

# Considerations about Intellectual Property Rights, Innovation and Economic Growth in the Digital Economy

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## ABSTRACT

*Three technological trends—the omnipresence of information in digital form, the generalised use of computer networks, and the rapid proliferation of the World Wide Web—have profound implications for the way intellectual property (IP) is created, distributed, and accessed by every sector of society. In the last ten years much discussion of these issues has occurred in the literature and political and legislative domain.*

*The information infrastructure offers an extraordinary ease of access to a vast array of information and peril for information to be reproduced inappropriately and for information access to be controlled in new and problematic ways. IPR regimes affect the diffusion of scientific knowledge, the innovation process and, ultimately, economic performance. Information technology raised some problems regarding the protection of intellectual property and drived to the discovery of a large number of solutions during past years. This paper's purpose is to reveal what is the situation regarding IPR protection, economic growth and innovation in Romania, in the context of digital economy.*

**KEYWORDS:** *intellectual property rights (IPR), innovation, economic growth, digital economy, Romania*

**JEL CLASSIFICATION:** *O34*

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## INTRODUCTION

During the last decade, the changes within the technological domain, law and business practices lead to many controversies regarding the protection of IPR. In the center of all these changes there is the progress from the analogical to the digital information.

The growth of publishing content types in digital form lead to easy and cheap copying and distributing of information with combined results regarding content distribution. On one hand, the content can be distributed with a much less expensive cost per unit. On the other hand, content distribution outside the channels that comply with copyright policies can diminish the creator's and distributor's revenue and thus diminishing their interest in sharing the content.

The digital information can be processed in infinite ways, can be copied without being damaged and at almost no cost, and can be easily shared, for free, for anyone and everyone who is connected, due to the rapid development of ICT and Internet. The digitalization allow to the whole world the access to a larger amount of information than the ones offered by any great library from the history of mankind – and allow anyone to be a creator and an

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editor. But the  *blessings*  of digitalization can be also seen as  *curses*  by the intellectual property rights owners (CED, 2004). In this context, the purpose of policy makers is to ensure that inventors and authors have enough incentive to bring their innovations to market. In the Information Age, this objective led to certain processes for identifying, certifying, and protecting intellectual property. The main benefit required for strong IPR protection is that by allowing innovators to appropriate a share of the benefits of their creative activities, R&D is encouraged, which leads to innovation and higher long-run growth. Starting from this assertion, the paper's objective is to approach the following issues:

- ✓ Which are the results of the research regarding IPR protection impact over the economic growth and innovation?
- ✓ Which is the current status in the research of IPR protection within the digital economy?
- ✓ Is there a positive correlation between IPR protection, on one hand, and economic growth and innovation, on the other hand, in the case of Romania?

The research is based on the secondary data usage, observation and interpretation. Information and data gathering was conducted from the specialty literature domain, governmental documents and national and international statistics.

## 1. LITERATURE REVIEW

A classical economical study regarding the compromise between innovation and intellectual property protection is the one of Nordhaus (1969), which examined the optimum length in time for a patent. The patents with a longer lifetime offer to the producers more incentives but, in the same time, lead to long periods of engrossment. Using a simulation model, Nordhaus completed a cost-benefit analysis of the compromise between these two effects and concluded that a patent lifetime of 20 years is reasonable enough.

Later, the economists examined other dimensions of the patent dimensions, such as patents applicability domain, the novelty state and so on.

As patents are applied to the inventions, the copyrights apply to the artistic and literary expressions (in text, audio or video formats) and represent the dominant form of intellectual property protection for electronic content. Many studies analysed the patent's economic impact, but much less studies were made regarding the copyrights, though in the present days, in the context of digital economy development, there is a much more intense activity in this domain from the legal and political points of view. Separately, this discrepancy reflects the differences regarding data availability; the data regarding the patents are available electronically in centralized databases, but the copyrights are granted automatically and do not need the official registering by the owner, in all the cases.

In the modern literature regarding the economic growth, the protection of IPR is regarded as the main determinative factor of the long term economic growth.

A major argument in favor of stronger IPR is that it stimulates economic growth by protecting innovators from imitation, thereby encouraging innovation. In fact, many countries have strengthened their protection of IPR by reforming their patent systems. However, although this view is widely accepted, many studies, both theoretical and empirical, indicates that, in a closed economy, the relationship between IPR protection and

economic growth is actually not so clear (Gould & Gruben, 1996; Falvey, Foster & Greenaway, 2006).

These technological progress come from the economic agents activities developed in order to benefit from new products development, or from the improvement of the existing ones (Grossman & Helpman, 1991). The economic agents are investing in R&D in order to take advantage of the inventions that will come from this. But, besides creating new products, the innovation amplifies the existing society knowledge stock, which is the basis of the next innovations. This process is being assisted according to the information, protected by IPR, available to other potential inventors, as well as patent requests. The global growth rate depends by the innovation rate and the existing knowledge, and IPR protection may enhance the economic growth by encouraging both of them.

Regarding the exploration of these issues in a multi-jurisdiction context, the most relevant analyses are those which examine a world compounded by two types of countries: the developed one, innovating "North" and the one which is currently developing, imitating "South" (Falvey, Foster & Greenaway, 2002). The main concerns were represented by the extent in which the high protection of IPR from North to South will contribute to the enhancement of the (global) growth rate, of the technological transfer rate from North to South and of the well-being level from both locations.

The most important conclusion that comes from the revision of the most important studies is that the implications of a higher IPR protection in South, either on the innovation incentives from the North, either on the technological transfer rate from North to South, are not clearly identified. This issue very much depends by the available transfer channels and by the southern ability to benefit from their technology.

At the level of each country, the impact of IPR protection over the overall development is likely to depend on the country's characteristics, especially on its technical assets. A small part of literature deals directly with the hypothesis that a stronger IPR protection generates a higher economic growth. This literature deals, generally, with the identification of the time and place in which a positive effect may be observed.

In the economic literature are used frequently two indexes for IPR protection and both are based on the perceived power regarding patents in a country: *Rapp & Rozek Index* [RRI] (1990) and *Ginarte & Park Index* [GPI] (1997).

[RRI] is based on the adherence of each country's patent laws in 1984 to the minimum standards proposed by the Chamber of Commerce of United States (1987). These standards include guidelines for patent examination procedures, term of protection, coverage of inventions, compulsory licensing, transferability of patent rights and effective enforcement against infringement. The index is on a six-point scale with higher numbers indicating stronger IPR protection (Rapp & Rozek, 1990). The RRI approach was extended by Ginarte and Park (1997).

[GPI] is also on a six-point scale and is constructed using similar criteria to the RRI. Their scoring method differs however, with five categories of the national patent law considered: the extent of coverage, membership of international patent agreements, provisions for loss of protection, enforcement mechanisms and duration of protection.

Numerous subsequent studies were based on the use of the two indices mentioned. Although issues remain regarding the direction of causality, the results of the various studies lead to reasonably consistent conclusions.

Gould and Gruben (1996) examine the relationship between IPR protection and growth in open versus closed economies and conclude that IPR protection has a slightly larger effect on growth in more open economies.

Thompson and Rushing (1999) use for analysis a system of three equations estimated using Seemingly Unrelated Regression (SUR) techniques. The three dependent variables are: the growth rate of real GDP per capita, the ratio of total factor productivity (TFP) in 1971 to that in 1990 and the RRI. The IPR index is found to have a positive and significant impact on TFP for the richest countries and the increase of TFP has a positive and significant impact on GDP growth.

Falvey, Foster and Greenaway (2006) investigate the impact of IPR protection on economic growth using threshold regression analysis in a panel data of 80 countries. They show that whilst the impact of IPR protection on growth depends upon the level of development, IPR protection is positively and significantly related to growth for low- and high-income countries, but not for middle-income countries. This suggests that, while IPR protection encourages innovation in high-income countries, and technology flows to low income countries, middle-income countries may have compensating losses from reduced scope for imitation.

In summary, the results of diverse studies provide evidence that strengthening an IPR regime can be growth-enhancing, depending on country characteristics. IPR protection seems to lead to higher growth in more open economies and in the richest and poorest countries, but has no significant effect on growth in middle-income countries, all other things being equal.

From the innovation perspective, the main benefit claimed for strong IPR protection is that by allowing innovators to appropriate a share of the benefits of their creative activities, R&D is encouraged which leads to innovation and higher long-run growth.

At the aggregate level, Kanwar & Evenson (2003) find that stronger IPR protection has a positive and significant impact on the share of R&D investment in GDP.

Little evidence on the importance of IPR protection for innovation in developing countries is available. Primo Braga et al. (2000) note that the criteria of novelty in patent grants is unlikely to be apt for promoting the small, incremental and adaptive innovations that are typical in developing countries.

There are a small number of econometric studies using data on domestic patent applications to examine the role of IPRs in promoting innovation. A study by Chen & Puttitanun (2005) however shows that stronger IPR protection has a positive impact upon innovation in developing countries.

In a related paper, Schneider (2005) examines the importance of IPR protection, high-tech imports and FDI on innovation and on per capita GDP growth. The author finds that while IPRs have a positive impact on innovation in developed countries, the impact in developing countries is negative, and often significant.

While both R&D expenditure and patent applications have advantages and disadvantages as measures of innovative activity, patent application data has the advantages of being relatively reliable, available over a relatively long time period and for a relatively large number of developing countries.

In Romania, Ștenc (2009) considers that intellectual property is both a representative and an engine for the technological innovation. He argues that intellectual property is a

representative of the technological innovation due to the fact that the level and strength of the technological innovation are directly indicated and/or represented by the level and strength of the results intellectual property protection, which emerged from the innovational process.

The best indicator for the technological development level of a country/technological branch/company are given by the number of patents, brands, drawings and models (design), software etc. that are being protected, and the fact that the statistics from industrial, economical, commercial domains are almost mirrored by the statistics from the intellectual property domain represent the best evidence that IP is an exponent of the technological innovation.

According to the author, the second valence of the IP, that of technological innovation engine, means that the level of technological innovation is being stimulated by a proper protection of innovation results. Once the results are protected, between the entity that protected and the rest of the competitors appeared a „protecting wall” which, finally, at least for a certain period of time, offers the advantage of exploiting exclusively the protected objects. The expression of the two IP valences starts with the local level of a Small and Medium Enterprise, of a research institute or company, continuing to the intermediate level of an industrial or technological branch and reaching the maximum level, that of the country.

## **2. IPR IN THE DIGITAL ECONOMY**

One of the effects of digitalization is represented by the trend to replace physical objects (such as CD's, magazines or books) with non-physical object – intangible aggregates of bits which imitate the information contained on/in physical objects.

Another change is that generated by the passing from physical objects to licensing intangible goods. We are used to buy discs, books, CD's, even software which serve as tangible proofs of human creativity. But in the intangible world we are told ever often that we are not buying creation works, but we are licensed of segments of intellectual property rights associated with a work. Unlike the property rights of the objects, the licenses, generally, come with a limited set of competencies strictly determined by the intellectual property rights owner.

We are passing from an analogical world which allows reselling objects, once this objects were distributed (the so called rights of “first selling”), to a digital world that has the potential, by using technology, to establish certain clear limits regarding what can be done with a content made available for the public. While the ground rule in the analogical world was “whatever is not prohibited, is allowed” (as an aspect connected to the reality, even if not also legal), the architecture proposed for the technical control in the digital world allow applying a very different ground rule: “whatever is not allowed by the intellectual property rights owner, is forbidden”. The digitalization offers the possibility, at least on short time, to have the most thorough information control that can be ever imagined.

This created what National Academy of Science from the United States named “digital dilemma” (Committee on Intellectual Property Rights in the Emerging Information Infrastructure, 2000). From this perspective, the digital technology has the potential to knock down the fine equilibrium of public goods and private interests which appeared due to the evolution of the intellectual property rights from the past 200 years. Shortly, the technology tends to dominate in front of the law.

In this new world, both the nightmare of the intellectual property rights owners, as well as the consumers ones are met: the intellectual property rights owners see the new technologies, as well as the Internet, as destructive factors of their control and state that the piracy is ruining them; the consumers see the proposals of protecting property rights as an information blockage and worry about a world in which all the information should be *pay-per-view*.

The digitalization and the Internet threaten to withhold the control rights of the creators and distributors regarding the way and the shape in which the work become available to the public and the rewards that come together with this control.

In the digital economy, protecting the intellectual property rights represents a “digital right”, together with others such as: network access, free speech, cybernetic security etc. The term “digital rights” is mentioned not as a right from the legal point of view, but as to describe the legal allowances of the individuals to do something which involves using a computer, an electronic device or a communication network. The term is linked especially by the protection and realisation of the current rights, such as the right to private life or to free speech (and information), in the context of the new digital technologies, especially the Internet.

Within time, our ability to obtain and share knowledge knows a rapid growth, due to the technical advances of the XXI century. Today it is reasonable enough to assume that an easier access to the worldwide knowledge would lead to a fair world, a world where economic disparities are reduced. The number of persons which can access the various information and knowledge is increased exponentially due to Internet usage, the availability of the individuals to have blogs and online diaries and or other non-traditional information sources. Together with the new technologies which allow easier information copying into various formats, these new channels of knowledge dissemination allow free usage of the knowledge as a public asset and are distribution models characteristic to the XX century, dominated by the great media conglomerates, scientific publication based on profit and business high education institutes.

There is a certain need of re-evaluating the knowledge system inherited from the industrial age and to adapt it at the current needs of the digital economy. The organizational behaviour theory states a “knowledge paradox”, which seems useful in the digital economy approach, based on knowledge (Andjelkovich, 2006). The paradox is present as long as the knowledge creation and exchange represent one of the biggest growth sources in a new economy. Also, knowledge is seldom a well-guarded resource and carefully transacted, thus generating obstacles for innovation and economic growth.

Digital technologies and global information networks have made a real progress in information accumulation and exchange. The old principles of intellectual property protection established in a completely different technological context do not work any longer in an emerging environment, and, therefore, new conceptual arrangements are required for international regulation of intellectual activities on the Internet.

The Committee on Intellectual Property Rights in the Emerging Information Infrastructure (2000) presents the multiple facets of digitized intellectual property and proposes research and policy recommendations as well as principles for policymaking. The study defines terms, identifies key issues, and explores alternatives. It follows the complex threads of law, business, incentives to creators, the American tradition of access to information, the international context, and the nature of human behavior. Technology is explored for its ability to transfer content and its potential to protect intellectual property rights.

The problem of digital intellectual property is treated in some studies of the the Committee for Economic Development (CED). The study CED (2001) focuses on the interaction between public policies and e-commerce and in chapter 4 treats the issue of innovation and intellectual property in the digital economy. Another study (CED, 2004) focuses on the economic impact of copyright protection in the digital age and the potential economic effects of proposals for change. The report explores the history of copyright law, revealing that legal protection of the rights of creators has always been explicitly balanced against protection of ongoing innovation.

In the last eight years Business Software Alliance (BSA) published some studies about piracy software in entire world. The BSA (2011) study reveal that:

- Half of the 116 geographies studied in 2010 had piracy rates of 62 percent or higher, and twothirds saw at least one software program pirated for every one that was installed legally.

- The piracy rate dropped in 51 of the 116 geographies studied in 2010 and went up in only 15. But, crucially, regional average rates rose by 1 point in both Asia-Pacific and Latin America — two economic hotbeds of the developing world.

- The global piracy rate for PC software dropped by a single percentage point in 2010 to 42 percent — 3.6 points higher than the previous five-year average. (BSA, 2011, p. 2)

The digital economy across the European Union is being affected by so-called digital piracy. The European Commission has issued detailed proposals to help stamp out this illegal trade. In EU, a new association – Communia, was launched with the mission to promote the digital public domain. The launch of Communia results from the work of an EU-funded project started in 2007 that brought together about 50 partners from research, library and advocacy institutions. The intention of the group is to focus on research and advocacy work, it also calls for harmonisation of exceptions and limitations to copyright, a pan-European system allowing full access to orphan works (for which the copyright owner cannot be found), facilitation of access to copyrighted works for education and research purposes, and strengthening of publicly funded and cultural organisations by ensuring information is freely available for all. The partners, many of which are also active as Creative Commons partners, decided after the end of the EU public funding that the work was indispensable.

### **3. INNOVATION, ECONOMIC GROWTH AND INTELLECTUAL PROPERTY RIGHTS IN ROMANIA**

Institutional and legislative framework In Romania, ensuring the protection of intellectual property is the duty of two specialized institutions: the State Office for Inventions and Trademarks - in the field of industrial property, and the Romanian Copyright Office – in the field of copyright and related rights.

To highlight the evolution of IPR, innovation and economic growth in Romania a few relevant data are presented below.

A complex research at regional level regarding innovation and intellectual property was conducted in Romania for the Inobarometru report (RO INNO, 2008). This represents a report regarding innovation at the level of the development regions, offered by National Authority for Scientific Research and is considered an access point towards regional innovation, offering benchmark points and objective trends which emphasise regional economies inventiveness.

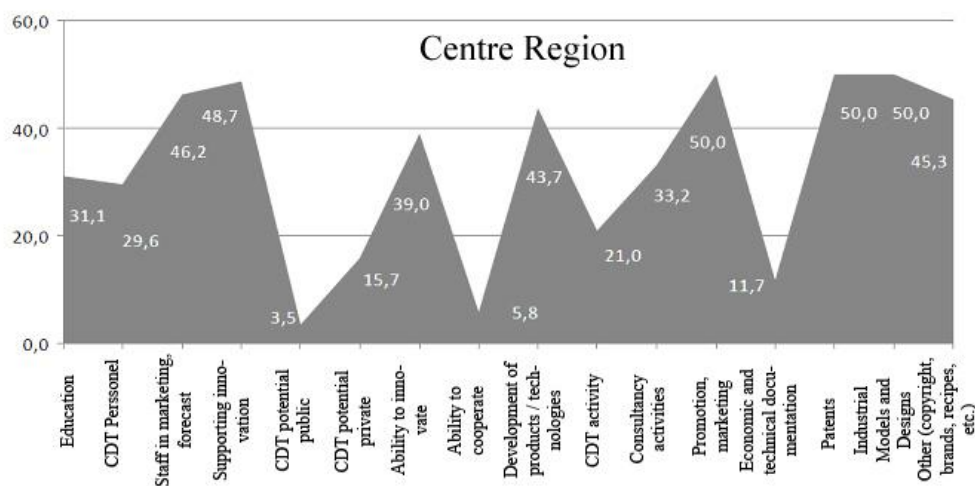
In order to obtain a wide image of innovation at regional level, it was elaborated an evaluation model based on 5 innovational factors, respectively: innovation leading potential, knowledge creation potential, innovation and system integration capacity, innovation activities and intellectual property performance.

According to the mentioned report, from the intellectual property innovational point of view, on the first place is situated Bucharest-Ilfov Region, followed by Center Region and on the last place – South Muntenia Region.

Analysing the general comparative situation and by innovational factors, it can be seen that although the Bucharest-Ilfov region is on the first place from the point of view of all the five factors, the Center region can be found on the sixth position for all the categories, excepting the intellectual property factor where it can be found on the second place.

The following graph illustrates the comparison between Center Region and Bucharest-Ilfov Region, the differences between the first two regions being quite significant.

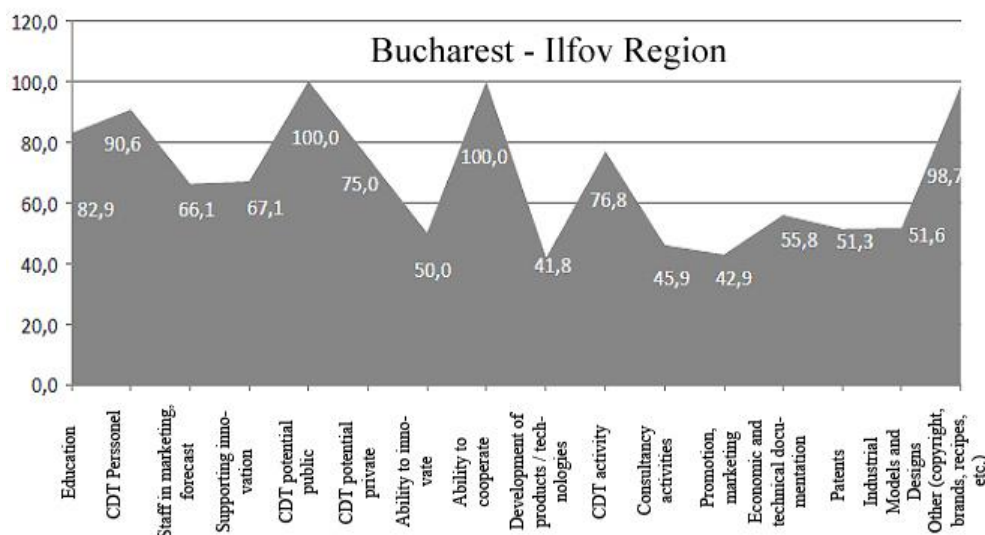
The situation of innovational sub factors, presented in figure 1 (a and b), shows the close values registered by the two regions regarding patents and industrial models and drawings (scores of ~50%), but Bucharest-Ilfov is clearly distinguished regarding the categories copyright, brands, networks and others (98.7 versus 45.3).



**Figure 1a Innovational sub factors situation in the Centre Region**

Source: RO INNO (2008).





**Figure 1b Sub factors situation in the Bucharest-Ilfov Region**

Note: CDT- the potential of creating knowledge

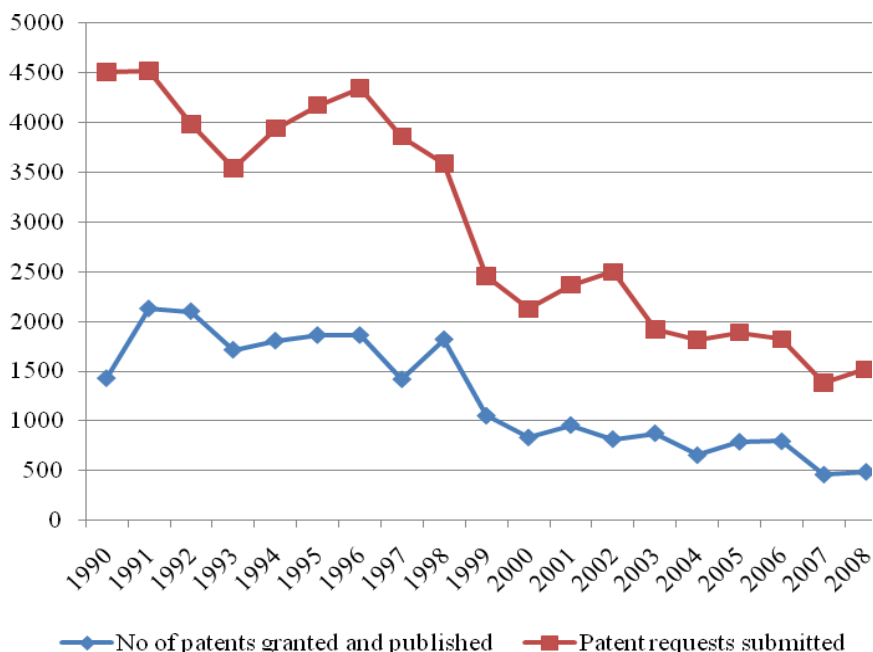
Source: RO INNO (2008)

A complex method used for measuring innovation capacity at national level is represented by the annual ranking realized at EU level based on *European Innovation Scoreboard (EIS)*. Starting 2008 year, the analysis of the innovation performance rank starts from considering multiple indexes, grouped in 7 categories. At their turn, these are grouped into three major innovation dimensions (UNU-MERIT, 2011, p. 7): „Enablers”, „Firm activities” and “Outputs”.

Regarding the *intellectual property*, this category contains some indicators reported to the million of inhabitants, respectively: number of patents submitted according with CTP (Cooperation Treaty regarding patents), number of patents for social issues, number of registered trademarks and number of drawings.

According to the European Innovation Scoreboard, Romania is considered among the countries which are in the stage of catching-up. Thus, in 2009, the Summary Innovation Index (SII) has the value of 0.296, Romania being situated quite far from the EU27 average, of 0.481, which puts our country on one of the last position (UNU-MERIT, 2010). In 2010, Romania was ranked as one of the *modest EU innovator*, with a performance situated under the average. Relative strong points are in Finance and support and in Outputs. Relative weak points are in Open, excellence and attractive research systems, Linkages and entrepreneurship, Intellectual assets and Innovators. High growth is observed for Public R&D expenditure, Community trademarks and Community designs. A strong decline is observed for Non-EU doctorate students. Growth performance in Finance and support and Intellectual assets is above average. In the other dimensions it is below average (UNU-MERIT, 2011).

In order to analyse the situation of IPRs in figure 2 is presented a summary regarding the number of patents submitted and granted in Romania.



**Figure 2. The patent situation in Romania (1990-2008)**

Source: INS (2009)

In the early phase of the global financial crisis, patent applications worldwide grew by 2.6% in 2008, albeit a slower rate than in 2009 (WIPO, 2010). There is considerable variation across countries regarding the impact of the economic downturn on patent application activity. The growth rate of applications worldwide slowed in 2008, largely due to zero growth in applications filed in the US and a drop in applications in Japan (-1.3%), the Republic of Korea (-1.1%) and the United Kingdom (-6.5%) (WIPO, 2010).

Patent applications in middle-income and low-income economies seemed to be less affected by the early phase of the global economic downturn. In Romania the patent applications recorded a double-digit growth compared with the previous years.

Regarding other industrial property rights in Romania, a significant growth for the period 2003-2008 was registered by the trademarks (107894 in the six years).

The diminishing of patents number happened on the background of R&D expenses growth after 2000 year, both in the public sector, as well as in the private one, from internal or external sources.

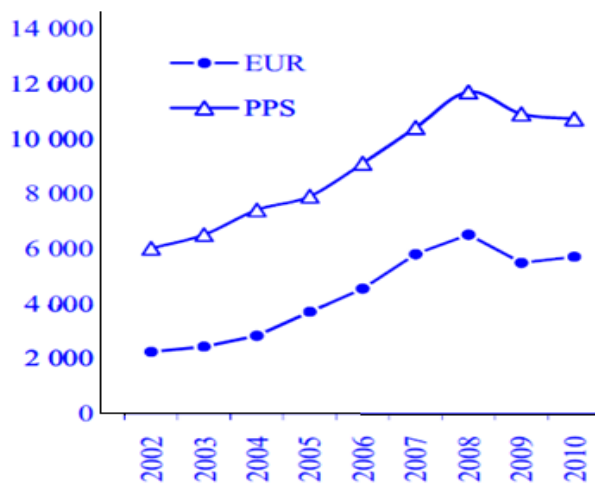
The explanation can be found in the results of the studies which demonstrated that a significant positive relation between protecting intellectual property rights and growth in the countries with a low income is not coming from encouraging the research and internal and innovational development.

Also, there are some opinions (cited in Idris, 2003) which state that the patents (in opposition with other forms of IP, such as brands and geographical indications) are not important for the countries in which the technological development state is relatively

diminished, and some critics say that this could harm such countries due to the power over the markets and prices, that patents grant to their owner.

The differences between economies in respect of the patent granting activity reflect their dimension and development level. In order to cross section compare is interesting to express the patenting activity versus GDP and national R&D expenses.

After 1990, Romania's GDP recorded considerable growth until the debut of economic crisis in 2008 (see figure 3).



**Figure 3. The evolution of GDP in Romania (2002-2010)**

Note: PPS – purchasing power standard

Source: INS, Eurostat

Negative correlation is evident, in the respect that although the GDP grew constantly, its growth is influenced by various other factors.

WIPO Statistics Database (WIPO, 2010) presents data regarding patent requests submitted by residents reported to GDP and, respectively, to the R&D expenses. These indicators can be considered measures of intensity of patent activity. Korea, Japan and China are the best ranked in 2008, for both indicators. United States held in 2008 the second place as number of residents' submission, but, due to its great economy, this occupies only the 5<sup>th</sup> position for adjusted GDP and 12<sup>th</sup> position for R&D indicator. Romania is situated on the 27<sup>th</sup> position from the patent submission vs. GDP per capita and on the 8<sup>th</sup> position for patent submissions vs. R&D expenditure (WIPO, 2010). The good rank registered in the case of the second indicator is generated by the small amount of R&D expenses, compared with the rest of the countries.

The International Property Rights Index (IPRI) is an international comparative study that measures the significance of both physical and intellectual property rights and their protection for economic well-being. In order to incorporate and understand the important aspects related to property rights protection, the Index focuses on three areas: Legal and Political Environment (LP), Physical Property Rights (PPR), and Intellectual Property Rights (IPR). The overall grading scale of the IPRI ranges from 0 to 10, with

10 representing the strongest level of property rights protection and 0 reflecting the non-existence of secure property rights in a country. Similarly, each component and variable is placed on the same 0 to 10 scale.

According to the 2011 Report, Romania's total IPRI score continues to increase. Despite IPR's significant increase in 2010 to 5.8, the IPR score decreased to 5.4 in 2011. *Patent Protection* remained relatively the same while the other two categories which compose IPR (*Protection of Intellectual Property Rights* and *Copyright Piracy*) decreased in score (Jackson, 2011).

BSA (2011) study also shows that software piracy rate in Romania are down from 69% in 2006 to 64% in 2010, following the development of legal framework for IPR protection.

## CONCLUSIONS

The objective of this study was to explore evolution of intellectual property rights protection, economic growth and innovation in Romania, in the context of digital economy. The question of how IPR affect the processes of economic growth and innovation is complex and based on multiple variables. The effectiveness of IPR in this regard depends considerably on particular circumstances in each country. The relation between the power of intellectual protection rights of a country and the growth rate is still unclear, reflecting the variety of channels by which technology can be achieved and their importance at different levels of development. The studies indicate that, although the impact of intellectual property rights protection over the economic growth depends of the development level, this is positive and significantly linked by the economic growth in the case of small and high income countries, but not in the case of those with medium income. Intellectual rights protection encourages innovation in the countries with high income, and the technological exchanges in the countries with small incomes. Economic growth in the countries with medium incomes is not significantly affected by intellectual property rights protection.

In Romania, although the GDP (both in absolute value and per capita) grew constantly during the period 2000-2008, the number of patents issued and published and the patent requests decreased significantly. Regarding the national innovation capacity, the annual ranking realized at EU level based on *European Innovation Scoreboard (EIS)* ranks Romania, in 2010, as one of the modest EU innovators, with a performance under average.

Studying the impact of IPR protection over economic growth and innovation is important in order to be able to change the contextual regulations within the changes induced by digital economy. In order to solve all these issues, it must be developed an adequate combination between governmental regulations, private initiatives and industrial sector, sustaining both consumer's needs and business environment.

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