Theoretical and Practical Approaches of Innovation at Regional Level

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Abstract:

În ultima perioadă, inovarea a reprezentat obiectul central al unui număr foarte mare de studii şi analize, datorită impactului potenţial pe care îl poate avea asupra nivelului de dezvoltare al unei ţări sau regiuni. Acest aspect este relativ uşor de explicat: inovarea constituie o sursă importantă a competitivităţii regionale/naţionale, un factor modern al creşterii şi rezilienţei economice, dar şi obiectivul fundamental al actualei perioade de programare şi al Strategiei Europa 2020.

Potrivit teoriei, inovarea este un proces care are loc, cu precădere, la nivel micro-economic. Totuşi, abordarea ei la nivel regional câştigă tot mai mult teren în cadrul abordărilor economice, pornindu-se de la premisa că, performanţele inovative ale unei firme sunt dependente, direct şi într-o proporţie foarte mare, de potenţialul endogen local, dar şi de o combinaţie de factori de influenţă, determinaţi de specificul şi condiţiile zonei.

Studiul își propune să analizeze, din punct de vedere teoretic și practic, rolul procesului de inovare în cadrul dezvoltării și creșterii economice la nivel regional, național și comunitar.

Abstract:

During the last period, innovation represented the core topic of a wide number of studies and analyses due to the potential impact it could have on the development level of a country or a region. This aspect is relatively easy to explain: innovation represents an important source of regional/national competitiveness, a modern factor of growth and economic resilience, but also the fundamental objective of the current programming period and of the Europe 2020 Strategy.

According to theory, innovation is a process that takes place predominantly at micro-economic level. Still, its approach at regional level gains increasingly more room within economic approaches starting from the premise that innovative performances of a company depend directly and to a large share on the endogenous local potential, but also on a combination of factors of influence, determined by the specifics and conditions of the area.

The study intends to analyse from the theoretical and practical viewpoint the role of the innovation process within economic development and growth at regional and national level.

Cuvinte-cheie: inovare, cercetare, dezvoltare regională, Strategia 2020, regiunea inovativă

Key words: innovation, research, regional development, Strategy 2020, innovative region

1. Introduction

During the last period, we witness an increasing trend of the interest given to innovation at regional level. Regarded – in a simplified manner – as an individual or entrepreneurial competence, innovation represents *the way by which the intended future is created*, as it is synonymous with an assumed risk of creating products: revolutionary technologies, and determining the emergence of new markets (Kao J., *Innovation Nation*, 2007).

At the same time, the approach of the current economic and social issues at regional level turns into a core element of the cohesion and regional development strategies and policies.

In time, the evolution of the innovation concept was influenced by the level/capacity of some companies to invest, as its approach has a multidisciplinary character and various sources of financing (private and public). There are several categories of investments that may be regarded as innovative: investments in knowledge, in research, innovative technologies, high- and medium-tech, the scientific production, patents and IT specialisation, innovative clusters and regions, smart specialisation, etc.

Technological change was regarded as a key-element of economic growth by various schools of economic thinking (neo-Keynesianism – the Harrod-Domar model, post-Keynesianism, and neoclassicism – Solow's Model).
Recently, Zaman Gh. et all[1] (2015) consider that there is considerable interest given to technological changes presented under the form of endogenous economic phenomena, the new theoretical approaches leading to reformulating the basic hypotheses of the economic growth models.
At community level, innovation plays a particularly important role within the process of implementing the *Europe 2020 Strategy* and of its stated goals: smart, sustainable and inclusive growth. Thus, the future of the European Union is deeply and indissolubly linked to the power of the regions and of the member-states to innovate and to the possibility of effectively implementing initiatives that are suggestively called *innovation-friendly regions*.
This study intends to analyse innovation, both from a theoretical viewpoint, and from a practical one, at regional level presenting the main shapes that its display takes during the current programming period, the allotted financial resources, but also the way in which Romania attempts to meet the requirements deriving from the European Union Strategy (EU-28), regarding innovation and knowledge at regional level.

2. Theoretical and Conceptual Approaches (synthetic)

In the neoclassic theory, innovation is regarded as a multifaceted concept that can be analysed and interpreted multi- and cross-disciplinary, being influenced to a large extent by localisation (the territorial component) and the endogenous potential.
In the *New Oxford Dictionary of English* (1998, pp. 942), innovation is regarded as a process of changing products or processes by introducing the *novelty*, a radical or partial change achieved by large companies, entrepreneurs or private individuals. Also, innovation can be relevant for the public sector (hospitals, social centres, town halls, etc.) but also for the private one, it can be incremental (as compared with doing nothing), radical (do everything), or at various approach levels (organisations, management groups and departments, regions, localities, individuals, etc.).
Another way of approaching the innovation concept is presented by OECD, as follows: innovation may represent the implementation of a new or significantly improved product, of new processes, of new marketing methods, or of a new method of organising trading practices, in organising the workplace or external relations (OECD, 2013).
From the viewpoint of achieved results (effects), innovation is assumed as the process of changing ideas into reality, fact that leads to increases in the (qualitative or quantitative) value of the product.
In the innovation management process, creative destruction is just as important as innovation: *each good idea replaces an obsolete one*, the main target of each company being to develop and promote successfully, the best and newest ideas.
Recently, innovation is regarded in a dynamic and evolutionary way: the companies must continuously innovate and replace the old products/processes/technologies with new ones; it is a continuous knowledge process of the learning effects (to effectively learn how to innovate with the purpose of improving the existing process/product).
As a rule, innovation is correlated directly with novelty and originality (even if the novelty is, several times, subjective: if for a company a minimal change can be considered as significant, for a large-sized company this fact is almost unnoticeable).
In the following, we present briefly, a series of definitions for the innovation concept that might contribute to clarifying the way in which it can be analysed and interpreted:

- innovation – a larger or smaller scale change, radical or incremental, for certain products, processes and services which triggers an increase in more added value and knowledge;

[1] Zaman Gh., Georgescu G., (coordonatori), Antonescu D., Goschin D., Popa F., (2015), Dezvoltarea economică endogenă la nivel regional. Cazul României, Editura Expert, ISBN 978-973-618-408-6, Bucureşti.

- a practical/technical instrument by which (bigger or smaller) changes are brought to some products, processes and services, by introducing the novelty within the organisation and for its customers;
- a process built based on certain changes to something already set, by introducing something new, adding value and contributing to the development of the company's knowledge;
- new thinking creating value (Lyons R., 1994);
- new products and processes, organic changes creating welfare (OECD, 2013);
- an instrument specific to entrepreneurs, an act by which is ensured that the endowment of the resources with new capacities triggers welfare (Drucker P., 1957);
- a deliberate and conscientious process (of new products, processes or services) the result of which (it might be an experiment or a study) has never before been created or used and which may be the outcome of individual ideas or of scientific research;
- research, discovery, experimenting, developing, imitation, adoption of new products, processes, and new organisational forms which trigger variety (diversity) and competition (Dosi G., 1982).

There are a series of elements that are assimilated to the innovative process, the relevant aspects of causality between them and innovation being presented hereunder.

a. Innovation and invention

According to some topical studies and researches, between innovation and invention there is a definite relationship which is under the impact of external forces.

The New Oxford Dictionary of English (1998, pg. 960) *defines invention as something new, which never existed before*. Innovation does not necessarily satisfy a need of the customer, nor makes reference to exploiting of a new concept on the market. Yet, a singular invention does not represent innovation, the latter presupposing both the activity of creating something new, and the exploitation of the benefit and the obtaining of added value. The invention is measured many times with the aid of the patents (ideas patenting).

The success or failure of an invention depends not only on the nature of the proposed ideas, but also on the way in which these are applied. As a rule, the invention is not desired by the customer, because the customer does not even know about its existence. A lot of inventions do not lead directly to innovation, up to the time when they are brought on and put to good use on the market. If an invention can be exploited and changed into value for the customer, than it turns into an innovation. On the other hand, there are several innovations that do not presuppose invention in relationship to originality, but also others that assume the use of techniques/technologies. Even if the invention does not determine directly the innovation, it could be argued that it represents a legitimate form of innovation.

b. Innovation and creativity

Creativity is regarded as a key-element of innovation, a mental process that leads to generating new ideas and adequate concepts that are useful and dynamic (Rosenfeld, Servo, 1984).

The creative process assumes four distinct stages: preparation, incubation, illumination and verification (Wallas, 1926). The subsequent reviews of this process have added a final stage, respectively the elaboration (Kao, 1989). Creativity presupposes a certain level of originality and novelty that is essential for innovation. Even though creativity is a fundamental part of innovation, it cannot replace the latter.

Innovation encourages the exploitation of the creativity potential (ideas) allowing for exploiting its value by a development process

c. **Innovation and design**

In terms of innovation, design is defined as a "conscientious process of making decisions by which the information (ideas) are changed into tangible outcomes (products) or intangible ones (services, processes) (von Stamm, 2003, p. 11).

The design activity is based very much on creativity, on problem solving (for instance, aesthetics), on the shape and functionality of the final outcome. Thus, during the exploitation phase of the

innovation process, the organisations engage in design activities that will ensure their optimisation, depending on the requirements of the market.
Even though design is an integral part of the exploitation stage, within an innovation process, it is only a singular aspect. Exploitation can include also other elements, such as the market development and preparation process, marketing, dissemination, etc.

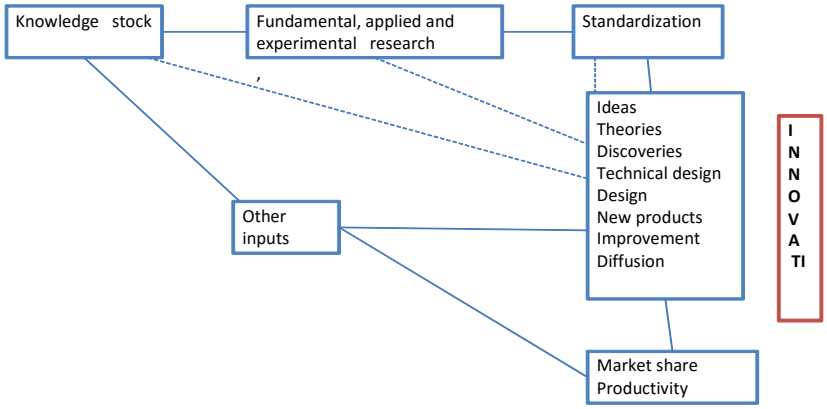
d. Innovation and exploitation

Innovation represents an invention that can be marketed (Martin, 1994). According to this approach, the invention is something new which never existed before. The new creation derives from the creative capacity of the organisation, providing for new opportunities of use and being expressed with the help of the following formula: **Innovation = Invention + Exploitation** (Roberts, 1988).
Consequently, innovation represents a systematic process of realising a creative environment based on discovery, invention and marketing. This approach presents a marked technological character, because several inventions are based on technologies. The replacement of the invention concept with the one of creativity makes it more applicable within organisations that are not actively engaged in the product innovation process. The formula which may best present this relational model is the following: **Innovation = Creativity + Exploitation.**

e. Innovation and change

Innovation cannot be equated with change. In order for the change to qualify as innovation, there must be a certain degree of intent (desirability) and intention (West & Farr, 1990). The change cannot have either a positive or negative impact on the organisation, because innovation by definition must be positive and show value for the customer. As result, it can be concluded that even though innovation may be regarded as a change, not any change can be regarded as innovation.
All aspects presented above represent important determinants of innovation. In the following figure, we present in a synthetic manner the innovation process and the relationship between this process and certain elements (labour force, capital, competitiveness and labour productivity increase, etc.).

Figure 1 - Innovation and its factors of influence



Source: Compilation on László Halpern, Literature survey on the links between innovation, competition, competitiveness, entry & exit, firm survival and growth

Innovation is essential in the evolution and development process of the organisations, as it can be measured based on the increase in the turnover and profits, but also from the perspective of knowledge, experience, efficiency, product, processes and services quality increase, etc. at the same time, the innovation process implies, naturally, also those failed, risky and unsuccessful ideas.

These aspects were expressed, already at the beginnings of the neoclassic theory by Schumpeter J., who described innovation as a process of "*destructive creation*", which is essential for economic growth. Moreover, Schumpeter defined innovation as a "new combination" of resources, knowledge, new or existing equipment (Schumpeter 1934, pp. 65).
Companies can learn by failure, and, when they can identify good, successful ideas, they shall be more adaptable than those who cannot do this. In managing the innovation process, destruction of the old is, very often, just as important as fostering the new. The destruction of older (obsolete) ideas determines the use of limited resources for obtaining new ideas.
Innovation determines economic growth, and is regarded as a final and concerted effort of putting to good use the economic and social, local and regional potential (Drucker, 1988). The effort leading to innovation can be obtained by means of several actions: increase in the quality of products or of the services, diminishment of costs, or avoidance of some high costs, increase in the turnover, etc. which, in their turn are determined by innovation.
In the specialised literature, several of the theories have proposed to analyse and explain the nature and factors of the economic growth process. If, in the beginning, in the framework of the main models of economic growth were identified three main, classic factors, of growth (labour, land and capital), thereafter, technological innovation began to make its presence felt and gain consequence. The fact that innovation will have an important role to play in the growth process, does not diminish the role of the other classic factors but, as it is also about continuing to maintain an important role for the labour force at high levels (quality of the human factor) and for the technologies.
In 1936, J. M. Keynes publishes his paper *The General Theory of Employment, Interest and Money* in his attempt to identify the factors triggering the crisis of the period 1929-1933 and the recovery possibilities after the Great Depression[2]. Thus, by supplying some theoretical substantiation with respect to public expenditures deficit and demand management, he suggests new policy initiatives that could represent a necessary and useful instrument in counteracting the effects of a crisis of such amplitude.
Few decades later, after the emergence of new crises, but also due to the finding that existing theories cannot provide for answers and solutions, the need to identify some new directions regarding the variables imposed by the change in mentalities and policy directions resulted (Nelson, Winter, 1977). Among these is counted also the explanation regarding the investment opportunity which still, singularly, is not enough to explain the emergence of innovation in the framework of the debates about economic growth and competitiveness (it is especially valid for the period 1980-1990).
Thus, by the beginning of the eighties, in the framework of some debates about the consequences of implementing new technologies on economic growth, Christopher Freeman emphasised the importance of some theoretical contributions for innovation brought by Adam Smith, Karl Marx and Joseph Schumpeter. Thereafter, Richard Nelson presented convincingly the limits of the models from the years 1950 and 1960 in relationship to the paradox of increasing productivity and to the challenges regarding competitiveness as determined by their static hypotheses (Nelson, 1981; Lynn K. Mytelka, Keith Smith, 2001).
According to the classic theory, innovation is a linear phenomenon, where each aspect is considered as linear and disconnected from the other components of the innovative process. Two traditional ways can be reminded in this context for approaching innovation: (1) "technology-push" and (2) "demand-pull", the latter being regarded as an exogenous variable. From the perspective of these approach angles, innovation is regarded as a reply to the demand for new or innovative products and processes (Andreanne Léger, Sushmita Swaminathan, 2007) (Figure 1).

[2] The world economic crisis of 1929-1933 was the most severe period of economic depression from the industrialised western society, triggering fundamental changes in the structure of economic institutions, in macroeconomic policies, and in the economic theory. The outbreak in the USA of the Great Depression determined decreases of productivity, unemployment increase and deflation at world level.

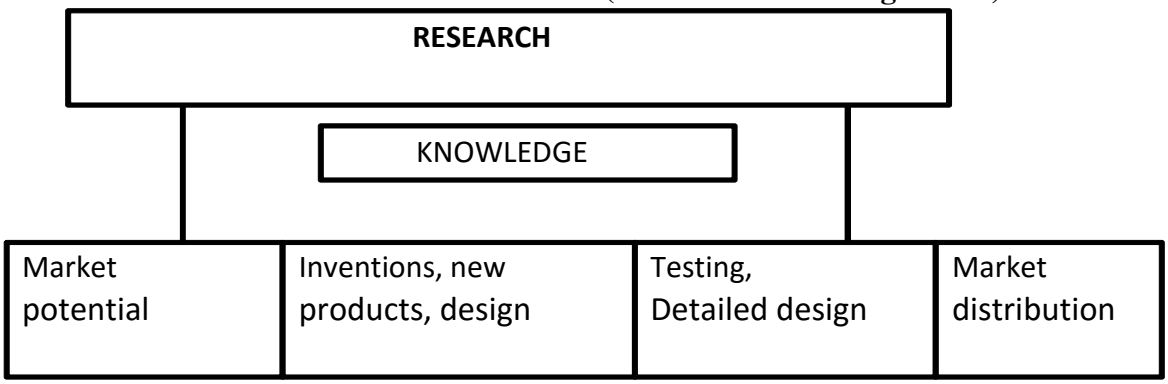
Figure 1: Linear model of innovation

Fundamental research Applied research Technological development Process/product development Production Marketing

Source: Compilation on Industry Canada, 1996-97, Performance Report

The limitative character of the traditional models and theories determined important changes regarding innovation (Mensch, 1979, Myer, Marquis, 1969).
At the beginning of the 80s, in Nelson's and Wilson's paper entitled *In search of useful theory of innovation* are presented and analysed innovative processes, their dynamics and impact on economic growth (Nelson, Winter, 1982). From the viewpoint of the theoretical evolution, according to Nelson and Winter, a series of models were developed for the innovation process, whose variables can take the form of: research, knowledge, inventions etc. (Kline and Rosenberg, 1986; OECD, 1992), all under the wide umbrella of *uncertainty* and *unforeseeable* (Rosenberg, 1976, 1990).
Analysed at institutional level, the interaction between knowledge and learning leads to the emergence of the so-called "*innovation system*" (Lundvall, 1992, 1995; Freeman, 1988; Freeman, Perez, 1998; Nelson, 1993; Pavitt, Soete, 1982). In this context, one model that should be reminded is the one promoted by Klein (the innovation model based on chain relations or links), is constituted based on the technical processes that take place in the framework of the innovation process under the impact of the external market forces, as well as based on complex interactions between the various stages of the processes (Figure 2).

Figure 2: The innovation model with chain links (the Kline-Rosenberg Model)

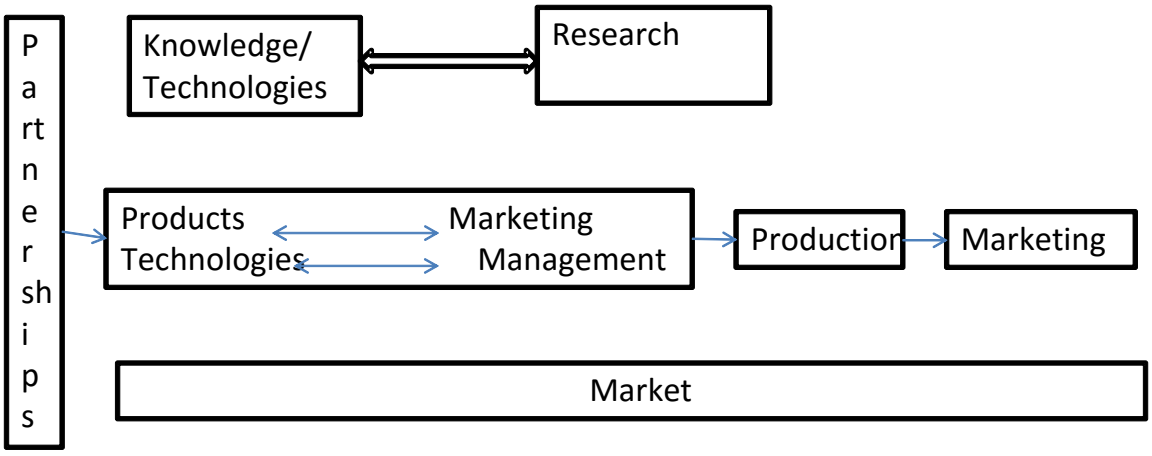


Source: Kline S.J. and N. Rosenberg (1986), "An Overview of Innovation", in R. Landau and N. Rosenberg (eds). The Positive Sum Strategy. Harnessing Technology for Economic Growth, National Academic Press, Washington, DC, p. 289.

The paradigm of an open system of innovation, launched by Henry Chesbrough (2003) is built based on the tendency of the companies to explore the internal and external sources of innovation, integrated with the new skills and opportunities (Viskari, Salmi, și Torkkeli, 2007).
Within the traditional theory, the innovation process of a company is considered as closed, the Research-Development-Innovation (RDI) departments being responsible for the development process and the design of new products. Meanwhile, under the influence of some external factors (such as, for instance, the emergence of opportunities, globalisation, competitiveness increase, etc.) the companies began to regard this process as an open one (Wu, Tsai, Chang, 2011).
Recently, Chesbrough (2012) mentions an innovation system as an innovative innovation model. This open system, even if it presents similar conditions to other models is applied differently, depending on the approached research topic (Franke & Hipple, 2003). In order to valorise their own innovation potential, companies must take over a series of opportunities received from outside the

organisation, resorting to various methods of combining them. Therefore, important aspects of the open innovation model are determined by the capturing, maintenance and valorisation of knowledge and ideas received from external sources of innovation (Cooke P., 2005) (Figure 3).

Figure 3: Open model of innovation



Source: Cooke, P. (2005). Regional asymmetric knowledge capabilities and open innovation. Research Policy, 34

Based on the analysis of the theories regarding innovation, it results that these recorded two main trajectories: one linear and one dynamic; while the linear approach presents a single direction, on which innovation can be obtained (fundamental research, applied research, technological development, etc.), the dynamic approach expands the possible knowledge trajectories, allowing for feedback between fundamental research and development-innovation.
After 1990, the dynamic approach allowed for *innovation to become a key-objective of policies and strategies for local, regional and national development* by which was attempted to create some optimum conditions required for sustaining the innovation and technological diffusion mechanism (OECD, 1992).
Under these conditions, the innovation process became, to a large extent, dependent on the local specifics (localisation) contributing at the same time to significant economic growth in the regions which succeeded in obtaining competitive advantages from valorising the innovative potential.

3. Key-factors of innovation

Innovation plays a key-role in the process of economic growth, its evaluation and quantification representing an interesting and current topic. Still, the multidimensional nature of innovation makes difficult the precise analysis of its value, both at national and at regional level (especially, due to the lack of statistical data and information).
With the stated purpose of providing an as real as possible image of the innovation degree, various evaluation methodologies were launched based on a series of indicators/indices, that would catch as many determinant elements and factors as possible and to provide accurately information regarding this process. Most of these methodologies are elaborated by international bodies (OECD, WTO, the European Commission, etc.) in their attempt to provide various rankings on countries and large geographical areas.
Based on the existing methodologies, there were identified several factors influencing the innovation process that are synthetically presented in the following:

1. *Quality of the human factor* – without education, specialised training and competences, involvement, etc., innovation cannot take place[3]; according to WIPO (World Intellectual

[3] OECD

Property Organization), the quality of the human factor influences decisively the innovation process.

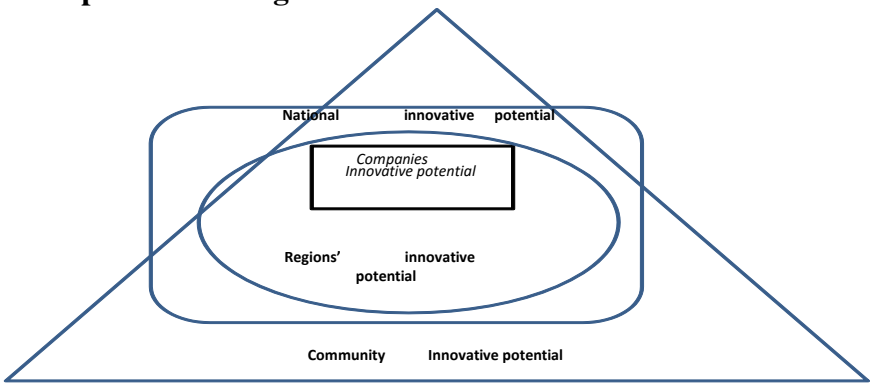
2. *Size of public funds allotted to innovation* – the role of the public sector is to support and discover inventions, contributing to a large extent to supporting innovation (Mazzucato, 2013).
3. *The level of social culture* – openness towards new technologies can be influenced by the degree of culture of the society and, in particular, by the social culture. Innovative societies have a high confidence degree, allow for mobility or migration and are open to collaboration.
4. *Copyright regulation* – a corresponding regulation of copyright that may ensure balance between copyright protection and open support to innovation represents an important element of productive innovation (OECD, 2010).
5. *Advanced technological and information ecosystems* – these represent an essential aspect, for supporting and developing innovative networks.
6. *Support for new companies* – irrespective of their size (micro-enterprises, start-ups, spinoffs) companies play an important role in the process of marketing new ideas, that can change, thus, into business ideas. The instruments available to decision factors are those like sustained promotion of entrepreneurial initiatives and ensuring a favourable climate to the business environment/entrepreneurial initiative, that would include measures and actions aimed at research-development-innovation (RDI) (OECD, 2010).
7. The Sanger factor – twice a Nobel laureate (1958, 1980), Frederick Sanger considers that *success attracts even greater success being easier to obtain success after obtaining the first one. (Galene, 2013).*

Still, not all inputs, nor all outcomes obtained within an economic process have impact on innovation, as unitary techniques and methods are necessary for evaluating them, as well as the compliance with a certain share of influences.

4. Innovation at regional level

According to the theory, the development differences between regions can be attributed to a larger extent to the endogenous human potential and to its capacity of retaining, attracting and developing innovative processes (Aghion, Howitt). Moreover, there are theories that present the stock of human capital as the leading driver of regional economic growth which affects the innovative ability or the catch-up process or the one of closing the gaps as compared with innovative and efficient economies (Nelson, Phelps, Schumpeterian) (Figure 4).

Figure 4: Innovative potential of region



Source: own compilation

In Figure 4 it can be observed that there is a *direct relationship between the innovation potential at regional level and the one existing at national or regional level*. Output, added value and incomes from the innovative regions are significantly better than the ones from less innovative regions (Weibert, 1999). Based on the findings regarding the innovation activities at regional level, it is found that there are high disparities between the two aforementioned categories of regions.
The concept of innovative regional system presupposes a specific economic and social environment, which has an important impact on the innovative character of the companies localised in the region (for instance, the local endowment with production factors, labour force, research institutes, universities, etc., as well as the interactions between them all). Even if there is no generally accepted definition of the regional innovative system, there are a series of commonly agreed on elements, included in the so-called innovative milieu which assumes innovative production systems, institutions, local culture, etc. The structure of this system can be characterised and analysed based on measurable (quantitative) elements, but also taking into account some qualitative aspects (which are more difficult to quantify).
Even if the impact of localisation of the milieu is acknowledged, there is no generally agreed on definition or a list of common answer about the relevant elements regarding the regional innovation systems. Still, there are a series of common answers to the question: *who are the relevant actors and the important factors influencing a regional innovative system?* The answers identified in the framework of theoretical approaches in the field are: the presence of large-sized companies ((Brenner and Greif, 2006; Stenke, 2000), the presence of some scientific research and technological development institutions (Soete, 2002), the specialised and high-skilled human capital (Soete; Stephan, 2003; Fröderer, 1998), financial resources (OCDE, 2000), networks, cooperation and distribution of knowledge (Pittaway, 2003) etc.
All these approaches have analysed a certain factor and the impact it has on the innovation process.
Also, some other factors were identified which can have significant impact, from among which we mention: the presence of demographic agglomeration (population density), the influence of foreign direct investments, infrastructure, etc.
An approach requiring special attention is the one about the impact exercised by the presence of *technological infrastructure* on innovation (Feldman; Florida, 1994). Feldman defines geographic agglomeration from the perspective of the existence of infrastructure that influences the creation and diffusion of innovation, this being definitely an innovation and regional development factor and, in particular, a form of technologies' and industrial sectors' specialisation by supplying knowledge sources and networks, as well as technical resources/expertise.
For analysing the influence of this factor – technological infrastructure – it is necessary to define it by the presence of the following elements: an agglomeration phenomenon in certain industrial sectors, of universities and research-development institutes, and institutes of industrial research (Feldman; Florida, 1994).
This infrastructure is closely correlated with a series of elements, from among which we mention: population of the region, geographical concentration and specific local characteristics, industrial sales, innovation demand, funds for research-development, management and consultancy services, brands, etc.

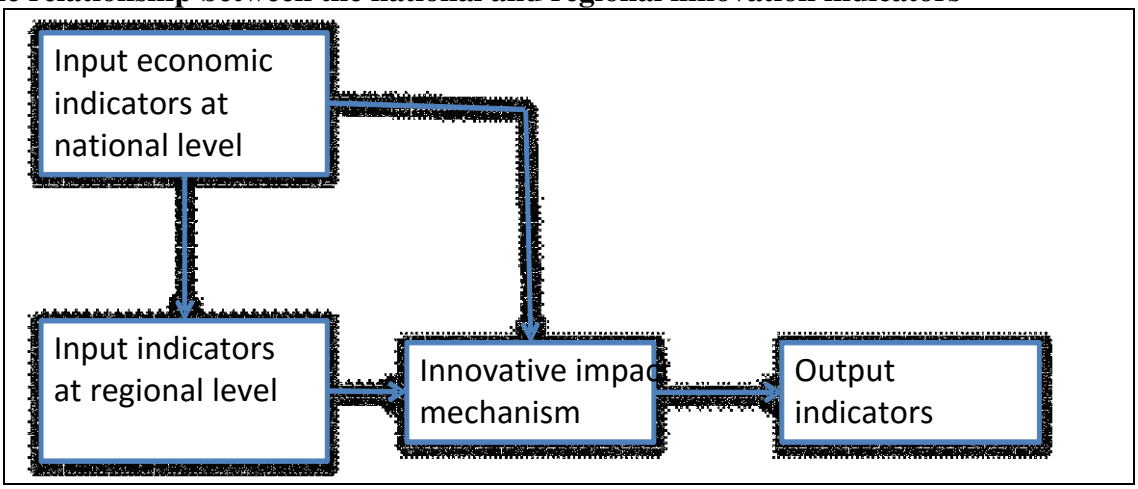
5. Techniques and methods of innovation evaluation at regional level

The innovative potential at regional level can be evaluated based on:

1. the innovative performances of the region with impact on regional economic growth;
2. individual factors determining the innovative potential.

The main indicators reflecting the innovative potential, at regional level, are similar to those existing at national level, each of them presenting to various shares, the innovation degree of the region (Figure 5).

Figure 5: The relationship between the national and regional innovation indicators



Source: own compilation

The input indicators of the innovative potential are those reflecting the innovative climate of the region as they present, most of times, also the influence of the conditions existing at national level (institutional climate, labour force quality, financing, etc.).

The macroeconomic institutional climate exercises an important influence on the innovation and knowledge transfer, both on its supply and demand side.

Regarding the innovative performances indicators at regional level, these can be grouped depending on the influence factors, as follows: institutional factors of innovation, labour force conditions, innovative regional climate, and regional funds. The indicators characterising the institutional factor can take the form: number of RDI centres, the number of innovative products/processes, innovative technologies. The conditions of the labour force can be expressed by means of the indicators regarding the education and training level, but also the indicators regarding working conditions.

An aspect with important influence on the regional innovation process is the one determined by the economic climate. In its turn, this climate is determined fundamentally by the demand of RDI, by the RDI expenditures and by the entrepreneurial climate. The indicators of the economic climate are presented in the table 1.

Table 1: Indicators and indices of the regional economic climate

No.	*Indicators*	*Indices*
1.	RDI demand	The demand for developing new products as weight in the incomes of the sector (%)
		The demand for the development of new technologies as weight in the incomes of the sector (%)
		The demand for fundamental research as weight in the incomes of the sector (%)
2.	RDI expenditures	RDI expenditures as weight in the regional GDP (%)
		RDI expenditures as weight in the national GDP (%)
		RDI expenditures/costs of the business sector as weight in total expenditures (%)
		RDI expenditures of the public sector as weight in total expenditures (%)
3.	Entrepreneurial milieu	Companies' density at regional level (companies/square km.)
		The ratio between migration of employees from the RDI sector in total regional migration (%)
		Total RDI employees in total employed population (%)
		Unemployment as ratio in employed population at regional level (%)

Source: own compilation

The indicators and indices presented above are evaluated with the help of econometric techniques of classic/usual regional analysis which have as basis the applied statistics and the mathematical analysis (Antonescu D., 2013; Goschin Z., 2012, Constantin D.L., 2003).
A relatively simple technique for evaluating the innovation degree of a region, frequently used in the specialised literature is the matrix of ranks which classifies from the quantitative viewpoint certain RDI indicators at regional level.
Also, an important place in the evaluation analyses and techniques of the innovative potential is the one of forecast. In this instance, it is necessary to make the distinction between the forecast methods (mathematical, statistical and comparative) and the ones of foresight (scenarios). Foresight models emerged relatively recently (after 1990) and can be used for reproducing the development trends and the strategic vision about a certain activity sector, region or field.

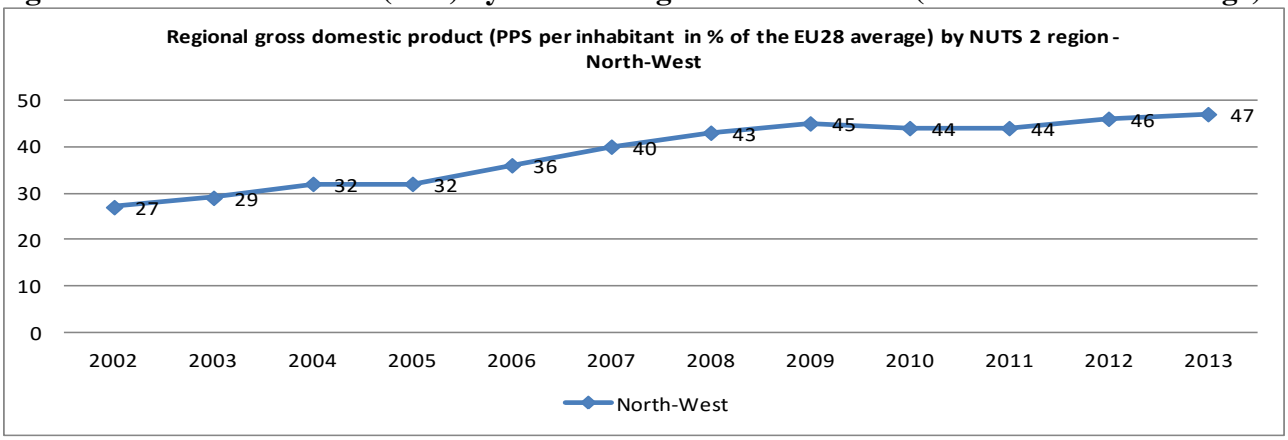
6. The analysis of the innovation on development regions in Romania

The region is a relatively recent level of approaching the issue of the innovation process in Romania.
The geographic proximity facilitates the acquisition, accumulation, and use of knowledge and innovation, given the condition of cooperation and collaboration between regions is met. Therefore, the building up of some regional performances depends not only on the existence of some research institutes and innovative companies in the area, but also on the interactions between these.
In Romania, the issues related to innovation at the level of the eight development regions are far from being solved, but there are important premises and opportunities that can determine and support the launching of an innovative process, at regional level during the current programming period.

a. North West region

Due to its localisation in the proximity of the former border of the EU-25, the North-West region shows a high degree of attractiveness, a dynamic labour market and an attractive business environment.
The GDP per capita corresponding to the region represents about 85% from the national average and 47% from the EU-28 average (Eurostat, year 2013) (Figure 6).

Figure 6: Evolution of GDP (PPS) by NUTS 2 region – North West (% of the EU-28 average)



Source: Eurostat

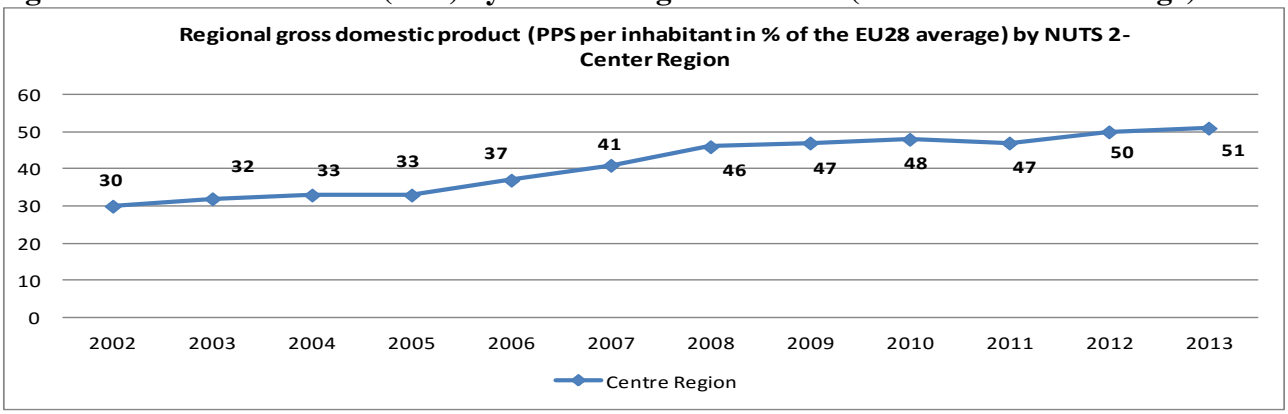
The economy of region is supported mainly by agriculture, by the manufacturing industry dominated by the traditional sectors (foods, beverages, textiles, footwear, machinery and electric equipment, wood processing). In the last period, is observed the emergence of some development trends of new sectors of medium high-tech (rubber, plastic, construction materials, non-metallic

products). The employed population structure is as follows (2012): 29% in agriculture, 25.1% in industry, 20.3% in services and trade, 1.3% in IT. The creative sector employs about 2.19% from employed population, while the financial sector employees 1.47% of the labour force.
The economic resilience is visible in the large urban centres of the region (Zaman, Georgescu, 2015), while small towns still have some difficulties in recovering after the globalised financial crisis.
The region has a moderate degree of FDI attraction (Antonescu, 2015), as it is the sixth region at national level, with a weight of 4.8% from total flow of foreign direct investments (year 2013).
In the region operates the Technical University (Cluj), within which is active the Centre for Robotics and Testing Simulation, the Romanian-Korean Centre for Advanced Training Ko-Ro ATTC, the Rapid National Centre of Prototypes, the Regional Centre for Industrial Metrology, the Centre for Mechanic Engineering Systems.
The main sectors of the region which present competitive advantages are: the IT sector, transportation, agriculture and furniture, and the financing sources of the innovative process are: BISNet Transylvania (http://www.bisnet-transylvania.ro/), Regio Net (http://www.pta-pdm-smartplus.gr/partners.html), Regional Operational Programme - Axis 4 (Support for the entrepreneurial milieu), SMART+ (http://www.smartplusinnovations.eu/?lang=6).

b. The Centre region

The Centre region has a balanced economic structure, dominated by industry (machinery, mechanics, metal processing, pharmaceuticals, construction materials, wood and processing, extractive industry, textiles and foods), localised mainly in the most developed counties (Brasov and Sibiu, are of tradition in this respect). At the same time agriculture (potato cultures, cereals, livestock breeding) are in full modernisation process, and the services are on increase (tourism, internet, etc.).
The regional GDP per capita represents 96% from the national average and 51% from the EU-28 average (2013, Eurostat) (Figure 7).

Figure 7: Evolution of GDP (PPS) by NUTS 2 region – Centre (% of the EU-28 average)



Source: Eurostat

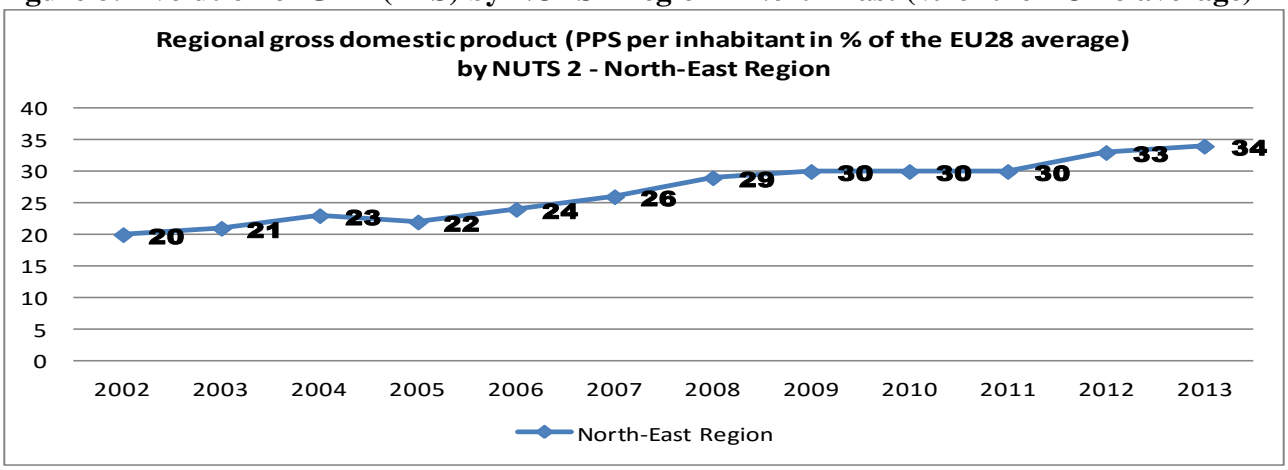
The counties Sibiu and Brasov have the highest contributions to regional GDP formation; the region takes the second position at national level with respect to attracting foreign direct investments (after the region Bucharest-Ilfov).
The structure on sectors of activity (2008-2013) is the following: industry represents 32% from total regional economy, followed by services (14.5%), agriculture (14.5%) and constructions (8.4%). The industrial specialisation results from the food industry, textiles, wood processing, and construction materials. In the region are reported wide disparities between the counties Brasov and Sibiu on one hand, and Covasna, Harghita and Alba on the other.
The Centre region has a relatively low share from the resources allotted to research-development and innovation at national level, of 4.5% from total RDI expenditures (period 2007-2012), 8.9%

from total RDI units (120 research institutes, out of which 85 private, concentrated in Brasov and Sibiu), and 6.9% from total researchers.
The regional innovative potential is relatively low (2008-2010). Innovative processes and products represent 11.7% from the national average, and are represented largely by SMEs active in innovative industries. In the year 2012, in the region were 14 industrial parks, out of which 12 were operational, and four business incubators.
The region is characterised by a low innovative level. The population with tertiary education combined with relatively low level of R&D expenditures could explain the low innovation level.
In the year 2010, a few clusters were formed in the region: renewable energy, RENERG, electro-technical, ETREC, and three wood processing clusters: PRO WOOD, REGIOFA and Transylvania Furniture Cluster.
For the current programming period, the region plans to promote the development of technologies in the wood processing industry, and in the bio-energy sector, as well as the knowledge transfer by realising a technological platform in the field of renewable energy and biomass.

c. The North-East region

The development level of the region is very low, regional GDP per capita represents 61% from the national average and 34% from the EU-28 average (2013) (Figure 8).

Figure 8: Evolution of GDP (PPS) by NUTS 2 region – North East (% of the EU-28 average)



Source: Eurostat

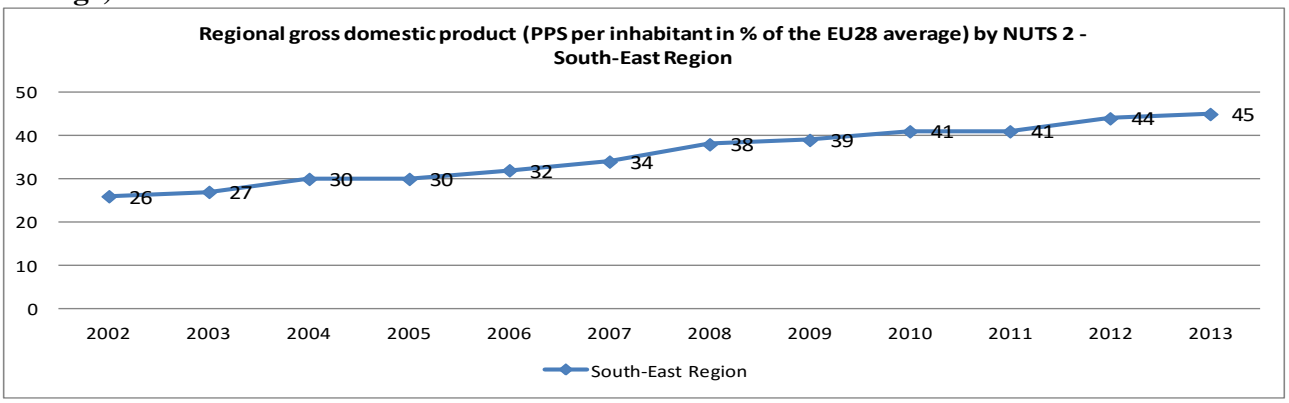
The region is one of the poorest ones, it shows top performances in higher education (two out of the first five top universities of the country) (2011).
The rural area have a low economic diversification and low economic efficiency due to the obsolete technologies, fragmentation of land ownership and the insufficient capacity of the industry to process local raw materials.
The main industrial sectors are concentrated in the large towns of the region (Iasi, Bacau and Suceava) covering: wood processing, furniture, textiles, footwear, machine-tools, and equipment, pharmaceutical industry and food industry. Regional tourism has an important development potential which is yet insufficiently exploited.
In the region, the SME sector has low development but on increasing trends. The most SMEs are in the sector of commercial services, even if a more intense activity is recorded for those active in top scientific and technology fields.
The region has less attractiveness for FDI (3% out of the FDIs at national level, NIS 2013).
Regarding employed population, the largest part is active in agriculture, 48.1% (2008-2013), followed by the services sector and trade (retail and wholesale, transports) 14% and industry 13%.

A percentage of only 0.9% out of the labour force is employed in the information and communication services (under the national average of 1.4%). An important trend of migration is recorded for this region.
The North-East region is regarded as a modest innovator, as the majority of the indicators regarding regional innovation are below 50% from the EU average (Eurostat). The regional performance is determined by activities with a moderate innovation level in the private sector.
The region's potential is insufficiently valorised, and the RDI expenditures of the public and private sector are low.
In the region operate clusters in the field of textiles, medical imagistic, and agricultural-food technologies, the economy being concentrated on traditional sectors with low technological level. According to the analyses realised by Eurostat (2013), the potential competitive and innovative advantage of the region is determined by the food industry, the textile-clothing industry and the wood processing industry.

The South-East region

The region shows an innovative potential above the national average, but is also faced with a series of economic issues of a structural nature. The regional GDP is approximately 10% of the national GDP (2011) and 45% from the EU-28 average (2013) (Figure 9).

Figure 9: Evolution of GDP (PPS) by NUTS 2 region – South East Region (% of the EU-28 average)



Source: Eurostat

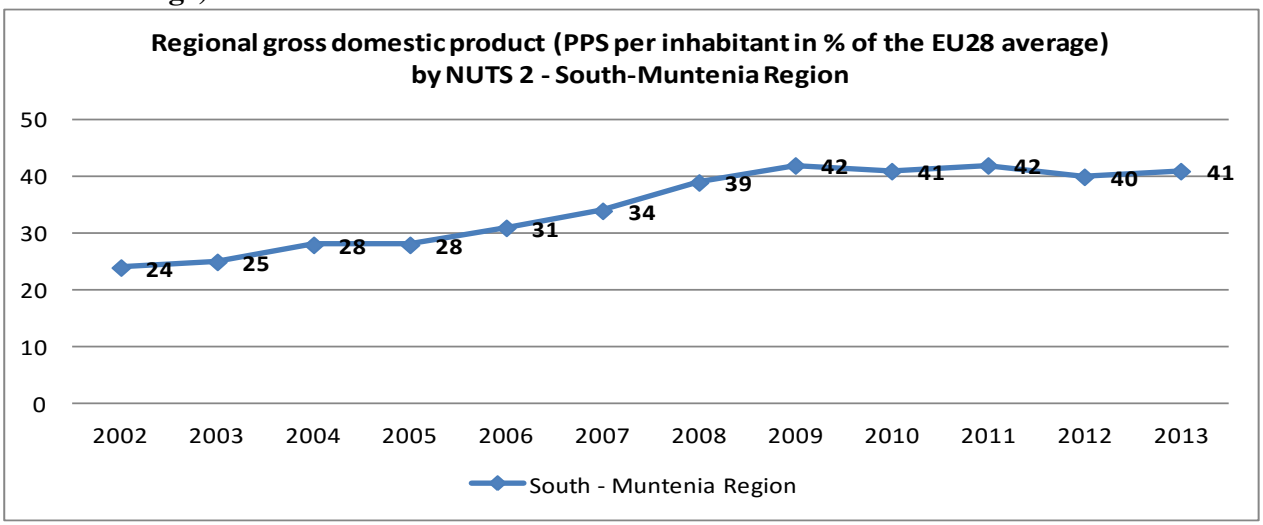
Agriculture is the sector with the largest contribution to the regional economy, even though the region does not have important processing capacities. The industry shows a relative diversity: petro-chemistry, metallurgy, nuclear energy, machinery, ships, construction materials, textiles, etc., and the endowment with transportation infrastructure is good (connections to three Pan-European transportation corridors, three maritime shipyards, four river shipyards and an international airport).
The region has a remarkable tourism potential, including the Danube Delta biosphere reservation, natural parks, archaeological sites, etc.
The employed population in agriculture represents 28% from the regional total, the industry has 22%, services 21%, and only 0.9% from total employed labour force in information services; 2.7% from the employed population is represented in the field of scientific research.
The region shows low FDI attractiveness and ranks on the fourth position at national level (year 2013), with a percentage of 5.5% from total FDIs. Also, it shows a low innovation potential: a share of only 3% out of the average of national expenditures (2007-2012), about 4.2% of the R&D units (56 research entities from which 25 private entities), 3.8% out of the RDI employees.
In the South-East region operate seven public and private universities (in Galati and Constanta). During the period 2008-2011, the average of public and private RDI expenditures was very low

(0.16%, respectively 0.07%). Also, the human resources involved in the RDI activity are under the EU-28 average (19.5% against 38.9%, in the period 2008-2012).
The region has three industrial parks (Galati, Navodari, and Constanta), two centres for technological transfers and a centre for information transfer (Tulcea). The strength of the region is represented by the fact that the sales for new products and of the innovative companies on the market have a profit of up to 90% from the EU average.
At local level, the metropolitan area Constanta (one of the seven national growth poles) is characterised by a high innovation potential, showing multiple competitive advantages.
In the Regional Development Plan 2014-2020, investments are provided for increasing the competitiveness of the regional economy, in the context of the SMART specialisation and of the Europe 2020 Strategy. In the framework of this priority, three major areas of intervention are targeted:
• the sustainable development of entrepreneurship by creating/strengthening the support structures for businesses (business incubators, scientific parks, the creation and development of clusters, etc.);
• the increase of companies' competitiveness, by new business models for SMEs, technological transfer, start-ups stimulation, support in adopting ICT, etc.;
• the development of the research and innovation infrastructure in universities, research institutes and in the private sector, as well as the creation of research partnerships between the *stakeholders* in the field of innovation.
In the Regional Innovation Strategy 2008-2015 (elaborated in the framework of ARISE and financed by FP-6 in partnership with the Tuscany region and Etruria Innovazione) are presented five priorities for supporting the innovation sector: promoting innovative culture, and the regional potential of research and development, promoting public administration as innovation factor and, also, supporting ICT investments and in energy from renewable resources.
Some important elements for sustaining innovation had financial support based on individual projects which were supported by all sectoral and regional operational programmes (for instance, ROP, SOP Increasing Economic Competitiveness, SOP HRD, SOP Transport, etc.), as well as based on the National Programme for Rural Development, the Interregional Cooperation Programme INTERREG IVC. Recently, relevant projects were launched which include innovation measures at sub-regional level (BORDWIIS +) and the stimulation at regional level of the ICT-based strategies.
In the year 2014, in the region was launched the initiative of setting up a national competitiveness pole, that would promote a modern manufacturing system, based on the principles of sustainable development. In the framework of this pole, companies in the field of equipment and electrical machinery, services' companies, universities, and research institutes will become operational. The pole mobilised a number of ten projects with a value of about 88 million Euros. Three of these projects are aimed at sustaining the RDI and concentrated regional innovation process.

d. The South Muntenia region

In the period 2007-2011, the South-East region recorded a weight of 12.4% from national GDP and 41% of the EU-28 GDP (2013) (Figure 10).

Figure 10: Evolution of GDP (PPS) by NUTS 2 region – South Muntenia Region (% of the EU-28 average)



Source: Eurostat

The industry is diversified and represents the main contributor to the economy of the region. Some sectors have an important tradition: chemistry, petro-chemistry, cars and electric products (Dacia-Renault), transport equipment, construction materials, textiles and food industry. Agriculture has an important national potential, about 80.2% from the total land surface of the region being agricultural land.

The South-East region has a good transport infrastructure as it is connected to four Pan-European transportation corridors and crossed by two highways (A1 and A2), including naval transports (at the Danube, four shipyards).

The tourism potential is very developed, about 35% from total tourism activities at national level.

The economy is highly segregated between the north (richer) and the south (less developed), two of the counties of the region being the poorest in the country (Giurgiu and Teleorman).

In the period 2008-2013, the employed population in agriculture represented 31.6% from total regional, industry about 22.8%, services 17% and constructions 9.3%.

Just like other regions, the recovery of the region after the crisis was visible, in particular in the large towns.

The region is attractive for foreign investors, FDI having a share of 7.2% from total flows at national level (2013). Nevertheless, the region is a modes innovator, a fact which is reflected in low inputs of RDI (both public and private). Innovative performances of the region within the private sector are minimal; all their normalised values of the latter being under 50% of the EU average (Eurostat). The strength of the region is represented by the moderate employment of the labour force in medium/high-tech, and in the sector of intensive services dedicated to knowledge.

The region is on the second position regarding RDI resources: 9.7% from the average value of the RDI expenditures (2007-2012, Eurostat), 6.1% in research-development entities and 8.5% out of total RDI employees from Romania (NIS, 2014). The number of employees in RDI decreased gradually but a slight recovery trend started after 2012.

In the region are four public and private universities, located mainly in Arges, Dambovita and Prahova.

In the period 2008-2011, the average values of RDI expenditures, both public and private have represented about 0.3% from GDP, each).

The regional innovation potential is relatively low: with a total of 457 innovative enterprises out of 5171 at national level the region is on the sixth position out of eight regions.

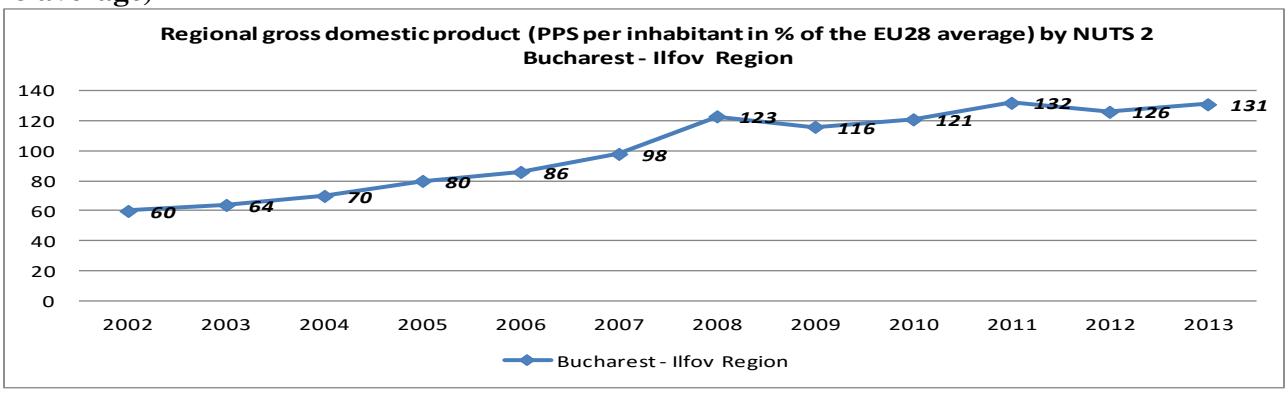
Innovative processes and products represent 11.6% from total national, and include mostly SMEs, (82%), concentrated in industry (81.5%) and services (18.5%) (NIS, 2013). The SMEs of the region are concentrated in Prahova (41.4%) and Arges (31.4%) (NIS, 2011).

The region hosts 20 industrial parks, more than one third of this number being industrial parks (52), and in their majority these are located in the county Prahova (11). Also, the region hosts three technological transfer centres. One major regional cluster is the Dacia Renault Cluster.
In the development plan of the region South-Muntenia, the strategic development objective is represented by the regional competitiveness on long-term strongly correlated with the Strategy Europe 2020 and with the Danube Strategy.
The specific objectives are as follows:
• Support for the SME sector, mainly for knowledge-based enterprises, inclusively by promoting entrepreneurial culture, modernisation of support services for enterprises and infrastructure, support for new business models; support for creating business networks;
• Support for RDI; developing an innovation culture especially within the private sector, investments in the RDI infrastructure; investments in complex RDI projects;
• Facilitators: technological and knowledge-transfer; partnerships between the regional academic and private sector; support for start-ups and spinoffs, etc.;
• Sustaining domestic and international cooperation.

e. Region Bucharest-Ilfov

The region Bucharest-Ilfov has a high innovation potential but which is yet insufficiently exploited. From the viewpoint of regional performances, the region's GDO increased by 17.3% (in the period 2000-2008), the representative economic sectors being, in particular, services ((wholesale and retail trade, transport, ICT, financial, professional, scientific, research and education, real estate, hotels and restaurants, etc.), constructions, some light industries and public administration.
The regional GDP is the highest from Romania (24.5% from the national average in the period 2007-2011), and GDP per capita 2.5 times higher than the national average. The regional GDP is approximately 31% above EU-28 average (2013) (Figure 10).

Figure 10: Evolution of GDP (PPS) by NUTS 2 region – Bucharest Ilfov Region (% of the EU-28 average)



Source: Eurostat

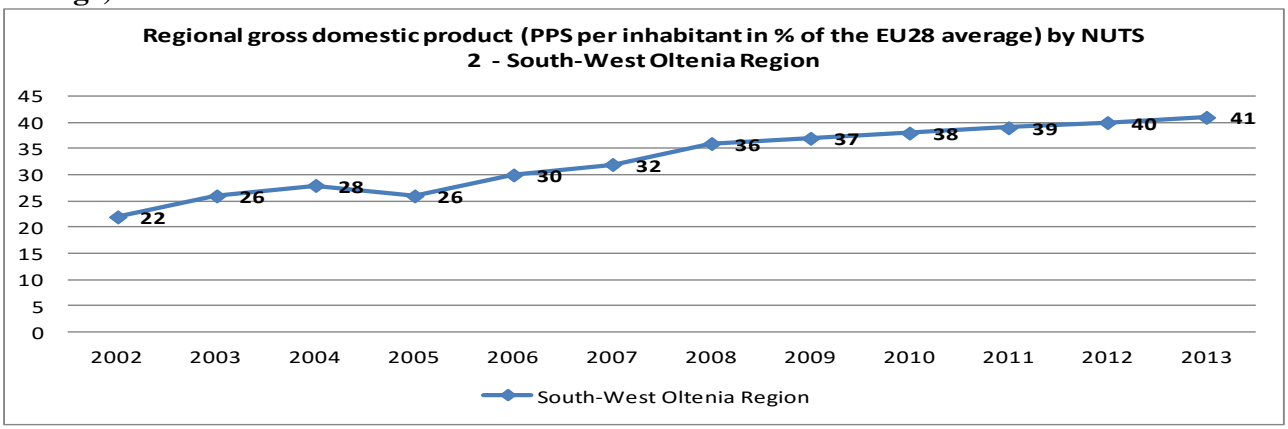
With respect to the RDI expenditures evolution, the region records a steady increase of these expenditures, the highest increase being in the period 2007-2008 (48%). Due to the crisis these expenditures decreased considerably by 27% (2008 compared with 2009). In the period 2010-2011, a slight process of resilience emerges but it decreases in intensity in the year 2011 (by 14% less than in 2008).
The evolution in the number of employees in the research-development activity (2005- 2011) followed to a large extent the evolution of the RDI expenditures. A more marked increase can be noticed after 2010, in the number of employees in relationship to expenditures (due to the decrease in the number of researchers). The increase in expenditures led also to an increase in the numbers of auxiliary personnel.
With respect to patent filing (year 2011), the region Bucharest-Ilfov contributed to achieving the national value by 41%.

Out of the total number of active companies, the region has a share of about 23% from total (2011). From this total, about 80% is represented by innovative companies, which launched on the market new or significantly improved products (goods or services).
Regarding the distribution of innovative enterprises on economic activities, it is found that in the year 2011 the services sector held 71% out of the total number of innovative enterprises, 29% of these being identified in the industrial sector.
The innovative activities undertaken, mainly, for developing and/or implementing new product or process innovations include the acquisition of tools, equipment, devices, buildings, software, licences, engineering and development works, design, vocational training and market implementation of innovations. Also, here are included all types of research-development activities.
The employment rate in the high-tech industry and in intensive knowledge-services for the period 2008-2011 is 5.7 times less as compared with the EU-28 average, but three times higher as compared with the national average (1.8%) (Eurostat).
The region Bucharest-Ilfov is the most attractive region for FDI (about 60.6% of total national in the year 2012).
The strengths of the region are influenced mainly by the capital Bucharest: a high potential for regional growth, the creation of jobs and attracting labour force, better development of local services, higher density of higher education institutions and of the RDI potential, higher educated labour force, the most important railways and airways knot, higher availability of public utilities and telecommunications infrastructure. There are also weaknesses, among which we mention: traffic congestion, social exclusion, etc.
In the region, there is one of the four scientific and technological parks from Romania – MINATECH, specialised on micro- and nanotechnologies, funded by the National Institute for Research-Development in Micro-technology (IMT-Bucharest) and the Polytechnic University of Bucharest (the year 2005) having as purpose supplying business incubation and laboratory facilities, as well as access to spaces of technologies' development for companies. A share of up to 80% from this park is held by five companies, ten incubated enterprises and one spinoff (ADR Bucharest-Ilfov, 2014).
Also, there are three industrial parks and eight technological incubators, the latter being in fields such as: machine building and renewable energy, textiles, biotechnologies, electronics. Most of these companies do not have own legal personality and are located in universities or public research institutes.
A study realised at national level shows that the smart industrial specialisation in the region Bucharest-Ilfov presupposes marine, power (mechatronics) intelligent systems, agricultural intelligent systems (agricultural machinery), technical textiles, health, car and agricultural food products' smart systems (Jaspers, Arup, 2013).

f. Region South-West

The GDP per capita indicator corresponding to the region South-West Oltenia represented 76% of the national average and 41% from the EU-28 average (2013; Eurostat) (Figure 11).

Figure 11: Evolution of GDP (PPS) by NUTS 2 region – South West Region (% of the EU-28 average)



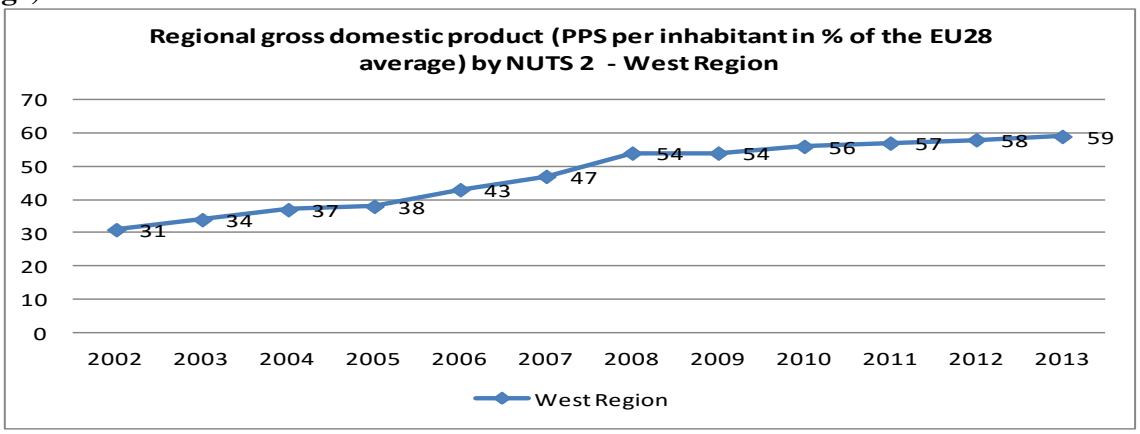
Source: Eurostat

The region shows diverse sectoral specialisation for the five constitutive counties. Dolj county has an important specialisation of traditional industries (cars, tractors, machines, airplanes, agricultural machinery, constructions, oil and gas, chemical industrial extraction, clothing, textiles, furs, leather, food and beverage products), and ecological agriculture.
The University of Craiova provides multiple specialisations, including in agriculture and with a technical profile. The county Olt has a diversified industry, with metallurgy (aluminium) in key-position, but also with a high agricultural potential. In country Gorj is predominant the oil and natural gas drilling and processing, brown coal and marble, but also other industries (electronics, electro-technical, machine-tools, food products). In county Mehedinti specialisations are determined by the shipbuilding industry, railcars, wood processing, inorganic products, wood furniture, pulp and paper, mining industry, thermal energy generation and the heavy-water production. The county Valcea has an important specialisation in the food and chemical industry, but also for coal extraction, oil and salt exploitation, wood processing, footwear, textiles and clothing, as well as tourism.
Even though there is a traditional industrial basis, labour force employment in industry is only 18% from total regional labour force, while the agriculture has 46.6% from the labour force (Eurostat). Commercial, transport, and tourism (services) activities represent 14% from labour force, while the construction activity represents 4.5% from total regional (Eurostat). The decrease in the employment of industrial labour force (from an average of 23.5% in the period 2000-2008) reflects the massive decrease of local industries, at the same time with the decrease in the numbers of employed persons, the largest part being absorbed by agriculture and services. Agricultural productivity is low, because of the low technological level, the rural population practicing the "subsistence agriculture".
In the period 2008-2013, the average employment rates in the information and communication sectors, in industries with an important scientific and technological character, as well as in the financial sector were very low (0.7%, 2.62%, 0.77%), and under the national average.

g. West region

The economy of the region registered rapid growth, being the second region from this point of view in Romania. The strengths of the region are: skilled labour force, proximity to western markets, important natural resources, culture, etc.
Regional GDP per capita was by 10.4% higher than the national average (period 2007-2011), representing 59% from the EU28 average (2013; Eurostat) (Figure 12).

Figure 12: Evolution of GDP (PPS) by NUTS 2 region – West Region (% of the EU-28 average)



Source: Eurostat

The industrial infrastructure of the region is well developed and diverse, including ICT, car industry, machine building, electronic devices, wood processing, and mining and chemical industry, pharmaceuticals, textiles, food products, ceramics, glassware, etc. A large part of the local economy is centred on the Western Europe markets.

The region has a diversified transport infrastructure, being a major logistical loop (E68, E70, E79, E671, E673), and being crossed by the Pan-European transportation corridors IV and VII, three international railways, four airports, three rivers (including access to the Danube), and the Trans-European network for TEN-T, etc.

Labour force employment has a relatively well-balanced structure: industry (36%), services (23%), agriculture (19%), and constructions (8%). A share of 1.3% of the labour force is employed in the information and communication sector. Tourism is, also, an important element of the region (national parks: Retezat, Apuseni), with a diversified tourism offer.

There are regional disparities between the multi-industrial developed counties (Timisoara and Arad) and the mono-industrial ones (Caras Severin and Hunedoara). Some counties have wide areas of poverty, which maintain the high regional disparities. The economic recovery was visible recently in the large cities, while in the small towns there were difficulties in maintaining jobs.

The region is attractive for FDI (third position in the country in 2012; 7.6% of total FDI) (National Bank of Romania and NIS, 2013). Still, the West region is a modes innovator. All performance indicators of the innovation system are below the threshold of 50% out of the EU average, save for the employment of labour force involved in knowledge-intensive activities, which is over 20% from the EU average. The very low levels of RDI expenditures and the low volume of innovation activities and cooperation between SMEs (all much under 50% from the EU average) explain the low performances of innovation in the region.

The region shows visible specialisation, especially in the counties Timis and Arad: in county Arad as specialisation are identified the car production, transportation equipment, furniture and computers, electronics and optical products manufacturing, while county Timis is specialised in more sophisticated sectors (computers, electronic and optical equipment, electric equipment, vehicles, leather products, footwear, rubber and plastic).

The industry generates the highest business turnover. The car industry in the West region led to the formation of the Car Cluster Automotivest (www.automotivest.ro), coordinated by ADR West. The group's association launched recently the project "DonauMotor" in partnership with Fraunhofer IPA, with the car group from Bulgaria and the Czech Republic, the Mechatronics network from Baden-Wuerttemberg and iMac Truceknuller & Company from Germany. The project is financed by the German government and is a platform for stimulating innovation in the car industry in the Danube region. The project supports the development of the innovative and efficient technological

network for the economic area of the Danube with the purpose of determining, on medium-term, the increase of companies' investments in RDI.
Another project is the Regional Competence Centre for Development which is supplier in the car sector. The town-hall of Timisoara received already a financing from ERDF of 2.8 million Euro for building the headquarters of the centre which has as main purpose to provide for enterprises the required infrastructure for applying a package of services and programmes of vocational training in the sector. The purpose is to increase the number of mechanic, engineering competences and the car sector of the region.
The region has an average RDI potential: 4.8% from total RDI expenditures (2007-2012), 31 research centres, 8% of the RDI employees from Romania. Only 0.37% of the active population in the region was employed in the R&D sector, and is on a decreasing trend. The region has a good higher education infrastructure: 14 universities (7 public and 7 private), especially in Timisoara and Arad. Research-development entities cover a wide range on fields: constructions, agriculture, and winery (Arad), mechanical engineering in Caras-Severin, in metal processing and mining in the county Hunedoara. In Timis the research centres are focused on nanotechnologies for welding and material testing, chemistry, medicine and ICT, etc.
The expenditures for research-development are very small (0.23% and 0.05% from GDP), which leads to a large gap against the EU28 (1.99% and 1.25%, respectively). The average percentage of human resources in the field of science and technology in active population of the region is of 21% (2000-2012), similar to the national average (source Eurostat).
The region has several industrial parks in four locations (Arad, Resita, Hunedoara and Timisoara), but there is no technological park in the region. A private project called Start Up Hub provides facilities of incubation pro bono, but only on a small scale, because of the financial constraints. ADR West coordinated the development of two clusters in the car and ICT sectors.
ROSENC – the Cluster for Sustainable Energy from Romania (www.rosenc.ro), the Technological Transfer Centre Tehimpuls (http://www.tehimpuls.ro/), which provide for innovation services in the region.

7. Innovation at national level

In Romania, the *National Strategy for Research Development and Innovation 2015-2020* establishes the following priority fields of smart specialisation (fields which are also the backbone of the National Research-Development and Innovation Plan III) [4] : biochemistry, information and communication technology, space and security, energy, environment, climate change, eco-nanotechnologies and advanced materials, as well as the fields of public priority: health, patrimony and cultural identity, new and emergent technologies.
During the current programming period, the budget allotted to research-development-innovation based on the National RDI Plan is of 15 billion Lei (funds from the state-budget, non-reimbursable external funds and contributions of the project partners) and pursues to sustain the objectives presented hereunder:

- ensuring the functionality of the national RDI system, increasing its performances and of the national and regional impact; stimulating cooperation between the public RDI institutions and the private companies, encouraging the exploitation of inventions and scientific innovations, especially in Romania;
- ensuring the critical mass of researchers in the system, training new generations of competitive researchers at community and international level;
- ensuring public funds for RDI financing according to the objectives of the Europe 2020 Strategy; concentrating resources in sectors and fields of smart specialisation, stimulating private RDI expenditures; and attaining public co-financing of about 1% from GDP until the year 2020;

[4] http://www.fonduri-structurale.ro/detaliu.aspx?t=Stiri&eID=16963

- the modern management of research administration, increasing the capacity of the central administration in the RDI field.

Based on the National Research-Development and Innovation Plan III is pursued to develop the large-sized research infrastructure, integrated into the Community infrastructure. Among the priorities that will be financed from the funds allotted to the RDI field are: the research infrastructure for Extreme Light Infrastructure –ELI- included among the priorities' list of the EU, the International Centre for Advanced Research Rivers-Deltas-Sees Danubiu (situated in the Danube Delta), etc.

8. Inovation at European Union level

The trends of the cohesion and regional development policy were built and structured around the *Europe 2020 Strategy* and based on the objectives established for the current programming period: smart, sustainable and inclusive growth. The pursued thematic objectives are from various areas of interest: employment, research-development, climate change, education, poverty and social exclusion.

With respect to innovation, the major trends of the current programming period are the following:

1. grouping all separate programmes dedicated to innovation-research (Erasmus, Comenius, Leonardo, Grundtvigt, etc.) from the preceding period into a single programme Horizon 2020 (formerly FP7);
2. simplifying procedures and applying some common principles of financing innovation;
3. executive decentralising the management of structural funds in parallel with increasing the role of executive agencies;
4. maintaining the financing system by Structural Funds (ERDF, ESF and EARDF).

The current policy framework of the European Union supported by the *Europe 2020 Strategy* proposes an increase of RDI expenditures from a share of 3% from the Community's GDP *(gradually up to the year 2020) establishing thereby the way to be pursued for economic growth, competitiveness, and by extending investments in the field of research-innovation.

The funds allotted by the cohesion policy are regarded as multipliers of the outcomes obtained based on innovation, opening the way towards excellence.

By means of the Horizon 2020[5] programme, in the European Research Area is promoted also a cohesion policy that aims to diminish regional socio-economic disparities, with the support of innovation and by strengthening excellence.

Starting with the traditional objectives of the cohesion policy, recourse is made during the current programming period to research, technological development and innovation which are regarded as new strategic elements that may sustain true regional economic performance in the present context of the extended globalised crisis.

In the period 2014-2020, the investments in the field of innovation-research are financed by the Structural Funds and by the programme Horizon 2020 as these complete each other. The discussions are about the presence of some synergies between structural funds and the Horizon 2020 programme, which might take place in an extended framework on three various levels of approach: at the level of the cohesion policy, at program level and at project level.

By means of the cohesion policy are strengthened the capacities and the infrastructure required for innovation, but also the knowledge transfer providing support to innovative businesses, based on the cooperation between companies and research institutions. The innovative investments of the companies and institutes shall increase the impact of the Horizon 2020 programme at regional level. Thus, up to 15% could be invested from the budget of a regional or national operational programme in other regions of the EU, provided that the measure is beneficial to the entire territory based on networked investments.

[5] http://ec.europa.eu/programmes/horizon2020/sites/horizon2020/files/H2020_RO_KI0213413RON.pdf

Both research and innovation policies, and the cohesion policy support together distinct actions, with independent operational ways, but their interaction can generate converging effects. Therefore, the respective synergies may lead to supplementary added value.
At programme level, the cohesion policy supports member-states to apply the Partnership Agreements and to implement the operational programmes promoting sequential schemes of financing, followed up by the integration of outcomes in international projects contained in the proposals of the Horizon 2020 programme. In this respect, the synergy is generated by the process of collective planning during the entire programming period, thus ensuring transparency and good collaboration.
At project level, each of the two instruments mentioned above (the cohesion policy and the programme Horizon 2020) shall allow for the cumulated financing of a certain project, thus avoiding double financing, as the subventions are distributed on segments financed separately. From the operational point of view, the synergies can take the form of some project flows (for instance, building-up some research and innovation and/or infrastructure capacities).

9. Innovation and the new features of the programming period 2014-2020

The current Community's policy framework supports and promotes synergies between the cohesion policy and the programme Horizon 2020, and the main identified novelties are the following:

- innovation represents the core element of the *Europe 2020 Strategy* of the current cohesion policy and of the financings from structural funds;
- in order to facilitate the synergies between the two categories of financing, new legislation was created for regulating this;
- the *smart specialisation strategy* supports the innovative priorities of the regions;
- the opportunity of using up to 15% from the cohesion policy funds outside the region if of the respective action benefit also other regions, allowing for financing cross-border project, this aspect being essential for combining the funds allotted to Community instruments;
- supporting intensively innovative clusters based on knowledge and competences that would allow for the transfer between regions;
- financial instruments allotted to the programme Horizon 2020 shall have a so-called *leveraging effect* for the regions that will receive also structural funds;
- as result of implementing the objective of *growth/smart specialisation* a consolidated impact will be obtained for scientific excellence, innovation and knowledge.

At EU level, innovation is regarded as an important instrument of territorial cohesion and a practical way to change and modernise the economy of the regions. In order to provide for a certain degree of territorial coherence and connectivity the *Smart Specialisation Strategy* was launched *by which synergy* can be ensured between innovation, research and cohesion (each region must aim towards such a strategy).
Starting from the previously presented aspects, during the current programming period is aimed to create an *Innovation Union based on smart specialisation*, by defining a limited number of priorities, based on identifying the strengths and weaknesses of each region, and budgetary predictability.
The smart specialisation strategies at regional level aim to high-tech fields in the framework of some economic sectors that show competitive advantages on a single European market, by appealing to innovation stimulation by entrepreneurship and technological adjustment of the regions, in a knowledge-based economy. These strategies aim to avoid the fragmentation of the financing efforts of the limited public resources.
The research and innovation fields established by regional strategies shall contribute to the diversification of the markets and to the modernisation of the economic activities or to emerging technologies. Among the innovative fields established is counted also the sector of transports that can contribute to supporting local specialisation priorities.

At the level of regional policies, the programme Horizon 2020 can support local strategic priorities of smart specialisation next to the sectoral and territorial operational programmes. For facilitating this support, it is necessary to build a support structure of the regions in using structural funds, regarded as strategic instruments for development-research-innovation.

Conclusions

The economic theory and practice have shown that there is the possibility of stimulating and increasing the competitiveness of regional economies by putting to good use the local innovative potential with positive and visible impact on the general development level.
The innovation process by its dynamic nature is influenced by a series of key-factors that are at the origin of the innovative process based on structural technological changes: *the quality of the human factor, the size of the public funds allotted to innovation, the level of social culture, the regulation of copyright, technological and information advanced ecosystems, supporting start-ups, etc.*
Between the regional level of innovation and the national context is a close and direct link: many of the innovative territorial key-factors are influenced by the decisions and measures taken at macroeconomic level.
The evaluation of the regional innovation degree borrows a series of indicators used for the analysis of the macroeconomic innovation level and statistical analysis techniques and econometric classical or modern methods.
During the current programming period, innovation represents a priority of the *Europe 2020 Strategy*, while the regions strengthen their position of key-actors in the process of re-ascertaining economic and social cohesion at Community level. Therefore, synergy is necessary between the support instruments corresponding to innovation and cohesion at community and regional level. Thus, by strengthening regional investments in the field of research and innovation, by mobilising all categories of resources (financial, human, and institutional, etc.) and by facilitating trans-national cooperation and by supporting European networks at international level, the strategic objective of the current programming period can be reached: *the Europe of innovation and smart growth*.
In Romania, the issues related to innovation, at the level of the eight development regions, are far from being solved but there are significant premises and opportunities that can determine and support the launch of an innovative process with positive on the innovative process at national level. The current regional development programmes could support the innovative effort and the diversification of local economies by stimulating innovative activities (RDI), as well as by the achievement of a synergy at local level by applying the innovation in current activities of the companies and by the technological transfer to the productive sector and supporting the innovative SMEs, and by supporting investments in modern business methods.
The regional level can represent an adequate level for approaching and developing the innovative process. Geographic proximity facilitates the acquisition, accumulation and use of knowledge and innovation, based on the condition of cooperation and collaboration between the development regions created in the year 1998 (Law no. 151/1998, modified by Law no. 315/2004) and activated after the European Union integration.
In this sense, building-up viable regional performances regarding the innovative process depends not only on the presence of some research institutes and innovative companies in a certain area, but also on the interactions between them.

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