

Competitiveness through innovation for the Romanian Economy. IP activity and its effect on competitiveness

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Abstract: *This paper aims to study the way that the efforts put into increasing one of the most significant competitiveness pillars (innovation) and results (especially Patent, Marks and Designs production and application) correlate for the Romanian economy in the last decade. We will then use as effort indicators the R&D expenses and the Innovation costs, as reported by the National Institute of Statistics and as result indicators we use the number and provenience of Intellectual Property (IP) activity registered with World Intellectual Property Organization, as well as GDP.*

Key-words: *innovation, competitiveness, patent application*

1. Introduction and literature review

It is well known that competitiveness and innovation are linked in a natural as well as sophisticated way, meaning that unsurprisingly innovation brings competitive advantage, but also leading potential, in a word superiority on different aspects. Within a dynamic and strongly competitive marketing environment, the most important requirement for the success [...] is competitiveness (Madar and Neacşu, 2013).

The development of SMEs plays an important role, these companies create a competitive environment and contributes to the correct distribution of revenues within the economy (Bărbulescu, Hapenciuc, Moroşan, and Costea, 2015). How much of the innovative potential of a national economy can be stimulated thru public policies and how much of it resides naturally within populations abreast it is difficult to discern. However, we will assert to demonstrate a faded link between R&D public efforts and a quantifiable increase in competitiveness due to these “stimulating” policies.

We shall start with a literature review on two aspects, as revealed by the scope of the paper, namely: on competitiveness and its indicators, as well as on innovation linked to productivity increase. The understanding of innovation as a key driver to competitiveness has its roots in the works of Schumpeter, who described market

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dynamics as a process of creative destruction. Later he developed further this concept, referring it as a process of “creative accumulation” (Dobrinsky, 2008). The competitiveness concept apply both to the national range as to the sectoral level; we base the national competitiveness performance on the sectoral competitiveness indicators, the same way that global indexes of competitiveness (used by WEF and IMD - Institute of Management Development) use national performance indicators in order to imbricate world classification of countries.

Competitiveness can be quantified, or at least can be used as ranking criteria. The World Economic Forum (WEF) is well known for measuring the level of worldwide economies national competitiveness yearly, based on a twelve pillars system. WEF is not a *benchmark* but it measures the respective factors with a specific method and ranks the countries according to it, while the reports based on the Lisbon Plan compare the facts to a previously planned objective.

Authors mention that the objectives are determined based on the situation of the member countries which differ a lot from the situation of the new ones which sometimes make the comparison difficult or even impossible (Nagy, 2010). It is not only the WEF that measure and benchmark the global competitiveness yearly. There are some structural indicators calculated in the EU countries, reunited in the called Lisbon Scorecards, as they were established in the Lisbon Strategy for Europe in order to increase the European countries competitiveness in the battle of globalization.

Every competitiveness index must start from a measure of national competitiveness performance (variable depending on analysis) bordered by activities which imply the competition with other countries (Coculescu, 2008). The impact of public debt levels upon economic growth and competitiveness was approached in a study realized by authors (Dincă and Dincă, 2015) on a sample of 10 former communist countries from Central and Eastern Europe. As to the link between innovation and productivity increase, various authors stress on the importance of the national environment (institutions, policies, strategies) that encourage at different levels the innovative processes in the economy and create an upright, effervescent milieu for new ideas. Innovation is particularly important for economies as they integrate the new knowledge into production process for creating modern technologies in order to maintain the companies and the nations' competitive edge. This requires an institutional environment that is conducive to innovative activity, supporting both the public and the private sector. Competitiveness is approached as concept in link with variables on the micro and macro environment in several studies (Dincă and Dincă, 2009) both for the private sector as for the public organization, which also recognize the concept (Băcanu, 2008).

The importance of a solid institutional environment becomes even more apparent during an after-crisis economic recovery. Innovation is not possible without institutions that guarantee intellectual property rights [...] so innovation and institutions are not only related to each other, but also tend to reinforce each other (Taranenko, 2010).

Other authors (Joumandreu, 2009) point out that the positive impact that R&D investment has on (general) welfare surpasses its cost, but only a small part of this impact is appropriable privately in the form of revenue. This is why private investments on innovation tend to be suboptimal, so public policies have to be put in place in order to sustain innovative activities. We will focus on the uprightness of this particular approach.

2. The link between competitiveness, innovation and patent applications

WIPO stands for World Intellectual Property Organization and is the global forum for intellectual property services, policy, information and cooperation. It is the global aggregator of patterns and intellectual property throughout the world. All innovations and property rights apply in principle to be protected throughout this organism (for worldwide intellectual protection) or to a similar (national) one in order to protect the author's rights to fruitfully use their innovation as well as related products and services in a limited geographical area.

The ultimate measure of competitiveness as general concept in economy is the actual profit and the accumulation of wealth. In the case of countries, other non-pecuniary measurements might be considered to appraise the competitiveness rank (e.g. international standing, standard of living, size of the economy, size of the military, welfare volume, foreign investments, etc).

Office	Contribution (%) 2000	Contribution (%) 2013	Evolution rate (%)
China	31,54	2,90	-90,81
USA	22,59	26,81	18,69
Japan	13,82	30,07	117,50
Republic of Korea	7,87	7,10	-9,74
European Patent Office	6,81	7,39	8,44
Others	17,36	25,74	48,21

Table 1. *Main contributors to the IP activity, per Patent Offices worldwide, 2013 and 2000*

Source: WIPO Statistics Databases, 2014 and 2001

As illustrated in Table 1, the number of patent applications worldwide went up in 13 years from 1,380,200 in 2000 to almost double, that is 2,567,900 applications received in 2013 and 9% up as compared to 2012, as recorded by the WIPO statistics. Top five contributors in 2013, that gather as much as 81% of the applications, are the Patent Offices from China, USA, Japan, Republic of Korea and

EPO (European Patent Office), but only the Offices from USA and Japan kept a place on top 5, while EPO went up at a steady pace, along with Republic of Korea (after 1995), and, expectedly China grew exponentially after 2005. During the decade, the Brazilian Patent Office went on top 5 occasionally, chasing the Japanese one out of the top. These are the aggregators of patents, meaning that they gather the innovative flow in their specific geographical area.

Out of the uppermost Offices that receive applications, the fields that require the most attention in protecting intellectual property are: IT, Electrical machinery and energy, Measurement, Digital communication, and Medical Technology. These fields concentrate from 25% (Republic of Korea) to 37% (US) of the published patent applications in 2012. The number of applications in the depicted fields went up by 342% from 2000 to 2012, showing a clear trend towards innovation in high technology and need to protect the associated competitive advantage.

We will start the logical link between competitiveness and patent applications with a blunt definition of the innovation process: an improvement in way of doing things. The improvement translates economically in lower costs or higher benefits, thus better competitive situation. A direct and logical consequence of an innovation is a patent application. The inventor wants its rights to be recognized and protected in his immediate business environment or at a larger scale if necessary.

Consequently we consider that the competitiveness of a particular national economy is directly correlated with the number of patent applications submitted by its nationals, whether they are residents or non-residents, even more so when the distinction between categories is actually documented by the relevant statistics. Whether the residents are innovative as depicted by the number of patent applications, or they become productive in terms of innovating outside their national borders, is a sanity indicator of the national environment and, ultimately, of the effectiveness of public policies sustaining innovation.

3. Linkage between Intellectual Property activity and Global Innovation Index

We take into consideration the top five ranks group of countries (Table 2), then the next five as recorded and ranked by the number of applications from nationals in 2013. China holds the first place on all areas of IP, while USA seconds only for Patents and Marks. Top five maintains generally the same group of countries for these categories of IP activity, while the Designs category consecrates an unexpected rank 4 for Turkey (27 and 7 for Patents and Marks) and 5 for Italy (11 for Patents and Marks), respectively. Romania ranks on a 33 to 44 position in all categories of IP filing (both for resident and non-residents applications), while scoring poorer on the Global Innovation Index in 2013 (no 48) and even lower in 2015 (no 54). Is there a correlation between the data series?

Table 2 illustrates a rather unexpected correlation between rankings on Intellectual Property (IP) activity per countries and the Global Innovation Index (GII), calculated for 2013. We use the Pearson correlation (r) to illustrate the potential link between the proposed data series and find a surprising dispersed result in associating the three forms of IP activity with the Global Innovation index (GII). While Patent filing seems to correlate positively with the GII ($r=0,43227$), Designs application correlates poorly with the same index ($r=0,1263$) and Marks claim correlates negatively with GII ($r=-0,1811$).

COUNTRIES	Top RANKINGS in IP activity and Innovation				
	Total filing activity by origin 2013			Global Innovation Index 2013	Global Innovation Index 2015
	PATENTS	MARKS	DESIGNS		
China	1	1	1	35	29
USA	2	2	6	5	5
Germany	5	4	2	15	12
Japan	3	5	7	22	19
Korea	4	10	3	18	14
France	6	3	9	20	21
Italy	11	11	5	29	31
Switzerland	8	12	8	1	1
Russian Fed	9	6	21	62	48
Turkey	26	7	4	68	58
UK	7	8	11	3	2
Sweden	13	27	14	2	3
Netherlands	10	19	16	4	4
Finland	17	38	30	6	6
India	14	9	15	66	81
Spain	22	14	10	26	27
Romania	44	33	34	48	54
Pearson Correl in 2013*	0,43226847	-0,181106	0,12632129		

*between series of Patents, Marks and Designs Data and Global Innovation Index (GII) in 2013

Table 2. Top rankings in the IP activity in 2013 per countries and GII rankings (2013, 2015)

Source: WIPO Statistics Databases, 2013, 2014 and 2015

While in the top 5 concerning the IP filing activity we find China, USA, Germany, Japan and Korea, the Global Innovation Index only retains USA ranking at 5 and the rest of the top five in IP activity rank only outside top 10 (going as far as no 35 for China, otherwise no 1 in IP). Why is this happening?

It has obviously to do with the methodology used to rank countries on the two series of data. While IP activity only takes into consideration the number of applications filed over a period of time, the GII has a multitude of criteria used to rank the countries, based on an Innovation Efficiency Ratio that is designed as a combination of two sub-indexes based on Innovation outputs and inputs respectively. Amongst them, the most significant inputs that are measured are:

Infrastructure (Communication and Technology, general infrastructure and ecologic sustainability), Market sophistication (investment, trade and competition), Political, legal and business environment, Human capital (education in general and particularly tertiary education), Research and development (R&D) expenditures and finally Business sophistication (knowledge absorption and innovation linkage). On the outputs we cite: knowledge creation, impact and diffusion, and creative substance (products and services, intangible assets and online creativity).

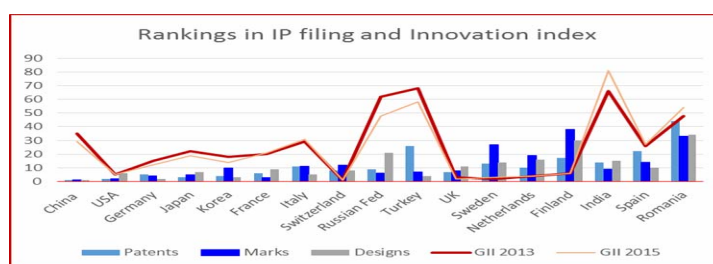


Fig. 1. *Top rankings in IP filing and Innovation index in 2013*

In the terms described above, innovation has multiple facets that go beyond the IP filing, exploring further the “innovation spaces” and “clusters”, as well as use and diffusion of R&D expenditures in economy and innovation processes. It is how it can be explained that Switzerland for example ranks first in GII system both in 2013 and 2015, while scoring 8 and 12 into patents, marks and designs application. Similarly, Sweden, UK and Netherlands hold the 2 to 4 ranking as in GII in 2013 and 2015, while IP activity situates them on positions varying from 7 (UK in Patents filing) to 27 (Sweden in Marks application). It is clear that only IP activity is insufficient to properly appraise the innovation potential of an economy, while remaining however an important indicator of the latter.

4. Link between official R&D expenditures and Romanian IP activity

Intellectual Property filing activity is recorded separately for residents and non-residents applicants, offering an interesting angle on the motivational national environment for innovators in their home countries.

As depicted in Table 2, the relevant statistics as published by WIPO place Romania on an overall position (44 for Patents, 33 for Marks and 34 for Designs application in 2013) out of which rankings 37, 30 and 29 come from the residents’ innovation activity. Comparing to 2012, the resident IP activity placed Romania on positions 35 for Patents, 30 for Marks and 32 Designed registered, out of a total of 23,595 applications filled by residents. In 2011 we find Romania on ranks 30 for Patents, 26 for Marks, and 30 fir Designs applications from residents, which gives us a quite clear image of a declining activity in IP from the residents’ side. Is this in

anyway linked with the public and private sectors efforts measured in the R&D expenditures percentage of the GDP? Table 3 illustrates the evolution of these indicators between 2000 and 2013, traversing the 2008 crisis.

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
% R&D expenditures in GDP, out of which:	0,37	0,39	0,38	0,39	0,39	0,41	0,45	0,52	0,57	0,46	0,45	0,49	0,48	0,39 ¹⁾
% R&D expenditures in Private Sector	0,26	0,24	0,23	0,22	0,21	0,20	0,22	0,22	0,17	0,19	0,17	0,18	0,19	0,12 ¹⁾
% R&D expenditures in Public Sector	0,11	0,15	0,15	0,16	0,17	0,21	0,23	0,30	0,40	0,27	0,28	0,31	0,29	0,27 ¹⁾
GDP (billion lei)	80,3	116,7	151,4	189,1	238,7	287,2	342,4	404,7	513	499,5	513,6	557,3	587,5	628,6
R&D expenditures (billion lei)	0,2971	0,4551	0,5753	0,7375	0,9309	1,1775	1,5408	2,1044	2,9241	2,2977	2,3112	2,7308	2,8200	2,4515
Inflation Rate	0,457	0,345	0,225	0,153	0,119	0,09	0,0656	0,0484	0,0785	0,0559	0,0609	0,0579	0,0333	0,0398
GDP corrected (billion lei)	80,30	86,77	91,89	99,54	112,29	123,95	138,67	156,34	183,75	169,44	164,23	168,45	171,85	176,84
% of variation (GDP corrected; 100=prev year)		8,05	5,91	8,33	12,81	10,38	11,88	12,74	17,53	-7,79	-3,08	2,57	2,02	2,90
R&D corrected expenditures (billion lei)	0,30	0,34	0,35	0,39	0,44	0,51	0,62	0,81	1,05	0,78	0,74	0,83	0,82	0,69
% of variation (R&D corrected; 100=prev year)		13,89	3,19	11,18	12,81	16,04	22,80	30,28	28,84	-25,58	-5,19	11,69	-0,06	-16,39

¹⁾ non-definitive data

Table 3. *Romanian R&D expenditures as % of GDP (2000-2013)*

Source: Romanian Institute of Statistics (INSSE)

Corroborated with R&D expenditures infused in the Romanian economy, we find that registered IP results is extremely meager, even in intervals with positive dynamics in stimulating innovation thru public policies and investment in research.

When looking at the Global Innovation Index for Romania in 2015, we find that, unsurprisingly, Romania scores a very low 27,8% in Human capital and research Innovation pillar, with 38,6% average score in Education, 32,6% in Tertiary Education and only 12,1% (lowest of all scores in measuring Innovation) for the R&D activity (Number of researchers per million population, Gross expenditure on R&D, as % of GDP and University ranking, average score top 3).

5. Conclusions

Although the Romanian public and the body politic are displaying increasing efforts in raising the economy's competitiveness through innovation, we find a very poor correlation between this type of input and the innovation outputs. While R&D expenditure are increasing at a steady pace in absolute figures between 2000 and 2008 (from 0,30 to 1,05 billion lei), the after crisis rebound is less noteworthy (from 0,78 to only 0,69 billion lei in 2013), showing that the increase of GDP did not accomplish a fair distribution towards possible effective innovation stimulators of further performances.

The lack of correlation suggests that the Romanian research expenditures are not having the desired effect because the number of Romanian applications stays very low (despite efforts made in increasing R&D expenditures level) demonstrating an important scarcity of innovation in the Romanian economy.

6. References

- Băcanu, Bogdan. 2008. *Organizația publică: teorie și management [Public Organization: theory and management]*. Iași: Polirom.
- Bărbulescu, Oana, Valentin Hapenciuc, Andrei Moroșan, and Mihai Costea. 2015. "Opinions of Economic Entities from Brașov and Suceava Counties Regarding the Importance of Lease Services for Developing the Business Environment" in *The USV Annals of Economics and Public Administration* 1(21): 176-188.
- Coculescu, Cristina. 2008. "Features Concerning Competitive Performance Measurement." *Romanian Economic and Business Review*, Vol. 3, No. 4: 76.
- Cozmei, Catalina and Margareta Rusu. 2012. "Brain Drain and Competitive Advantage in the Context of Globalization." *Yearbook of the "Gh. Zane" Institute of Economic Researches*: 54 and 55
- Dincă, Marius Sorin, and Gheorghița Dincă. 2011. "Using indexes in the complex analysis of sales turnover." *The Annals of Craiova University, Economic Sciences Series*, vol. IV, No. 39: 193-202.
- Dincă, Gheorghița, and Marius Sorin Dincă. 2015. "Public Debt and Economic Growth in the EU Post-Communist Countries." in *Romanian Journal of Economic Forecasting*, Volume 18, Issue 2: 119-132.
- Dobrinsky, R. (coord). 2008. "Innovation as a Key Driver of Competitiveness." *UNECE Annual Report Economic Essays*, No 6: 53.
- Joumandreu, Jordi. 2009. "What explains the evolution of productivity and competitiveness? The innovation link." *IESE Research Papers D/804*, University of Navarra.
- Madar, Anca, and Andreea Neacșu. 2013. "Quality Strategies Applied by the Company Star East Pet." *Bulletin of the Transilvania University of Brasov*, Vol. 6(55) nr.1, Series V, p. 63-70.
- Minarelli, Francesca, Meri Raggi, and Davide Viaggi. 2013. "Network for innovation as a way to enhance competitiveness: an overview of Italian food SMEs entering networks." presented at the *2nd AIEAA Conference "Between Crisis and Development: which Role for the Bio-Economy, Italy*
- Nagy, Csaba. 2010. "Competitiveness and Innovation of the Romanian Companies." *Journal of the Faculty of Economics University of Oradea*, Issue 2: 119&120
- Stark, Oded, Christian Helmenstein, and Alexia Prskawetz. 1997. "A brain gain with a brain drain." *Economics letters*, 55(2): 227-234.
- Taranenko, Iryna. 2010. "The Challenges of Global Competitiveness: the Institutions and Innovation Development." *Review of General Management*, vol.12, Issue 2: 135.
- *** Global Innovation Index Report for 2013, 2014 and 2015, Romanian National Institute of Statistics (INSSE), and WIPO Report for 2013 and 2014.