CHANGES IN THE RESEARCH SYSTEM. RESEARCH AND DEVELOPMENT ACTIVITIES FROM TERTIARY EDUCATION

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ABSTRACT
Increasing the role of research in tertiary education is a challenge for the Romanian higher education system, and a represents a resource for a sustainable development for universities in the future. The purpose of this contribution is, first, a brief assessment of the elements that support research in Romanian tertiary education - human and material potential, financial resources allocated (especially from the state budget) and attracted, the orientation of the research spending, possible ways to put in evidence the research outputs. Secondly, it has outlined some of priorities for the development of Romanian research in tertiary education during the period 2014-2020 in order to strengthen its position and its connection to the European requirements.

KEYWORDS: *citation, financial allocation, patent, tertiary education research.*

JEL CLASSIFICATION: I23, H52.

1. INTRODUCTION

In looking for excellence in research and innovation structures are strongly involved the key players from the knowledge market - universities, public research and development institutes, and other research entities from public and / or private sector. All of these actors are in a permanent process of transformation, attracting and developing human resources and focusing on most important material, financial and information resources for the research activity. However, involvement in research and closer links with key players within the market knowledge, including those from business, has contributed not only to providing additional resource sources, but also to restructure more serious tertiary education institution.

In Romania, after 1989, the whole system of R&D went through a very difficult period - late underfunding and delay in sector restructuring; slow down registered in connecting our country to trends of international science and technology, to European ones included, with only few isolated cases of significant achievements; reducing the number of researchers, parallel with their age increases; exodus abroad of young performing researchers; low quality of the research infrastructure; lack of a realistic assessment of human resources and of institutional structure

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ones, in view to sustain performance and excellence; limited managerial capacity to provide research products and services of interest, etc. In the same time it has to stress that the Romanian manufacturing sector has not showing a realistic and an adequate capacity to get and implement authentic outputs from R&D activities.

In Romania, compared with the EU-27, in 2012, total spending for R&D activities was equivalent of 48.4 Euros per capita (PPP, in constant prices 2005); this level was 10.4 times lower than the EU-27 average (467.1 Euros per inhabitant). In total, in Romania, only 19.6% (9.5 Euros per capita) were allocated to the R&D activities from the tertiary education institutions.

Education reform introduced by the Law No.1/ 2011 changed the rating university system (they were separate entities having as target research and learning or only learning for local/ regional needs). Under this law was established the allocation of resources from the state budget based on performance registered in the past and in accordance with international rating systems. Also, by Government Decision No.96/2012, on decided that all public R&D units were put under the Ministry of National Education, in view: (i) to ensure an exclusive and homogeneous coordination of the public research and development activities and (ii) to concentrate thematic areas on common research competencies of public institutions. However, inclusion of Romania's participation in the Financial Framework Programmes during 2007-2013 has been achieved in European initiatives of Lisbon Programme for Research and Innovation. In this context, Romania can be near the international competitiveness of universities and research institutes, near the development of entrepreneurial skills and transfer of knowledge into products and services.

2. MATERIAL AND HUMAN POTENTIAL IN R&D OF HIGHER EDUCATION

2.1. The number of R&D units from tertiary education

In 2010, the activity of R&D was care out in 102 units of tertiary education, which represented 15.5% of the total number of Romanian research entities. 75.5% of this units were R&D universities under the state ownership (77 entities), and the remaining (24.5%) being represented by R&D units from higher education under the private ownership.
The total number of R&D units from tertiary education have almost doubled (increased by 92.5% in 2010 compared to 2000 year) only in 10 years.

Table 1. The units with research and development activities from the tertiary education sector, by type of ownership, during the period 2000-2010. Data are for the end of each year

Specification	2000	2005	2007	2008	2009	2010	2010/2000, %	2010/2007, %
Total	52	85	86	103	97	102	196.2	118.6
- State majority ownership	40	78	58	74	74	77	192.5	132.8
- Private majority ownership	12	7	28	29	23	25	208.3	89.3

Source: NIS.2014. Data Base Tempo Online, National Institute of Statistics, Bucharest.

After Romania joined to the EU, it rising of the total number of R&D units from the tertiary education was less rapid (increase by only 18.6% in 2010 compared to 2007 year) - a phenomenon due to several reforms that bring in the international assessment systems from university.

Also in 2010 compared to 2000 year, on the total number of universities with research and development activities was recorded an increasing (with 6.8 percentage points); the greatest contribution was brought by R&D state ownership universities (their number moved up by 18.9 pp), because during the 10 reference years, the share of private ownership structures in the total number of R&D units from tertiary education has stagnated (them growing up by 0.4 pp only).
After Romania joined to the EU, in 2007, the dynamics of the total number of R&D universities has changed. Thus, in 2010 compared to 2007 year, the number of R&D state ownership units from tertiary education increased (by 32.8%) and those from the private ownership sector decreased (by -10.7%).

2.2. Full-time staff from R&D universities

Full-time staff from R&D universities, in 2012, accounted 8,710 persons, which represented 28.0% of the total number of employees involved in the Romanian research. Overall, the share of women employees in R&D units from tertiary education was 47.9% of the total employees involved in the Romanian research.

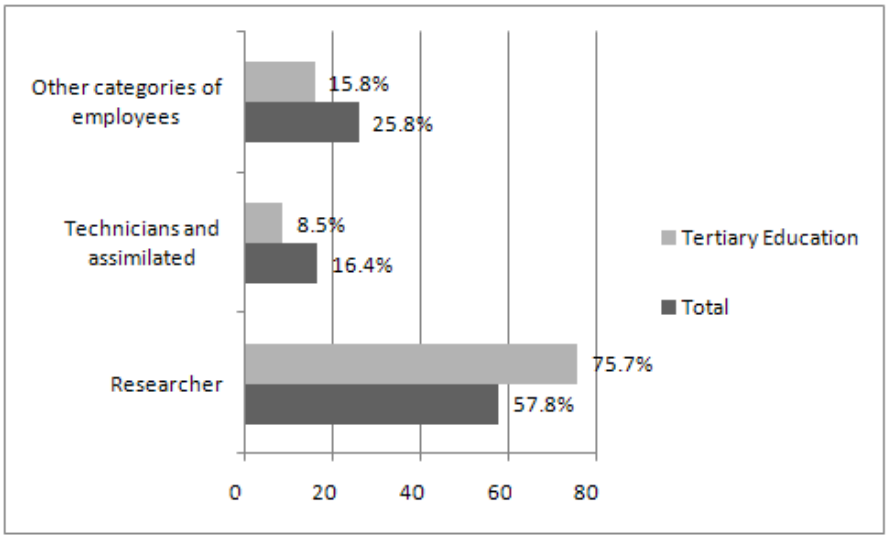

Figure 1. The structure of employees involved in R&D, by type of work, in 2012 year. Total = 100%
Source: NIS. 2014. Data Base Tempo Online, NIS, Bucharest.

Most of the staff with full-time employees in R&D universities (74.8% of total) had the age between 25 and 54 years, as follows: 28.8% of the total number of the staff with full-time employees in R&D institutions from tertiary education is included in the age group 35 to 44 years; 24.5% in the group 25-34 years; 21.5% at 45-54 years category.
According to Eurostat, in Romania, in the year 2012, researchers with full-time employees in R&D institutions from tertiary education held 40.4% of the total; this level is very close to the

average of the same indicator from EU-28 (40.2%; Source: Eurostat - online date code: tsc00004, OECD,
http://epp.eurostat.ec.europa.eu/tgm/refreshTableAction.do?tab=table&plugin=1&pcode=tsc00004&language=en).
Full-time employees in the R&D institutions from the tertiary education, in the year 2012, presented the following professional structure: 75.7% researchers; 8.5% technicians and related human resources; 15.8% other categories of employees.
In 2012 compared with the year 2000, the total number of employees involved in R&D activities from universities increased by 2.3 times. The occupational categories included in the category of the full-time employee from R&D universities has been an increase of the researchers number (by 8.2 percentage points in 2012 compared to 2000 year) and reduced the share of technicians and assimilated staff (with -2.3 pp) and of the others category of employees (with -5,2pp).
After Romania accession to EU – as the effect of the reforms adopted in the entire sector of R&D and as a result of the sector re-orientation to enhance and develop its specific activities - it appears that, in 2012 compared to 2007 year, there was an increase less faster of the total number of employees in R&D from the tertiary education sector compared with the total sector (1.3 times versus 1.1 times). Also, there have been changes in the types of occupations of the staff with the full-time in R&D from tertiary education; it means that was registered an increasing of the researchers share (by 2.0 pp), and of the technicians and assimilated (by 2.9 pp); on the other hand, in the same period, the weight of the staff with the full-time from other categories from R&D universities was reduced its share (by -4.9 pp).

Table 2. The number of employees in R&D* universities, the stage of instruction, between 2009 and 2012 years. Number**

	2009	2010	2011	2012	2012/ 2009, %
Total employees from R&D universities	**22,126**	**21,179**	**19,461**	**18,700**	**84.5**
Holders of doctorate (Ph.D.)	11,493	12,177	10,659	10,552	91.8
Postgraduate studies (excluding Ph.D. holders)	1,962	2,088	2,443	2,838	144.6
Tertiary education by long-term training	7,915	5,748	5,111	4,168	52.7
Tertiary education by short-term training	161	267	253	214	132.9
Other training types	595	899	995	928	156.0

* Refers to the physical number of people and not to the number of employees established in full time equivalents.
** International Standard Classification of Education (ISCED)
Source: NIS.2014. Data Base Tempo Online, Bucharest.

Regarding the structure of the staff with the full-time involved in R&D from universities taking into account them training stage, according to the International Standard Classification of Education (ISCED), employees, in the year 2012, it was dominated by possessors of doctorate/ Ph.D. (56.4% of total employees involved in the R&D from the tertiary education institutions)

followed by long-term tertiary education (22.3%) ones and by the staff with post-graduate studies – exclusive Ph.D. holders (15.2%).
In the year 2012, the structure by range of employed women (under the International Standard Classification of Education – ISCED) in R&D units from tertiary education was close to the overall research sector, except the category of doctorate (Ph.D.) holders which registered a lower level for the female staff (by -3.6 pp).

Regarding *missions of human resources involved R&D institutions from tertiary education them refers* mainly to: publication in scientific journals with international visibility; access to national and international research grants; participation in international research teams; set-up partnerships with business environment in view to initiate joint projects and / or to utilize the research outputs. This missions system functions - flexible and dynamic - allows building opportunities; so that, each educator throughout on his entire university career, depend on the accumulated capital knowledge and can create its own contribution to R&D sector from tertiary education and to feel fully motivated.

Another component that was added to the training of human resources involved in the research institutions from tertiary education, after Romania's accession to the EU, was represented by international and inter-sectoral mobility of very educated staff. On this way on could ensure an effective transfer of knowledge and skills amongst the public and the firms, with people from several EU Member States. At the same time, research universities were stimulated to diversify their activities (by establishing their own Excellence Research Institutes in the strategic areas of Doctoral Schools, postgraduate activities, etc.).

3. FINANCING SCHEME OF THE RESEARCH AND DEVELOPMENT ACTIVITIES FROM THE UNIVERSITIES

3.1. The share of GDP allocated for R&D activities

The financial resources allocated to the research, development and innovation from tertiary education institutions have been closely linked to the overall economic development, with the capacity of the national economy to support the costs of R&D activities; it is reflected in the share of R&D cost in GDP. In 2012, Romania has been allocated for R&D 0.49% of GDP; this level was below the EU-28 average (2.06%). The research, development and innovation system developed within the tertiary education institutions from Romania received 0.10% of GDP only compared with to 0.49% of GDP as recorded in the EU-28 (Source: Eurostat - online date code: tsc00001, OECD).
The total R&D expenditure in tertiary education, in 2012, was 566.6 million lei (aprox.128.0 million Euros). After the EU accession, in Romania the size of R&D from the tertiary education institutions has increased (by 8.0%), but its level remain still low.

3.2. R&D expenditures by main components

In 2007-2013, the evolution of total R&D expenditure has been contradictory. Thus, immediately after Romania joined to EU, in 2008, total R&D payout per inhabitant and the allocation for tertiary education per inhabitant have increased (by 4.2% and by 21.6%).

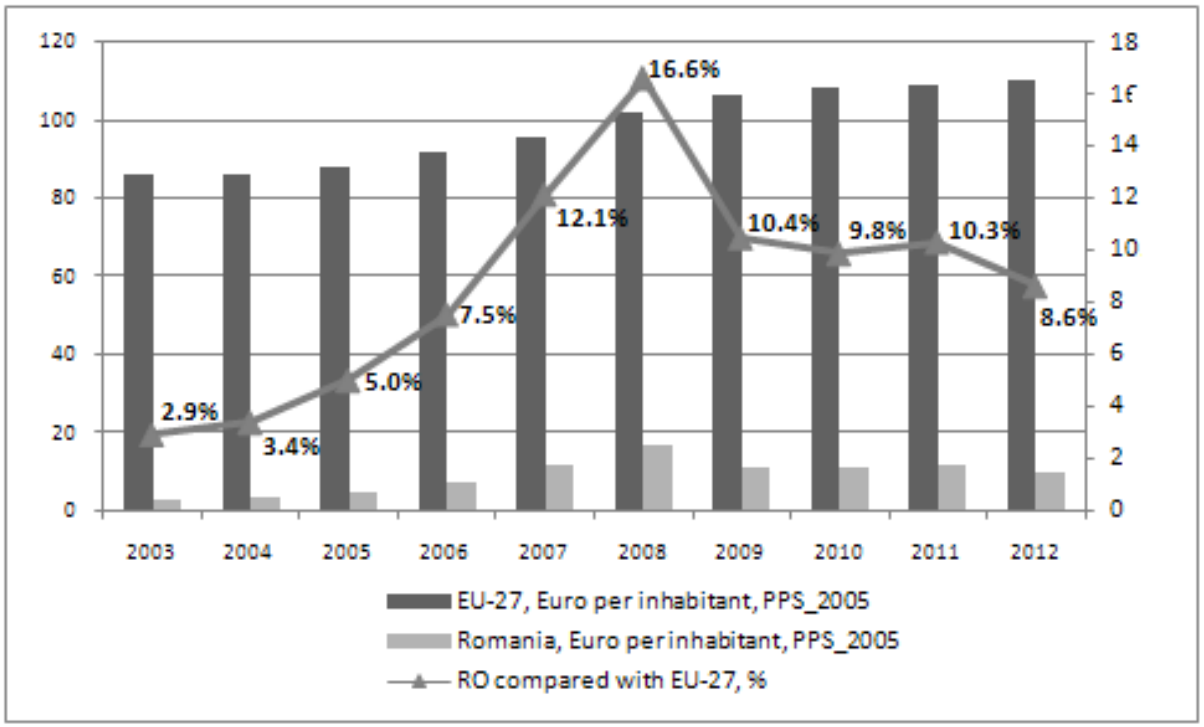

Figure 2. Expenditures on R&D in tertiary education per inhabitant in EU-27 and in Romania, during 2003-2012

Source: Eurostat after; http://appsso.eurostat.ec.europa.eu/nui/show.do

In the years of the economic crisis, in the year 2009 and 2010 respectively, were registered a decrease of expenditures on R&D in tertiary education per inhabitant (by -4.3% on the total R&D expenditure per capita and by -7.8% on the R&D expenditure from tertiary education per inhabitant). The descending trend of the reference indicator continued during the next two years and the size of the per capita expenditures in R&D units from tertiary education decreased (by -3.4% in the case of the total R&D expenditure per capita; by -18.1% case of the R&D expenditure per capita within tertiary education).

In the year 2012, the main components of the expenditures per capita for R&D in tertiary education shows that 73.8% was represented by the current expenditures, out of which 43.4% was the cost of the labor force and 11.0%, were the material costs.

Table 3. Costs allocation for R&D from tertiary education institutions, during 2007-2011. Thousands RON, in current prices

	2007	2008	2009	2010	2011	2012	2012/ 2007, %
Total	**524,742**	**859,964**	**583,055**	**591,324**	**637,208**	**566,640**	**108.0**
Current expenditures	383,305	684,048	497,338	490,740	493,722	418,105	109.1
-For Personal	156,440	266,858	245,789	269,530	285,615	246,080	157.3
-For Materials	149,882	292,418	202,401	131,482	94,427	62,331	41.6
-Other current costs	76,983	124,772	49,148	89,728	113,680	109,694	142.5
Capital expenditures	141,437	175,916	85,717	100,584	143,486	148,535	105.0
-Lands and buildings	1,991	709	1,455	24,143	34,939	26,362	1.324.1
- Equipment and machineries	133,097	168,071	79,039	72,211	101,292	114,678	86.2
- Expenses with specialized software acquisition for R&D	:	:	:	:	5,074	3,721	73.3*
-Other capital costs (including the costs of the transport means)	6,349	7,136	5,223	4,230	2,181	3,774	59.4

Source: NIS. 2014. Data Base Tempo Online, Bucharest.

The share of capital expenditures for R&D in tertiary education, in the year 2012, was 26.2%; on mention that the volume of the equipment and machinery was prevalence (20.1% of total).
In 2012 compared to 2007, the cost structure of R&D from tertiary education registered the following changes: an increased of the staff cost share (by 13.8 pp); reduced the share of material costs and of capital expenditures ones (by 17.6 percentage points and respectively by - 0,8pp).

3.3. Financing sources for R&D in tertiary education

In 2011, R&D sector from tertiary education received 77.1% of total financial allocations from domestic funding (36.9% public funds; 28.9% funds from public general university funds – GUF; 5.7% from sponsors from businesses environment; 1.8% funds from tertiary education units, 0.1% financial allocations from non-profit institutions, 2.8% were other national funds) and 22.9% were funds from abroad.

Table 4. Sources of financing of R&D in tertiary education institutions, between 2007-2011. Thousand lei, in current prices

	2007	2008	2009	2010	2011	2011/2007, %	Structure in 2011, %
Total financial support	**524,742**	**859,964**	**583,055**	**591,324**	**637,208**	**121.4**	**100**
Domestic funds	496,130	816,574	518,548	486,077	491,168	99.0	77.1
-Sponsors from businesses environment	29,162	21,363	22,299	25,686	36,206	124.2	5.7
-Public funds	297,146	187,373	83,530	21,731	235,104	79.1	36.9
-Public General University Funds (GUF)	152,034	532,878	374,065	390,149	190,125	125.1	29.8
- Tertiary education institutions	17,481	74,487	38,026	47,873	11,227	64.2	1.8
-Non-profit institutions	307	473	628	638	588	191.5	0.1
-Other funds	…	…	…	…	17,918	…	2.8
Funds from abroad	28,612	43,390	64,507	105,247	146,040	510.4	22.9

Source: NIS. 2014. Data Base Tempo Online, Bucharest.

Comparing the financial sources allocated for R&D in tertiary education institutions with the total funds distributed for R&D sector on find that the finances received from domestic sources were lower, in 2011, (by -10.9 pp compared with the total expenditure for R&D), but the financial allocation received from abroad balanced this circumstances. For GUF category public funds for R&D in tertiary education institutions was with 23.0 percentage points higher than total allocations. However, funds for R&D financial allocation for tertiary education institutions were under the total domestic funds for R&D at the following categories: sponsors from businesses environment (with -27,8pp); public funds (with -5,4pp).

3.4. Orientation of financial allocations to programs and to research projects

General orientation of expenses for R&D in tertiary education institutions, in 2011, in Romania, was focused on fundamental research (63.0% of total), followed by applied research (27.2%) and experimental development research (9.8 %).

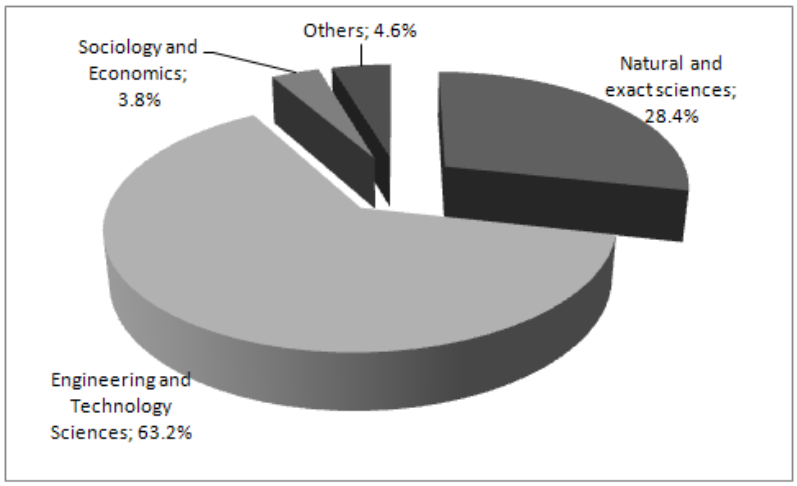

Figure 3. Structure of expenditure on programs and projects to promote general knowledge*; R&D GUF financial allocations, in 2012. Total = 100%
* According NABS – Nomenclature for the Analysis and Comparison of Budgets and Programs Scientific. Source: NIS. 2014. Data Base Tempo Online, Bucharest.

In 2011 compared to 2007, the largest increase in expenditure for R&D in tertiary education institutions was recorded in experimental development research (50.2%) and lowest in applied research (10.5%).

In 2012, the total number of projects realized - according to the Nomenclature for the Analysis and Comparison of Scientific Programmes and Budgets (NABS, for this classification are available data in Romania, in 2011) - was 8,394 out of which 24.7% (2,073 projects) were GUF funds for research and development promotion.

In 2012 compared to 2011, as a result of the general economic crisis, decreased by 11.8% the total number of projects oriented to promote research and development from GUF funds. Programs and projects oriented to promote general knowledge in R&D financed from GUF funds were in the following areas: 1,311 projects (63,3% of total) in engineering sciences and technology; 589 projects (28,4%) in natural and exact sciences; 78 projects (3,8%) in social and economic sciences; 44 projects (2,1%) in the humanities; 30 projects (1,4%) in agricultural sciences; 21 projects (1,0%) in medical and health sciences.

4. RESULTS OF THE RESEARCHS PERFORMED

Under the National Excellency Research Program (CEEX) – launched in 2005 – by the National Authority for Scientific Research (ANCS) – public spending were targeted for creating the Romanian Research Area and for research preparation and for development of research community to participate in the Seventh Framework Programme for Research and Technological Development (FP7) open to Member States for the period 2007-2013.

CEEX provided funding for: complex research and project development; projects destinated to young researchers; projects to stimulate researchers come back home; mobility projects. Management promoted by CEEX encourage set-up of strong consortium, promoting interdisciplinary research, human resource development, international advertising of the Romanian Research-Development-Innovation System and the consolidation and development the certification of the results.
CEEX program was a success, allowing over 700 funding projects (until 2009) in all areas of research. Under the FP7, during 2007-2013 were realized several collaborative links such as ones with: Germany (1710 joint links); Italy (1427); France (1293); United Kingdom (1280); Spain (1246).

Table 5. Universities from RO which was included in Top 10 Beneficiaries Participated within EC Financial Contribution Granted in FP7

Name	Beneficiaries Participated		EC financial contribution	
	Number	Structure, %	Euros million	Structure, %
Total Top 10 beneficiaries	**219**	**x**	**41.3**	**x**
***Out of which*: Universities**	**149**	**100**	**28.01**	**100**
Percent of total	68.0	x	67.8	x
-Universitatea Politehnica din Bucuresti (UPB)	45	30.2	9.38	33.5
-Universitatea Tehnica Cluj-Napoca (UTC)	32	21.5	5.59	20.0
-Universitatea Babes Bolyai	24	16.1	3.51	12.5
-Universitatea de Vest din Timisoara (West University of Timisoara)	10	6.7	3.48	12.4
-Unitatea Executiva pentru Finantarea Invatamantului Superior, a Cercetarii, Dezvoltarii si Inovarii (UEFISCDI)	36	24.2	3.41	12.2
-Universitatea din Bucuresti (UB)	2	1.3	2.64	9.4

Source: EC. 2014. Processing after: eCORDA DATA, July, http://ec.europa.eu/research/fp7/pdf/country-profiles/romania/country_profile_and_featured_projects.pdf#view=fit&pagemode=none

Within the top 10 recipients who had access to funding through FP7, during 2007-2013, were six universities (Polytechnic University of Bucharest – UPB Technical University of Cluj-Napoca – UTC, Babes Bolyai University of Cluj-Napoca; West University of Timisoara – West University of Timisoara, Executive Unit for Financing Tertiary Education, Research, Development and Innovation – UEFISCDI, University of Bucharest – UB), which together attracted 68.0% of the total participation of the first Top 10 beneficiaries of FP7 financing allocations (149 projects) and 67.8% of total funds related (28.01 million Euros).

4.1. The number of scientific articles citations

Basic research, valorized by scientific articles, has been almost the only component of the RDI System from Romania, internationally visible, mentioned the document „Develop national strategy for research, technological development and innovation" (see: http:// www.cdi2020.ro/wp-content/uploads/2014/02/pn-cdi-2014-2020.pdf; www.cdi2020.ro).

Table 6. The number of scientific articles citations, by the year of citation and by the year of publication apparition, during in the period 2004-2010

Articles appeared in the year	Number of scientific articles citations							Total apparitions
	2004	2005	2006	2007	2008	2009	2010	
2004	362	2,314	2,944	2,883	3,245	2,894	2,661	**17,303**
2005		657	3,139	4,031	4,654	4,488	4,101	**21,070**
2006			606	2,669	4,553	4,363	4,007	**16,198**
2007				604	3,867	5,475	516	**10,462**
2008					1,343	5,759	7,437	**14,539**
2009						1,544	6,394	**7,938**
2010							1,676	**1,676**
Total citations	**362**	**2,971**	**6,689**	**10,187**	**17,662**	**24,523**	**26,792**	**89,186**

Note: We have considered only articles published in SCI-EXPANDED.
Source: ANCS. 2010. *Government policies for research, development and innovation in Romania – 2010 Report*; Web of Science, Science Citation Index Expanded.

In 2008, the number of Romanian article quotations was 1,343 of citations and represented 3.8% of the total, a level that was below 10% – figure considered to be significant for assessing the quality of articles published in internationally collections recognized. This is due by the fact that Romanian articles are peripheral subjects or them had a poor quality. In 2010, the situation of article quotated has improved; it has been an increased of them citations (with 24.7% more than in 2008; 1,676 citations), but this level was still low faced to the international standards for the scientific articles citations recognition.

4.2. The Patent Number

Basically, the immediate effect of the scientific creation and technical innovation in a country is given by the number of international patents. In 2013, at the State Office for Inventions and Trademarks (OSIM) from Romania were submitted 1,046 applications for patents, out of which 19.7% (206 patents applications) were from R&D universities.

Table 7. The OSIM Patent Applications, during 2007-2013

	2007	2008	2009	2010	2011	2012	2013
Total patent applications	**926**	**1031**	**1091**	**1418**	**1463**	**1077**	**1046**
***Out of which:* Romanian applicants**	**867**	**995**	**1054**	**1382**	**1425**	**1020**	**995**
- Physical applicants	533	466	529	567	641	429	495
-Enterprises	122	121	162	135	139	158	151
-Research units	121	230	222	334	357	208	143
-Universities	**91**	**178**	**141**	**346**	**288**	**225**	**206**
Foreign applicants	59	36	37	36	38	57	51
Dynamics, 2007 = 100, %							
Total patent applications	100	111.3	117.8	153.1	158.0	116.3	113.0
***Out of which:* Romanian applicants**	**100**	**114.8**	**121.6**	**159.4**	**164.4**	**117.6**	**114.8**
- Physical applicants	100	87.4	99.2	106.4	120.3	80.5	92.9
-Enterprises	100	99.2	132.8	110.7	113.9	129.5	123.8
-Research units	100	190.1	183.5	276.0	295.0	171.9	118.2
-Universities	**100**	**195.6**	**154.9**	**380.2**	**316.5**	**247.3**	**226.4**
Foreign applicants	100	61.0	62.7	61.0	64.4	96.6	86.4

Source: OSIM. 2014. Database of State Office for Inventions and Trademarks - OSIM, August 20, http://www.osim.ro/despre_noi/capitolul_statistici.php#

On mention as a positive phenomenon the high dynamics of patent submission for getting the OSIM acceptance - in 2013 compared to 2007, there was an increase of 2.3 times for the R&D universities, compared with only an increase with 13.0% registered at the level of the whole country.

Most patent applicants SOIT/OSIM were Romanian residents (95.1% of total applications), including tertiary education establishments which get the second rank (19.7% of total SOIT/OSIM application request for patents).

In 2013, 66.2% of total SOIT/OSIM patent applications came from the following units of tertiary education: the University "Stefan cel Mare" Suceava (30.5% of total SOIT/OSIM patent applications); "Transilvania" University of Brasov (10.5%); Technical University 'Gheorghe Asachi' of Iasi (9.8%); University Politehnica of Bucharest (8.1%); Technical University of Cluj-Napoca (7.3%).

Most patent applications, in 2011, were submitted in the following technical areas: general needs of life (22.0% of total SOIT/OSIM patent applications); Physics (17.7%); Mechanical, lighting and heating (16.2%). The fewer SOIT/OSIM patent applications were for the textile, paper (0.9%).

Reforms from the Romanian Research System, during 2008-2012, had as effect the reducing of the total patent applications issued by SOIT/OSIM (by -31.1%), while in the case of tertiary education institutes has been a substantial increase (by 6.9 times, respectively from 11 patent applications issued in the year 2008 to 76 ones issued in 2012); this phenomenon confirms the development of research activities recorded in the tertiary education establishments.

General report of total patents issued by SOIT/OSIM and total patent submitted to SOIT/OSIM, in 2013, was 1 to 2.2. Thus, of the total number of patent applications filed with SOIT/OSIM (see the Annual Report 2012 of the SOIT/OSIM http://www.osim.ro/rapoarte/raport2012/Raportul_Anual_2012.pdf) were issued patents only for 34.8% (375 patents were issued to SOIT/OSIM), of which 20.3% (76 patents) were from tertiary education institutions.

Regarding the issue of international patents (EPO, USPTO) Romania has not registered the same trends as those internally; this phenomenon could indicate a possible structural deficiency of the Romanian system. In this context, the reforms which will be developed in the field of R&D, in the future, will made as necessary the creation and implementation of an entire sub-system to sustain the results of applied domestic research (in this moment it is missing and / or it is dysfunctional). Without an increase in the international patent capacity, it is not easy to produce economic effects expected by many sponsors of the R&D activities in Romania and also to grow the recognition of national intelligence. However, we must not forget that the international recognition of Romanian patents means expensive and difficult procedures, and generally on is practiced only if there are promising innovations, successful ones.

In 2012, Romania registered a total of 40 patents with the European Patent Office (EPO) and 60 patents with the Patent and Trade Office in the USA (USPTO). Regarding the type USPTO patents - issued by American authorities for Romania - it is said that in recent years their number increased 5.5 times (from 11 USPTO patents in the year 2007 to 60 patent in 2012).

The most general indicator measuring creativity on international R&D System is the share in GDP of Licensing Income Products "Hi-Tech" and "Medium-Tech" which are highlighted in the Trade Balance of each country.
Thus, in Romania, in 2011, these reference indicators were 0.13% and respectively 0.38%, while on the European level, the average of Licensing Income Products "Hi-Tech" and respectively "Medium-Tech" from the EU Trade Balance was 0.58% and respectively 4.20 %.
On can concludes that presently the recognition of the Romanian creativity by the share in GDP of Licensing Income Products "Hi-Tech" and "Medium-Tech" from the Trade Balance is far of EU average – concerning the gaps between Romania and EU average represented by the share in GDP of Licensing Income Products "Hi-Tech" and "Medium-Tech" from the Trade Balance is 1 to 4.46 and respectively 1 to 11.1.

5. CONCLUSIONS

In view of EC institutions involved in R&D from tertiary education units should be able to connect to the flow of international ideas, to get more opportunities, to conquer new markets and to set-up local high quality jobs.

The European Union intends to support the efforts of national authorities and of the tertiary education institutions to continue modernization of R&D&I and for sustaining this idea on will set up a High Level Group for Modernization of Tertiary Education. Through this specialized structure will be adopted a several measures, including:

- A Strategic Program on innovation in view to ensure an optimal circulation of ideas and results from R&D and the transfer of scientific knowledge, also;
- On will recruit a Quality Framework for Internships periods, which will be accompanied by a unique platform for Offers Internships in Europe; The European Commission will support the development of relations with the third countries in the field of tertiary education institutions with research activities;
- European Commission will propose some changes of Directives regarding foreign students and researchers to transform the European Space in a more attractive destination for this applicants.

In Romania, universities with research and development activities represent the essential institutions from the national research and innovation system. University potential for the development of the research system and for implementation of Smart Specialization Strategies are a challenge to implement the requirements of the Romanian Partnership Agreement with the EU for 2014-2020. However, to these institutions on asks to provide:

- Better absorption of European funds for research;
- Support regional research and innovation, because in the current programming period universities with research and development potential will function to create dynamic local economic structures, based on the application of research results on creativity and on the "exploitation/ putting in practice" of new ideas in the European Area.

During the period 2014-2020, Romanian tertiary education institutions with R&D, togther with other interested research organizational structures will have to be more interested and more intensely involved in:

- Establishment of interactions, relationships and strategic partnerships between university with R & D activities and the rest of the economy, and the establishment of Joint Collaborative Research Agenda in view to maximize the use of the research outputs. On this way, on can stimulate and exploit the synergies amongst national and international programmes, also;
- Improve recognition and professionalization of knowledge transfer activities conducted in universities and, in the same time, strengthening the role of institutional structures involved in the transfer of knowledge;
- Increasing concerns of tertiary education institutions with R&D activities from Romania for attracting regional structural funds for research and innovation;
- Adoption and implementation of different measures for publishing data and results financed by public research sources;

- Developing the marketing capacity for the research findings undertaken;
- Better management of intellectual property rights and paralel to initiate and encourage a stronger dialogue with the business environment in view to support the research needs;
- Implementing and promoting assimilation of the electronic identity and of digital research services.

Prioritization of research objectives in the National Competitiveness Strategy of Romania, in the National Strategy for RDI and within Smart Specialization Strategy for universities involved in the research and development activities; this will conducted to a better application of commercial principles for the RDI activities from these entities. Also, by the continued existence and improvement of the economic and fiscal environment on will offer additional tax incentives for R&D activities from the Romanian universities. For ex. Fiscal measure regarding the tax deduction (which was introduced in 2010 and updated in 2013) applied for research and development expenses at the level of entities engaged in such activities, provided that tax incentives for R&D should be given in the following conditions: (i) to reduce taxable income for through additional deduction of 50% for the costs incurred in the fiscal year; (ii) to apply the accelerated depreciation for equipment and outlets used in research and development activities.
It should be noted that several R&D institutions from research - included tertiary education ones - are prefered to use only the second fiscal instrument.

By Romanian Partnership Agreement with EU, for the period 2014-2020, was established main objectives in the field of research, also, namely: bio-economy (agriculture and forestry, fisheries and aquaculture, food, biotechnology and bio-pharmaceutical products); ICT, space and security; Energy, environment and climate change; eco-nano-technologies and special materials; health.
Considering the above objectives, at the beginning of the programming period, on suggest that it is important that each institution of tertiary education with R&D activities to try to set-up their own qualitative investments directions in R&D taking into account the following issues: correlation with future labor market requirements; creation and development of their size regarding the research and technology transfer in specific areas with growth potential; intensifing transnational cooperation actions and competition with other Membre States developed under the Porgramme Horizon 2020; ability to develop entrepreneurial programs by spin offs and start-ups.
In this way, R&D tertiary education institutions will improve programmes and projects related to increase their role and place in domain. Also, them will can expand their financial resources attracted fot these activities form different sponsors.

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