on the assessment of National Reform Programme and Convergence Programme for Romania mentioned:

“Recent trends show that is given the low commitment of government and the very low level of business R&D activities (business R&D expenditures is one of the lowest rates in the EU). The 2% of GDP target could be achieved only if the country prioritizes R&D in a context of smart fiscal consolidation, whilst implementing without delay key reforms as outlined in the Action Plan for Research. Moreover, the current economic structure in Romania does not lend itself to medium/high R&D intensities, which implies that the policy response will need to support further structural change”.

Referring to the same issue, another recent EU Report underlines: “Romania has made limited progress in 2011 and some targets remain difficult to reach. This is the case in particular for investments in R&D. Romania should step up efforts to accelerate the delivery of the Europe 2020 Strategy as the basis for any growth initiative” (EU, 2012 b).

Revealing fundamental, core vulnerabilities, the current economic crisis compels a new approach, able to answer to the frailties of the present Romanian R&D systems as well as to enhance a more challenging competitive fields of research. In this context, the experts have repeatedly mentioned that the crisis is not a good time to defer investment in research and

innovation, as these activities are vital for meeting great challenges such as the climate change and globalization (EC, 2012a).

The three pillars for economic growth along the next decade, as they appear in the Europe 2020 Strategy, are (1) smart economic growth (knowledge consolidation, innovation, education, digital society), (2) sustainable economic growth (through raising production efficiency and competitiveness) and (3) inclusive economic growth (more absorptive labor markets, human resources with new professional skills and poverty reduction) (EC, 2010a). One may notice that any of these three fundamental objectives cannot be attained in Romania without the support of the multi sectoral scientific research. Especially regarding the last two objectives, we underline that the socio-economic sciences will play an outstanding role.

A major challenges for the Romanian R&D system continue to be the overall fragmentation of the R&I system, as reflected in the large number of researchers, combined with a lack of critical mass in terms of the quality of research results, poor governance and weak coordination between research and innovation policy and other policies, as well as very weak links between education, research and the business sector”(EC, 2012b).

The Lisbon 2010 Strategy experience shows that raising competitiveness through research and innovation cannot be attained solely through smart programmes, through conferences or seminars. Companies and their personnel may be the most important asset bringing the most valuable contribution to the goal, as they could take advantage of the crisis opportunities to become more creative and to find efficient and valid answers to the great challenges of the current circumstances (which are greatly different from the time when the Lisbon Strategy was launched).

In many European countries, especially in those with low RDI intensity (such as Romania), the RDI budgets are heavily strained by soaring budgetary deficits, the lingering recession, slow economic growth rates, growing competition on the international markets as new strong Asian competitors have emerged.

The key concepts for this new strategy are *smart, sustainable and inclusive growth* but the criteria for assessing 2020 Europe objectives attainment are mainly quantitative, based on indicators that most often do not capture the real extent to which the goals are fulfilled. For instance, the substance of the main challenge for the RDI system is the final output of the research activity, which is innovation and its practical application and not the means expressed through the level of research-development expenditures. Yet, the progress is measured by indicators such GERD and BERD, etc. Along the last years, Romania has spent tens of billions of Euros for numerous and very diverse research projects and yet, their applicability, relevance and usefulness have very seldom been proved.

Therefore, genuine stimulation of investment in research – a major objective for Europe 2020 Agenda –stays, still, as a very important and big challenge for Romania.

Starting with the preparation for EU accession, especially with 2005, raising the investment in RDI has been continuously acknowledged as a priority for public policy and the different targets has been more or less accomplished through supplementing the public funds for RDI. Regarding the 2005-2008 periods, the EU reports frequently mentioned the accelerated dynamics of the public expenditures for RDI. In 2009 and 2010, the crisis brought about a steep decrease in public funds allotted to RDI, finally joining the trend of the business sector contribution, which has been decreased since 2003. We may conclude that new solutions must be found for further supporting this sector, given a better financial management and serious expenditure control to avoid more resource wastage. This would involve designing effective incentives and appropriate context for increasing the contribution of the private sector to RDI investment through tightened cooperation between research and education systems on one hand, and industry, economy and society on the other. Improvement of intellectual property rights regime would, also, play a very important role.

The new political approach has to fight against the chronic flaws of the Romanian RDI system, and against their consequences: a general inability to exploit the research and innovation results, to increase their contribution to higher productivity levels able to sustain competitively; the lack of appropriate conditions and incentives for the demand and supply of innovative products and services; over fragmentation of the RDI system deploying parallelism in public funds spending; poor impact of political instruments (such as public acquisition) designed to raise the demand for innovation products, etc.

On the road towards a more integrated political perspective, the integration of the Romanian RDI system within the European Research Area represented a key milestone, as it provided specific European programs more effectively encouraging cooperation between research and industry (Partnership in priority areas, Excellence in RDI), smart specialization and removal of many blocking researchers' mobility.

Moreover, despite the position of net contributor to the Framework Programs due to low funds absorptive capacity, Romania benefited also from the European Structural Operational Programs for funding infrastructure, mobility, doctoral and postdoctoral programs etc.

Given the current financial and economic crisis that intensified the hindrances to reaching the objectives Europe 2020 Strategy, Romanian orientations for economic recovery aim to stimulate the demand for research output and the restoration of confidence within the business environment, to set-up effective fiscal and financial incentives, to encourage the research careers of young researchers and increase, to encourage public investment in innovation, R&D infrastructure, R&D labor force development mostly in the high tech sectors.

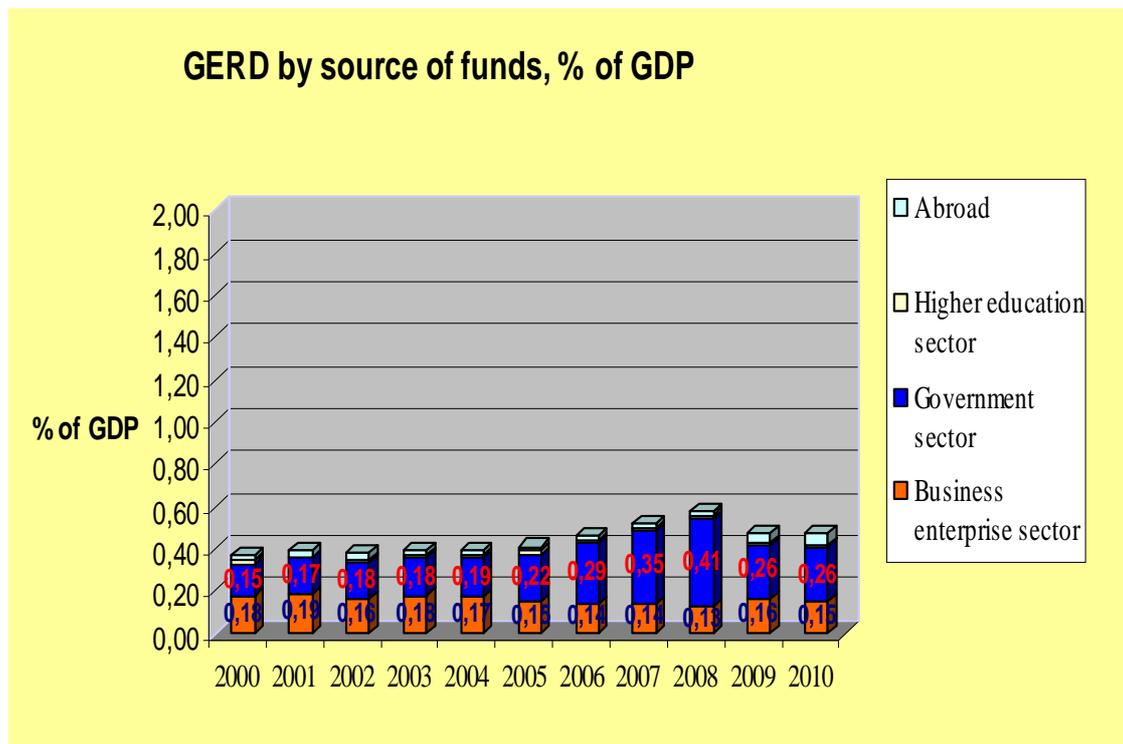
## **2. Some obstacles hindering the Romanian R&D and innovation system and possible solutions to overcome them**

Reiterating the target of 3% of GDP for research and innovation gave rise to fervent debates for establishing, for each country, the individual reference values of the RDI objectives within Europe 2020 Strategy. For higher accomplishment, for tighter and more effective community monitoring and control, it was agreed that each country should delineate its own individual target.

Having in view its lowest R&D intensity in the EU (0.47% of GDP for RDI in 2010), Romania has assumed the target of 2% of GDP in 2020, 1% coming from the public budget and 1% from the private sector. This target is very ambitious and difficult to reach, given the low commitment of the government and the very low level of business R&D activities (business R&D expenditure is 0.18% of GDP, one of the lowest rates in the EU).

Allotting 2% of GDP to RDI activities until 2020 represents a very challenging target, both for public and private sectors, given their current low level of expenditures. The private sector contribution, which should reach 1% in 2020, has stayed quasi-constant along the last five years, questioning the possibility of raising this percentage seven times in the next eight years. With public contribution decreasing in 2009 and 2010, associated with constant private contribution, many strategic objectives, ambitiously formulated in official documents (Government of Romania, 2012a and 2012b) will not be attained.

National and international experts have increasingly suggested that surpassing the economic crisis is dependent on research and innovation. Under financing scientific research – frequent consequences of the economic crisis – may have a negative social and economic impact, on the medium and long term, leading to a deepened crisis and a narrowed solution range for sustainable development. Any crisis management strategy would be made void if RDI is not considered as a vector for re-launching economic growth.



**Figure no.1**

Source: Romanian National Institute of Statistics Database, The Romanian Statistical Yearbook, 2011

There are some European countries (such as Germany, Norway, Netherlands, Austria) that could provide best practice examples for Romania. They reacted promptly for preventing the contraction of the national knowledge base, as the private sector was forced to diminish its investment in research and innovation. Acknowledging the key role of RDI for sustainable growth and competitiveness, these countries have consistently supported the RDI activities performed in public research institutes and laboratories; they have also encouraged the research initiatives in university and NGOs, the public acquisitions of research projects, the private research – through direct or indirect (fiscal incentives) subsidy, the transfer and dissemination of knowledge and technologies. The companies bringing new products and technologies are promoted and the cooperation between the various sectors of the national research-development and innovation sectors is consistently encouraged and consolidated (OECD, 2012).

Designing a consistent system of public policy instruments and measures, able to support higher investment in research, development and innovation and higher efficiency of RDI spending, requires analyzing and identifying the causal relationships among the factors that interact within the national RDI system. To this end, a very important aim is to understand the dynamics of the complementary or substitutive relationship between the public and private contribution to the investment in research-development and innovation. This becomes even more relevant in the context of diminished private investment to research and innovation. The public support should stimulate and not substitute the interest of the private sector – vital to the Romanian RDI. Raising financial resources for research and innovation must be joined by previous sound analysis proving the social and economic efficiency of R&D expenditure, through concrete results with high technological, economic, social or environmental effects (Sandu, 2010).

The most challenging aspect of Romanian R&D system is the low intensity of business sector. In order to increase the private sector contribution to the investment in research, development and innovation, in order to provide the requisite for sustainable development, policy

makers should design a policy mix strategy, working together towards a much more integrated sectoral policies, be they industrial, fiscal, financial or competition policies. This policy principle may bring forth a wide range of new and effective indirect but complementary policy instruments that have been scantily harnessed before. Fiscal incentives, disposable risk capital, higher state aid for innovation performed in the business sector have proved to be amongst the most effective tools for increasing private investment in RDI.

Most of the EU member states acknowledged the growing importance of the fiscal incentives and their role as a complementary mechanism to direct RD public funding (Deloitte, 2011). They have consolidated the portfolio of instruments for direct funding stimulation by simultaneously extending and improving fiscal stimuli.

The national strategic papers regarding the RDI system mention some fiscal (OUG 200/2008) and financial (PRO INNO Europe, 2009) instruments designed for encouraging the private industrial RDI activities and expenditures. Their impact is, yet, very low.

The interest of the private investor in RDI may be stimulated through easy access to valuable results of public research and innovation activities that can be employed as significant input for further private research and innovation initiatives. Unfortunately, many of the publicly funded research projects couldn't be used, due to their scant knowledge value added, or to poor technology transfer infrastructures, to their low relevance to the business sector or to the low absorptive capacity of the potential last user.

The weak cooperation between research and industry is critical for the Romanian R&D and innovation. Collaboration relationships between research and business sector are more frequent within the National R&D programmes designed specifically to encouraging this partnership (for example Partnership Program in Priority Areas). The innovation and technologic transfer infrastructures – namely the entities specialized in RDI results dissemination, transfer and exploitation such as clusters, technologic platforms, transfer networks – are, still, incipient. The experience of developed countries prove that scientific parks may represent a good natural environment for educational and research activities that can be subsequently turned into strategic instruments for setting up spin-offs and spin-outs and for increasing technologic concentration around universities. Given that there are only a few scientific parks in Romania, some new specific programs designed for this end may provide the necessary framework for productive partnerships between business, university and R&D institutes. The importance of such political initiatives has been proved in countries such Netherlands, Germany and France, where regional development was plainly stirred by spin-offs transferring scientific research results towards private businesses.

It is self-evident that the principal requisite is that research activity would be effectively oriented towards the specific needs and requirements of the industrial and business sector. The political concern for intensifying knowledge and technologic flows has to be accompanied by strenuous efforts, at all levels, to increase and improve quality, usefulness and performance of public funded research and, moreover, of the quality of human resources employed in research. Despite several political measures oriented toward resources and results improvement (within the National Plan and Strategy for Research, Development and Innovation) the exploitability of the R&D projects funded through the national programmes is still low due to their poor usefulness and to the lack of rigorous ex-post evaluation and monitor of the research results which diminish the researchers motivation to obtain high-quality, exploitable outcomes.

Beyond the responsibility of the policy makers (to allot more financial resources to research and innovation, to provide the legislative instruments for private investment stimulation, etc.), beyond the responsibility of the managers of research centers and laboratories to efficiently manage the public funds and to stimulate the researchers, the performance of the national research system depends, first and foremost, on the responsible and ethical conduct of the each individual researcher.

For the Romanian researchers, professional responsibility involves serious concern for increasing the scientific prestige of Romanian research and the exploitability of their own research results. It requires compliance with professional ethics acknowledged in the international researchers community: scientific rigor, moral integrity when using available data and information, congruence of the research activity and its results with sustainable development desideratum, etc. Moreover, the researchers should pursue to publish the research results in prestigious journals or to turn them into patents, as this is a weakness of the Romanian RDI system. We would notice that, despite the low number of ISI indexed articles (as compared to other European countries), this indicator displays an upward trend: the level of 2008 was double the figures in 2007.

It is very important to emphasize that the exploitability of the research results obtained in universities and public research institutes depends also on the companies' adequate absorptive capacity, of the potential users' ability to evaluate, assimilate and employ the available knowledge in the external environment. It is apparent that the absorptive capacity is tightly correlated with the share of highly educated employees, of the interface personnel (between the scientific knowledge springs and last users), with continuous interest for fundamental research, with the current assimilated knowledge stock, etc. Developing the absorptive capacity depends on micro and macro economic factors. Therefore, legislative environment should be accompanied by concern for developing a pro-innovative culture inside the business sector because, eventually, the final decision to invest and exploit belongs to the company.

### **Conclusions**

The literature, as well as the official documents of the European Commission and EU member states, including Romania, firmly acknowledges the important role that research, development and innovation (RDI) play in recovering from recession and re-launching the economic growth. But, no matter how well they may be designed and thought, no matter how convincing and widely disseminated the theoretical or econometric studies may be, the real outcome may be substantially different than the expectations. It depends on strong political will, consistency beyond electoral mandates, competent and committed management and, not the least, a well known, performing and responsible scientific community, able to provide effective solutions to the challenges confronting our economy and society nowadays.

The current economic crisis has had a negative impact on the Romanian research and innovation system, more than in other countries, intensifying its weaknesses. Competent and realistic analysis of the research potential, funding sources and their accountability is needed for sound political decisions so that the Europe 2020 objectives may be attained.

Following the *analysis* concisely presented in this paper, we conclude that the target of 2% of GDP allotted to RDI represents a major challenge for Romania, especially in the context of the current crisis and budgetary restrictions. Unlike other developed European countries that acknowledged that overcoming recession is tightly connected to higher investment in research and innovation, Romanian policy makers decided a significant contraction of the public funds for RDI during 2009-2011. The national sustainable development depends on understanding the role that research and development play for good productivity dynamics and for economic growth.

Effective incentives are needed to stimulate the private research, which may be an underestimated spring of much needed externalities. Yet, as the business contribution to R&D investment is decreasing given the economic recession, the national RDI intensity depends, mostly, on public funding. Therefore, this should be further increased or, at least, maintained, in order to protect the knowledge base of our country.

The principles and means regarding funding the research performed in the public sector, the priority setting and performance monitoring and control should be revised and adequate according to the particularities of the field, of the spillover effect, of the relationship between private and public research.

Funding priorities should be centered around research areas that may support economic recovery, as well as on research projects with application in industry and performed in private-public cooperation. Better management of RDI funds, monitoring the quality and quantity of scientific research results which should be consistent with the current needs of the economic activity, stimulating collaboration between universities and research institutes and industry and a real and effective transfer of applied research results into economy are of a great importance for increasing effectiveness of Romanian R&D system.

Having in view that the impact of the research output on productivity depends, at least, on the private R&D intensity, a better cooperation between the public and private sectors would ensure a smoother and more continuous knowledge transfer.

The conclusions of this paper are consistent with previous analyses and remarks of the authors. Therefore, this study represents a new alarm clock over the need for the reinvigoration of the RDI system, so that it may be effectively integrated into the European Research Area and Innovation Union, and may contribute to economic recovery and growth.

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