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## EDUCATION, RESEARCH – DEVELOPMENT AND INNOVATION IN THE SOUTH-EAST DEVELOPMENT REGION – A CASE STUDY

### ABSTRACT

Starting with the 1950s, the regional development concept has been increasingly present both in the academic and in the practical debates. In many countries, mainly in the developed ones, the national social and economic development strategies include the regional dimension in their componentry. The main goal of this paper is to make a diagnosis analysis of the South-East region as regards innovation, research, development and education and to identify the strengths, weaknesses, opportunities and threats specific to this domain (SWOT analysis). The analysis leads us to the conclusion that in terms of these dimensions, the South-East region is under or at the level of national average, ranking among the last regions of the EU. The obtained results can be useful to political decision-makers for the elaboration of efficient development strategies for the region.

**Key words:** education, research-development, innovation, regional development.

**JEL Classification:** R10, A20.

### 1. INTRODUCTION

The establishment of the South-East region in the year 1998 had in view, in the first place, to attract European funds with the declared goal of contributing to the socio-economic development of Romania. This region has six component counties: Brăila, Buzău, Constanța, Tulcea, Galați and Vrancea. From the point of view of the territorial and demographic dimension, this is one of the largest regions of the country: it accounts for about 15% of the country's total area and 13% of the country's population.

The South-East region is characterized by the existence of important resources: 1) natural resources – significant arable areas with fertile soils; unique flora and fauna in Europe (the Danube Delta, the Small Island of Braila); well-known vineyards and wine production centers (first place as regards areas under vines on bearing); 2) tourism resources – the presence of the Black Sea Shore and of the Danube Delta, of spas, a rich history and a special cultural and ethnic diversity.

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However, the economic activity of the region, mainly in the recent years, has experienced a decline, in the industrial sector in particular. This process was also accompanied by the population's diminution and mainly by the decrease in number of the urban population in the counties Braila, Constanța, Galați and Vrancea (RDA South-East, 2014). The population's incomes in the region have also decreased under the national average. Thus, the South-East region is among the significant risk regions in terms of poverty (24.2%) as against the national average (18.5%). In the rural areas and in the small towns, there are significantly higher percentages of people facing poverty risk (NIS, 2016).

According to the documents issued by the EU, the highly qualified human capital, the investments in research and development, the market conditions favorable to innovation and the faster adoption of new technologies are among the main favouring factors for increasing the welfare of a country/region and for getting out of the vicious circle of poverty (Coe et. al, 2004).

## **2. STATE OF KNOWLEDGE**

The regional development appeared and imposed itself as a discipline of public and academic interest in the 1950s. The first approaches had a sectoral character, being oriented to the economic sector, focusing on what the firms in the region are doing and on the way in which their performance has influenced a series of economic indicators (labour employment, GDP, etc.) (Eversole & Martin, 2005). By the end of the 20th century, the regional development was approached in a multidisciplinary manner: the political sciences, the public policies and sociology became important disciplines that were analyzed together with the economy. The authors focused more on what a region could be and on the way in which a series of factors (not only economic factors) define the region concept (McCall, 2010).

In the 21st century, new regional development theories focus on the human and social capital, on innovation and spatial dynamics – the demographic changes – as key dimensions in the process of understanding the way in which the peripheral sub-national economies are challenged to respond to the global economy pressures – the competition and need to create advantages in the regional economies. Knowledge production and distribution is a significant process in determining the economic development and competitiveness of a region (OECD, 2001).

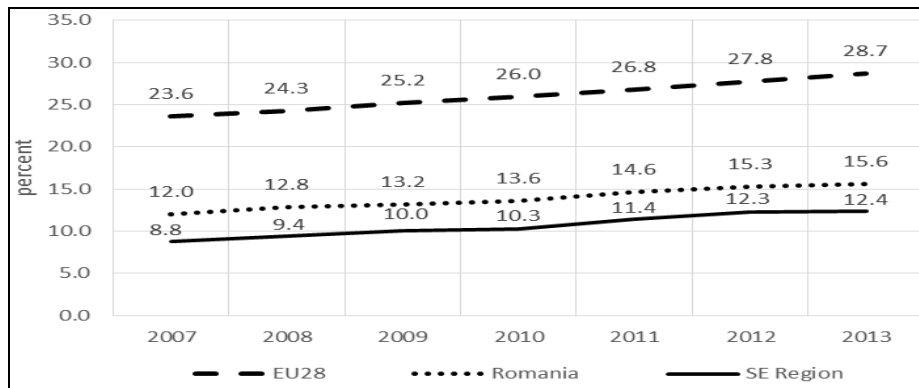
## **3. MATERIAL AND METHOD**

The approach adopted in the present paper is in concordance with the causal knowledge of the economic and social phenomena and processes specific to regional development. The declared goal of the paper is to make a diagnosis analysis of the South-East region as regards innovation, research, development and education

and to identify the strengths, weaknesses, opportunities and threats specific to this domain (SWOT analysis). The investigated period had in view the post-accession years, 2007–2013. The data sources used were those supplied by Eurostat and the National Institute of Statistics. It started from the hypothesis that research and development together with innovation represent the backbone of a competitive knowledge-based economy. The investments made in this field have fostered the economic growth and contributed to job creation and welfare increase.

#### 4. RESULTS AND DISCUSSIONS

Education has a special importance for the economic and social progress. In a globalized knowledge-based society, population's education is closely linked to the labour market through the training of qualified labour, able to compete in terms of productivity, quality and innovation. The analysis of the participation of the population aged 25–64 years to tertiary education, in the year 2013, reveals that the South-East region has significantly lower values (12.4%) as compared to the EU-27 average (28.7%) and the national average (15.6%). In fact, according to this indicator, the South-East region ranks on one of the last places among the EU regions (Fig. 1).



Source: Eurostat - [edat\_lfse\_04]

Figure 1. Evolution of population aged 25–64 years, enrolled in tertiary education (levels 5–8)

The share of the population aged 25–64 years enrolled in tertiary education, by genders, has quite similar shares for the two genders, with a slightly higher share in the case of women (13.6% women as against 11.1% men). In the period 2007–2013, we can notice, at the level of the investigated region, a slightly increasing trend of this indicator, similarly with the trend in EU-28 and that at the national level. It is possible that this situation will get worse in the next years, in the conditions in which the number of students started to decrease beginning with

the school year 2011/2012 under the background of decreasing school population as well as of the significant decrease in high school graduation in the last years and due to the increasing school abandon rate (RDA South- East, 2014).

As regards the number of higher education graduates, the South-East region has a relatively low share (i.e. 8.02%) of the total number nationwide. The distribution of higher education graduates by counties reveals a high concentration in the counties Constanța (62.76%) and Galați (32.55%) and low shares in the other counties (NIS, 2016). In fact, in the region, the state higher education is present in Constanța with “Ovidius” University, Maritime University, Military Navy Academy “Mircea cel Bătrân”; “The Lower Danube” University, with its many facilities, functions in Galați University Center. The private higher education was/is present in Galați with “Danubius” University, in Brăila with “Constantin Brâncoveanu” University, in Constanța with “Spiru Haret” University, in Tulcea with the Ecological University, and in Buzău with “George Barițiu” University and “Spiru Haret” University.

The analysis of higher education graduates by groups of specializations reveals a significant share of technical specializations (32.45%), above the national average (25.96%), followed by the pedagogical university specializations (22.50%) and by the economic sciences (21.02%). With small exceptions, in the period 2012–2013, the number of higher education graduates decreased in all specialization categories, which is a trend in conformity with that at national level (Eurostat, 2016).

The attractiveness of the educational offer of the Romanian universities is very low, due to ranking on the last places in the international classifications, the small number of common study programs, the lack of decision-makers’ vision at university level, lack of financial resources. Thus, the promotion policies are lacking, and many times the long-term benefits of these universities are sacrificed to the detriment of those on the short term (Nicolescu & Lloyd-Reason, 2015).

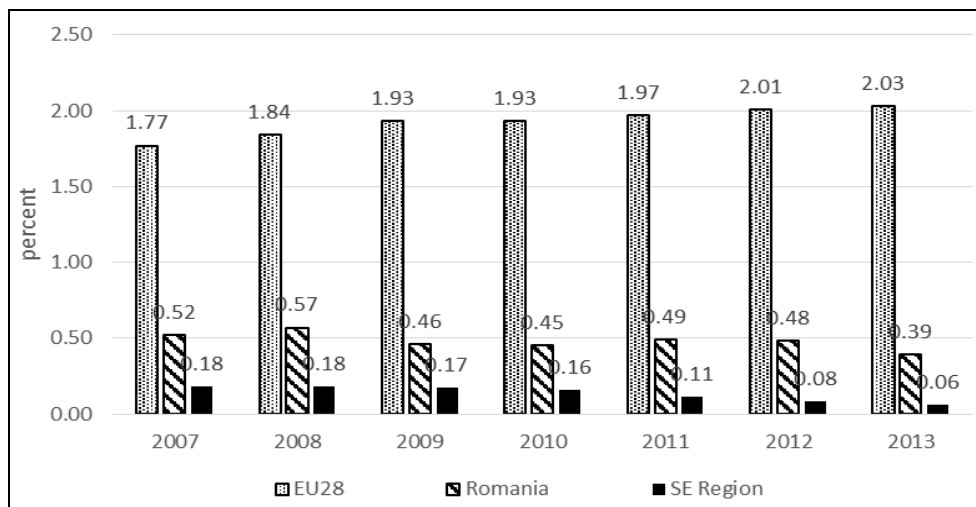
The Romanian universities are generally absent on the international lists with the best universities. Thus, QS University Rankings EECA – 2016, classifying the universities from the emergent European countries and from Central Asia, places Ovidius University from Constanța and “The Lower Danube” University from Galați on the last places – 151–200 (under the conditions when the best-classified university in Romania is on the 32nd place)<sup>1</sup>. This low attractiveness of the universities in the region is revealed by the low number of foreign students participating in the long-term university education. Thus, in the year 2010, out of the total number of students (15,465 persons) who were attending this higher education form, only 151 were foreign students (0.98%). These were mainly found in the counties Constanța and Galați. It must be mentioned that in the period 2007–2010 the number of foreign students in the region decreased by half (NIS, 2016).

As regards the Romanian universities, these are weakly connected to the international network. Despite some positive evolutions, the Romanian education

<sup>1</sup> <https://www.topuniversities.com/university-rankings/eeca-rankings/2016>

system still suffers from structural dysfunctionalities. For instance, the “European Reform Barometer<sup>2</sup>”, which takes into consideration 34 countries, indicates place 32 for education quality and place 34 for the research excellence indicator. This would be one of the main reasons of the low number of students coming to Romania for study (0.55% of the total number of students in 2012). Another aspect of this situation is that many Romanian students have opted to study at foreign universities (3.75% of the total number of students in 2012) (NIS, 2016; MNE, 2014).

Although the South-East development region has tradition in the research field (marine technology and ecology in Constanța, ecology in Tulcea, naval architecture and metal working in Galați, land reclamation and agriculture in Brăila, etc.), the sector is facing a series of problems firstly linked to the insufficient finance and the precarious situation of the labour force. The R&D activity is weakly represented in the region. The analyzed indicators reveal a relatively weakly developed research sector, and a low performance of the actors in this domain. Thus, the investigated region ranks among the last regions in the EU: in the year 2013, the R&D expenditures did not exceed 0.06% of GDP, much under the EU-28 average (2.03%) and under the national average (0.39%). These expenditures had a decreasing trend in the period 2007–2013, similarly to the national trend, and contrary to the situation at European level (Fig. 2).



Source: Eurostat - [rd\_e\_gerdreg]

Figure 2. Evolution of total R&D expenditure (% of GDP)

The analysis of the distribution of these expenditures, by activity sectors, indicates a major difference of the South-East region by comparison with the situation in the EU: while in the EU’s case, the most important R&D funds are

<sup>2</sup> <https://www.businesseurope.eu/sites/buseur/files/media/imported/2013-00264-E.pdf>

spent by the sector of enterprises, in the case of the investigated region the largest part goes to the governmental sector. This negative characteristic is mainly the result of the under-capitalization of the Romanian firms and of the lack of fiscal incentives to support the research-development activities.

The number of employees in the research and development sector in the region is very low. At the end of the year 2013, 454 persons full time equivalent were working in this sector, accounting for 0.03% of total researchers at national level (Table 1). Another aspect worth mentioning is that the number of researchers had an increasing trend in the EU-28, in the period 2007–2013, while in the South-East Region from Romania the trend was negative.

Table 1

Evolution of R&D expenditure (GERD) by all sectors of performance (% of GDP)

Indicator		2007	2008	2009	2010	2011	2012	2013
Total Researchers (FTE)	EU 28	1.458.115	1.523.247	1.555.600	1.602.756	1.626.802	1.681.342	1.730.841
	Romania	18.808	19.394	19.271	19.780	16.080	18.016	18.576
	SE Region	1.006	746	749	669	503	543	454
Business enterprise sector	EU 28	667.464	695.180	695.601	719.934	747.215	792.840	830.261
	Romania	7.754	6.309	6.127	5.853	3.518	4.956	5.333
	SE Region	574	461	362	321	13	72	30
Government sector	EU 28	188.306	192.370	199.209	201.545	203.821	207.399	210.647
	Romania	5.818	6.169	5.744	5.590	5.846	6.372	6.583
	SE Region	113	114	113	161	228	200	191
Higher education sector	EU 28	585.624	618.352	642.777	663.325	656.965	662.141	676.012
	Romania	5.104	6.839	7.310	8.245	6.563	6.591	6.578
	SE Region	319	171	274	187	261	270	233
Private non-profit sector	EU 28	16.721	17.345	18.014	17.952	18.802	18.961	13.921
	Romania	132	77	90	92	153	97	82
	SE Region	:	:	:	:	1	1	:

Source: Eurostat - [rd\_e\_gerdreg]

As regards the distribution of researchers by activity sectors, there are also great differences between the investigated Region and the EU-28 average: in the South-East Region, the greatest number of researchers is found in the higher education sector and the governmental sector, in opposition to EU-28, where the greatest number of researchers is found in the sector of enterprises, followed by the higher education sector. Women's participation in the R&D field is important: out of the total number of researchers, women represent 48%, which is above the national average (45%). The greatest number of women researchers is found in the higher education sector. In the period 2007–2013, in the South-East region, the number of women researchers was down in absolute terms by 193 persons, which represents a decrease by 47% in percentage terms, a lower value compared to the national average (55%) (NIS, 2016).

In the year 2013, about 90% of researchers activating in the South-East Region were located in three counties: Constanța (53.70%), Galați (24.45%) and

Tulcea (11.00%). The analysis of data shows that in the counties ranking on the first two positions, the trend was different in the period 2007–2013: Constanța had an increasing trend (from 620 to 850 researchers), while the county Galați had a decreasing trend (from 1307 to 387 researchers).

The link/network between the research centers and the business environment, mainly SMEs, is in an early stage. Most structures supporting this link were established after 2010. As it is presented in the South-East Regional Development Plan (2014), business support structures operate in the region, mainly for the SME support, namely:

– *industrial parks* – in the year 2013 two industrial parks operated in the region: 1) *Industrial Park Galați*, an investment of greenfield type, operating under partnership with the University “Lower Danube” Galați and the University “Danubius Galați”, having as objective the improvement of the local business environment and the development of activity sectors generating products with high value added; 2) *Industrial Park Mangalia*, with the main objectives the development of processing industry, metal construction works, shipyards, light and textile industry, as well as the development of the tertiary sector – business developers, consultancy, banking services and financial intermediation.

– *scientific and technological parks* – created in order to support innovation based on the absorption of R&D results and the development of partnerships between the R&D units, the higher education institutions and the industrial partners. Thus, the Park for Information Technology is operating in Galați.

– *technological and business incubators* – these provide the small business the possibility to develop on the basis of technical, administrative and consultancy assistance in business. The Business Incubator from Mangalia is operating in the South-East Region.

– *competitiveness clusters or poles* – a business support structure considered a geographical concentration of interconnected companies (mainly SMEs), specialized suppliers, suppliers of services, companies from related industries, universities, research institutes, etc. Four clusters were created in the South-East region: the Association Cluster “Traditions – Manufacture – Future (TMV) South-East”; the Romanian Maritime Cluster; the Cluster Association Monteoru Renaissance (Carpathian Tourism Cluster) and the MEDGreen Cluster (ARD, 2014).

Innovation in its broadest sense refers to new development opportunities based on new products and services derived from technological discoveries, new business processes and patterns, etc. The regional economic development supported by innovation represents an effort of the society, in which the collaboration capacity and mainly the ability to identify common solutions to common problems represents the central point. In the investigated period, the South-East region can be included among the regions with the lowest degree of innovation in the EU. Thus, in the year 2012, with only 2.07 applied patents, this region accounted for 3.6% of the total number of applied patents at national level, much under the EU average. Nevertheless, a positive aspect can be mentioned: while at the EU level the number

of patents applied in the period 2007–2013 had a decreasing trend, in Romania and in the South-East Region the trend is increasing, although the values of indicators are extremely low.

Table 2

Patent applications to the EPO by priority year by NUTS 3 regions

	2007	2008	2009	2010	2011	2012	2013
EU 28	58494.0	56938.4	56687.2	56601.6	57284.6	56601.3	56571.3e
Romania	32.57	32.47	31.13	34.38	60.61	60.33	
SE Region	:	0.5	:	0.5	1.0	2.17	
Braila	:	:	:	:	:	:	
Buzau	:	:	:	:	:	1.17	
Constanta	:	0.5	:	0.5	:	:	
Galati	:	:	:	:	:	:	
Tulcea	:	:	:	:	1.0	1.0	
Vrancea	:	:	:	:	:	:	

Source: Eurostat - [tsc00009] [pat\_ep\_rtot]

Under the background of R&D expenditure decline, there is a risk of enlarging the innovation discrepancies between the Member States and between the regions of the Member States. In the year 2012, the South – East region had 36.5% innovative enterprises as against 20.7% the national average (Table 3). The number of innovative enterprises decreased in the last years both at the level of South-East Region (18.23%) and at national level (37.93%). At the region's level, similarly to the national level, the innovative small size enterprises have the greatest share (46.1%). The enterprises developing their activity in the South-East region are investing very little in research and development activities. Most of expenses made by these big enterprises are directed towards the procurement of machinery, equipment and software. The existing data for the county level are insufficient for a pertinent analysis.

Table 3

Innovative enterprises by size classes (% of total enterprises)

	2008	2010	2012
National (RO)			
RO – total	33.3	30.8	20.7
RO – small	29.8	27.5	18.3
RO – medium	40.8	38.8	26.6
RO – large	58.9	56.4	40.1
South – East			
South-East – total	44.6	36.9	36.5
South-East – small	42.8	33.7	36.4
South-East – medium	46.6	45.7	35.1
South-East – large	68.2	60.0	46.1

Source: NIS - [http://statistici.insse.ro/shop/]



The SWOT analysis presents an overall image, an X-ray, of the investigated domain in the case of the South-East Region.

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>– a relatively balanced gender structure of the population having graduated higher education;</li> <li>– increasing trend of the persons who graduated a higher education form (from 8.8 in 2007 to 12.4% in 2013);</li> <li>– significant share of the technical specializations graduates (32.45%), which is above the national average (25.96%);</li> <li>– gender structure of researchers in the R&amp;D units slightly biased in favor of men (48% women and 52% men);</li> <li>– presence of links/networks between the research-innovation research centers and the business environment /SMEs;</li> <li>– slightly positive trend of the numbers of patents applied by enterprises.</li> </ul>	<ul style="list-style-type: none"> <li>– low share of the population who graduated higher education (12.4%) as against the EU-28 average (28.7%);</li> <li>– low share of higher education graduates – only 8.02% of the total number at national level;</li> <li>– strong concentration of the higher education graduates in two counties of the region (Constanța –62.76% and Galați –32.55%);</li> <li>– in the period 2012–2013, the number of higher education graduates was down in all specialization categories, in line with the trend at national level;</li> <li>– the attractiveness of the educational offer of the Romanian universities is very low, firstly due to their weak position in the international rankings;</li> <li>– insufficient funding and maintaining the negative trend in the R&amp;D sector (0.06% of GDP, under the EU-28 average of 2.03%);</li> <li>– the highest share of the R&amp;D expenditure goes to the governmental sector, with a low involvement of private enterprises;</li> <li>– small number of researchers and their diminution year by year (0.03% of the number of researchers in EU-28);</li> <li>– concentration of the R&amp;D activities mainly in three counties (GL, CT and TL);</li> <li>– the networks established between the R&amp;D centers and enterprises are in an early stage/collaboration;</li> <li>– extremely low number of applied patents (2.07 – only 3.6% of the patents applied at national level);</li> <li>– very small number of innovative enterprises (36.5%) under decreasing trend;</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>– existence of national and European programs having in view the internationalization of the Romanian research and higher education;</li> </ul>	<ul style="list-style-type: none"> <li>– poor connection of Romanian research and higher education to the European network;</li> <li>– migration of the young and highly qualified population</li> </ul>

## 5. CONCLUSIONS

On the basis of our analysis, we can draw the conclusion that in terms of education, research, development and innovation, the South-East region is under or at the level of the national average, being on one of the last positions among the EU regions. The training of a highly qualified labour force focusing on

productivity, quality and innovation represents rather a desideratum than a reality. As regards the human capital quality, the participation of the population from the group 25–64 years to tertiary education is low, i.e. 43.2% of the EU-28 average. Nevertheless, in the region, there is an increasing trend of persons having graduated higher education (from 8.8 in 2007 to 12.4% in 2013), together with a significant share of technical specialization graduates (32.45%). The R&D domain benefits from low support: the R&D activity is weakly developed, with significant differences across counties. The networks developed between the business environment and research are in an early stage of establishment and collaboration. The lack of financial resources and of human resources represents one of the main reasons for the weak interconnection of the R&D sector with the production sector of the enterprises, and implicitly, with their innovative orientation.

## 6. ACKNOWLEDGEMENT

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