

THE ROLE OF UNIVERSITIES IN REGIONAL INNOVATION SYSTEMS. ONE-STEP FURTHER IN ASSUMING THE THIRD MISSION?

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Abstract

Universities were identified as key-actors in the process of designing and implementing of S3 strategies (Goddard, J., Kempton, L., 2011). This paper will explore how the regional innovation system approach as an instrumental policy for growth is influencing universities transformation towards assuming the third mission. The main research question is if the active involvement of universities in S3 implementing creates effects on their entrepreneurial potential. I have applied a qualitative research, using a bibliometric research regarding universities role in regional innovation system. Also, in the framework of indicators proposed by Regional Innovation Scoreboard, I assessed the contribution of the universities from North-East region of Romania to regional innovation. The findings of this research are identifying the main challenges universities are confronted with in order to contributing to regional development as part of their third mission.

Keywords: universities, regional innovation system, smart specialization

Introduction

The shift from local influence over global competitiveness in the education and research market can mean overcoming the classic Humboldt's status of the university and exploring the new meaning, built on quantifying institutional responsibility for a constantly changing society. At the beginning of the 21st century, a cultural transformation takes place in the academic environment. This generated in the last twenty years a new institutional model of university (Loprieno, 2018): university autonomy does not reduce the financial dependence on the political environment, the importance of the role increases institutional and thus the institutional goals and strategic plans define the new vision and value system of the organization.

"Entrepreneurial University" is the third mission undertaken by higher education institutions, together with research and education (Etzkovitz, 2013, p. 487). The importance of universities in regional innovation systems is proven by the work for theorisation of its role, during last decades (Gunasekara, 2006, p. 102).

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In the context of regional development, universities can contribute to different ways for economic and social growth. Research and education activities enhance innovation and also improves human capital skills, diffusing knowledge to business environment and promote enterprises development. Gunasekara (2006, pp. 103-104) proposes a conceptual framework of analysing the role of universities in regional innovation systems. This is looking for two types of roles performed by universities: one is based on the triple helix and the other is grounded in university engagement literatures. Therefore, in according with the key elements of the regional innovation system (regional agglomeration, or clustering of industry, human capital formation, associative governance, regional cultural norms) universities can play a generative role and a developmental role (Gunasekara, 2006, p. 104). The generative role is contributing to knowledge capitalisation and capital formation projects, driving of regional innovation strategy, development of university-industry linkages. On the other side, the developmental role lead to entrepreneurial approach, education oriented to regional needs and shaping regional networking.

In the global competition universities have to assume not only a „third mission”, but a „third role”. This role is about maintaining regional innovation systems „smart and effective” (Markkula and Kune, 2015, p. 7).

European Union developed Smart Specialisation as a place-based approach within Cohesion policy, built on the identification and valorisation of regional competitive advantages. The Smart Specialisation Strategies (S3) development is a bottom-up process, bringing up together local authorities, universities, business environment and the civil society. The implementation of long-term growth strategies supported by EU funds requires partnerships and collaborative working of these stakeholders. Universities were identified as key-actors in the process of designing and implementing of S3 strategies (Goddard and Kempton, 2011, p. 14).

On the other hand, the universities are encompassing the third mission of economic development in addition to research and teaching (Etzkowitz and Leydersdorff, 2000, pp. 109-113) and contributing to the regional development is connected to the third mission. The regional contribution to universities defined by European Union's Smart Specialization Platform is focused on the following areas: 1. Business innovation, related to the research function of the university, 2. Human capital development, related to the teaching function, 3. Community development related to the public service role of universities, 4. Institutional capacity of the region, related to its engagement in local civil society (Markkula and Kune, 2015, pp. 10-11).

There is a great interest in exploring the mechanisms by which universities can contribute to the regional development, among them being the following areas of engagement: enhancing regional innovation through research activities, promoting enterprise, business development and growth, contributing to the



development of regional human capital and skills, improving social equality through regeneration and cultural development (Goddard and Kempton, 2011, p. 15).

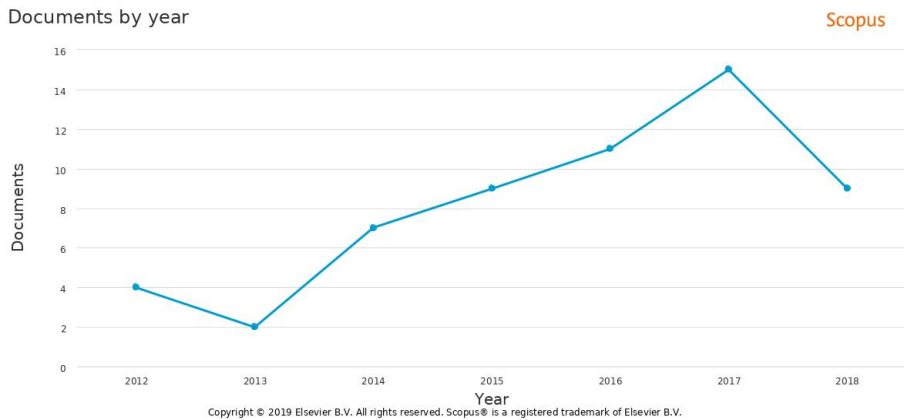
In this context, this paper will explore how the regional innovation system approach as an instrumental policy for growth is influencing universities transformation towards assuming the third mission. The question is if the active involvement of universities in S3 implementing creates effects on their entrepreneurial potential. In order to answer this question, a bibliometric research presents some of the universities' role in regional innovation system.

Another approach to answer is using the framework of indicators proposed by Regional Innovation Scoreboard. It is known that the more developed regions are associated with high innovation scores. All the development regions of Romania are "Modest Innovators", according to Regional Innovation Scoreboard 2017. The measurement framework of the Regional Innovation Scoreboard 2017 includes indicators grouped into four main types: framework conditions, investments, innovation activities and impacts. This measurement approach is reflecting to some extent the engagement of universities in regional development. The research will analyse the influence of research activities towards regional innovation performance using group of indicators included in the Regional Innovation Scoreboard.

1. Exploring the relationship between university and regional innovation system- a literature review

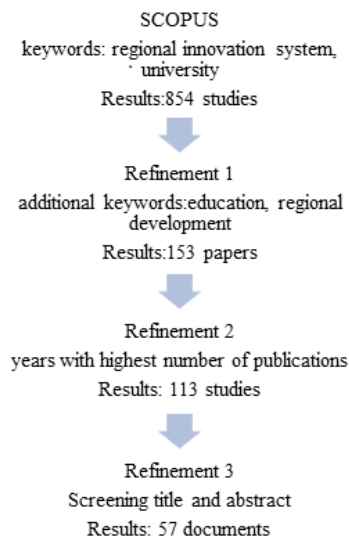
Previous research in the field can offer the frame for selecting the main ideas highlighting the relationship between university, its entrepreneurial characteristics and regional innovation system. In this regard, a search on SCOPUS was made using the key words: "regional innovation system" and "university". Then the search was refined, using the words "education" and "regional development".

For the period between 1982-2001, the results indicated only 3 studies. The most prolific period for the studies of interest was 2012-2018, as shown in the graph below.

Figure 1. Documents per year, using the key words

Source: SCOPUS

The steps pursued in the study selection are illustrated below:

Figure 2. Study selection

From the final refinement process, the result is a list of 57 studies, from which were extracted the following 15 articles relevant for this paper.



Table 1. Main aspects regarding relationship between university and regional innovation system incorporated the reviewed literature

Author	Relevant relations between university and regional innovation system
1. Ponsiglione <i>et al.</i> , 2018, pp.1-19	Main achievements in the theoretical perspectives of RIS (Learning region, Smart Specialisation, Ecology of Innovation, Complexity Science); introduces a model (CARIS) using Complex adaptive systems approach in RIS analysis. The decline of innovation performance during 2011-2017 in the EU regions, assessed by the Regional Innovation Scoreboard proves the distance between theoretical approaches, approved measures and related regional performance.
2. Hauge E.S. <i>et al.</i> , 2018, pp.485-503	The ability of HEIs to operate independently of firms and to adapt their teaching and research activities to regional potential and demands.
3. Budyldina (2018, pp. 265-277)	„National and regional programs and policy measures at stimulating the establishment of university-industry links and cater to the financial motives of local firms (co-financing of research projects by government, cutting costs, tax benefits, etc.) would create a market for academic research and innovation and provide a fruitful milieu for entrepreneurial universities.”
4. Barra and Zotti (2018, pp.432-457)	Using a Stochastic Frontier Analysis a number of factors were found having a positive impact on RIS efficiency: Population density has a positive effect on innovation performances with impact on R&D activities area more urbanized; RIS performances are found to be influenced by the labour market and firm characteristics; innovation performances seem to be positively influenced by the rate of employment and by the presence of firms with high values of exports; RIS performance is positively affected by the share of employees in industry sectors; the evidence also suggest; the existence of an intermediation structure between knowledge producers and firms, such as universities’ technology transfer offices, has an important role on the innovation process.
5. Gomez and Doloreux (2018, pp.78-107)	A bibliometric analysis searching for new possible stakeholders, beyond universities and enterprises. Interaction between different organizations within a region regarding production and dissemination of knowledge is influencing the innovative performance.
6. Pasciaroni <i>et al.</i> , 2018, pp.88-112	Explores the factors conditioning the relation between knowledge organisations and firms in a medium-size city in Argentina; recommendations for state policies in the field in order to support the individual researchers with a predisposition to link with the productive sector and also to encourage innovation in strategic fields, for increasing the demand for knowledge.
7. Gjelsvik (2018, pp.10-31)	Universities can contribute to create new paths for regional development through collaboration with regional industry.

Author	Relevant relations between university and regional innovation system
8. Karlsen <i>et al.</i> , 2017, pp.463-479	Higher Education Institutions as instruments for regional development are engaging in their host region mainly through their first mission, teaching.
9. Baycan <i>et al.</i> , 2017, pp.1-14	There is a need for investigating more closely of the connection between local R&D, local knowledge creation and local innovation, from a spatial approach in terms of networking.
10. Cervantes (2017, pp.27-42)	Demand for their knowledge is the successful key of universities' contribution to innovation. There is a need for local policies of encouraging universities to maximise the knowledge spillovers. Place-based policies for supporting innovation and knowledge transfer are really justified.
11. Lombardi <i>et al.</i> 2017, pp.130-145	Different environmental factors such as „social values, individual attributes and government investments” can determine universities to adopt innovative way of teaching entrepreneurship, which influence the development of regional innovation systems
12. Isaksen and Trippel (2017, pp.122-140)	Combine the different approaches of RISs types the STI (science, technology, and innovation) mode and the DUI (doing, using, and interacting) mode with types of knowledge linkages in order to reflect spatial dimensions of knowledge generation and transfer in the innovation process. Different influence of universities on regional high-tech growth mainly reflects „differences in the local supporting infrastructure and culture for entrepreneurship”.
13. Culkin (2016, pp.4-16)	Universities are anchor institutions („organisations at the heart of a local regional community that have a clear social purpose and are able to offer a range of formal and informal support and guidance to local SMEs”) within RIS. Universities play an important role in shaping the development of skills in the regional economy.
14. Brenner and Duschl (2015, pp.103-130)	Knowledge of causal relations in regional systems of technological activities depend on the industry under consideration and its knowledge base-this is important for policy formulation.
15. Smith <i>et al.</i> 2014, pp.341-359	Institutional structures of the RIS change as a result of the environment for spin-offs developing, which is consequently reflecting the interdependencies between universities and the region (results based on study of university-related companies in London, involving 12 of London's 42 higher education institutes (HEIs).

Source: own development



2. Regional Innovation and Universities

2.1. Smart specialisation and Entrepreneurial Discovery Process

European Union defined Smart Specialization as an important process aimed at enhancing Innovation in Europe's Regions. In this policy context, each region must identify the region's specific strengths and comparative assets and prioritize research and innovation investment in competitive area. In 2010, European Commission request the national and regional governments to explore and valorize their competitive advantages and to develop Smart Specialization Strategies (RIS3)¹.

Smart Specialization concept was initially designed to address the main problems related to the fragmentation of public research system, unable to complete independently on a global scale and the scattering of the resources across European Research Areas, as a result of the research duplication work². Bringing together research community, business, higher education, public authorities and civil society, Smart Specialization is a place-based process. Its goal is to identify the strategic areas for intervention based both on the analysis of the strengths and potential of the economy and on an Entrepreneurial Discovery Process (EDP) with wide stakeholder involvement.

The smart specialization approach supports the necessity of anchoring the innovation policies in local R&D environment.

Other opinions on RIS approach consider in globalizing learning economy RISs cannot any longer be conceptualized as regional phenomena but should be understood as local nodes in globally distributed knowledge networks (Asheim *et al.*, 2005).

Universities have new additional roles in the economic development of region and countries (Uyarra, 2008, p. 8). Smart Specialisation is particularly addressing HEIs through the following specific elements: entrepreneurial discovery process, the specific R&D and innovation sectors within the regional economy which can generate competitive advantage, more interest in exploring the different specialisation within European Union regions and trans-regional networking for new technologies development (Goddard, *et al.* 2013, pp. 80-101).

Entrepreneurial discovery (EDP) process lies at the core of RIS3, as Aranguren (Aranguren *et al.*, 2018, pp. 451-461) close after investigating the recent approaches on EDP: a process "that can be built with evidence-based analyses" (Gyanelle, Kyriakoua and Cohen, 2016, cited in Aranguren *et al.*, 2018, p. 451) and "through the combination of bottom-up and top-down processes" (Kleibrink, Larédo and Philipp, 2017; Kroll, 2015, cited in Aranguren *et al.*, 2018, p. 451).

¹ See COM(2010) 553 final "Regional Policy contributing to smart growth in Europe 2020.

² See https://ec.europa.eu/regional_policy/sources/docoffic/2014/swd_2017_264_2_en.pdf.

Infrastructure in RDI, innovations, patents, researchers are one of the categories of influence factors included in the theories of endogenous economic growth (Zaman *et al.*, 2015, p.154). Universities are central institutions in the regional development, as main provider of knowledge and human resources with high qualifications and from this position.

Cervantes (2017) considers that HEIs are important for innovation, becoming “central actors in innovation systems” for the following reasons:

- They play a mediating role between capital and labour in economic growth
- They can contribute to the technological progress by increasing the efficiency of research activities, and thus increases the stock of knowledge capital
- Embracing the “third mission” HEIs are contributing to local economic development
- They are large employers and provide services to regional companies and public agencies

The challenges for HEIs in promoting regional engagement and innovation are related to correlation between regional policies and the territorial dimensions of research policies. The national research funding which is provide little support for regional engagement often reflects the lack of a territorial dimension of the research policy (Cervantes, 2017).

The first Regional Innovation Strategy - RIS for North East region was developed since 2008, by the North East Regional Development Agency- the organization with legal attributions³ in Romania for regional strategic development coordination. Approved in 2014 and currently in a review process, RIS3 North-East is designed as a necessary tool for delivering effective investment in research, development and innovation.

Higher Education Institutions (HEIs) were directly involved in this development, through the Entrepreneurial Discovery Process. The governance structure of S3 is also including HEIs, as following: they are members in Regional Innovation Consortium (the main coordinating structure for S3 governance) and in the Academic Task Force (the structure with advisory role in S3 governance).

Which would be the most efficient ways of coordinating the innovation policy in the regional context? Aranguren (Aranguren *et al.*, 2018, pp. 451-461) analyse the opinions about governance possibilities of science, technology and innovation. From usual hierarchies in the past to formalized networks, some considers that “national government need to have well-developed, permanent machinery for co-ordination” (Metcalf, 1994, cited in Aranguren *et al.*, 2018, p. 452). On the opposite, not always the formalized vehicles for coordinating of science, technology and innovation governance, are the most effective (OECD, 2011, cited in Aranguren *et al.*, 2018, p. 452).

³ See Law 315/2004 on Regional Development.



2.2. The Third Mission and Innovation

The evolution of the university is increasingly associated with its contribution to the economic progress of society: the institution needs to interact with the private sector and public administration in order to guide the evolution of the community towards innovation, competitiveness and sustainable development. External circumstances related to the role of education and research on the economic and social environment require new changes, such as creating structures that facilitate technology transfer and allow and promote commercialization of research results.

Why did the behaviour of universities change? Elizabeth Popp Berman in „Creating the Market University. How Academic Science Becomes An Economic Engine „considers two perspectives that have generated the change (Popp Berman, 2012). The first is that the government has encouraged universities to regard academic science as a valuable economic product. The second is that the spread of a new idea - scientific and technological innovation serves as the engine of economic growth - has been critical to this process, first turning development policies and, ultimately, how universities understand and define their mission. It should be noted that these changes have not occurred by reducing resources, so that universities are forced to try to make money from their research. The author believes that the idea of Schumpeterian origin, according to which innovation leads to economic growth, became increasingly influential among policy-makers in the late 1970s. The consequence is the creation of public policy proposals aimed at strengthening innovation.

Universities become more entrepreneurial to compete and become more productive and creative in establishing links between education and research (Kirby *et al.*, 2011). Along with traditional missions, teaching and academic research, a third mission emerged for universities as a result of their increasing role in social and economic environment. Carrión *et al.* 2012 consider two approaches in defining the third mission: the “Triple Helix” model of university-industry-government relations (Leydesdorff and Etzkowitz, 1996, cited in Carrión *et al.*, 2012, pp. 1218) and the definition which outlines the activities related to generating and exploitation of knowledge and “other university capabilities outside academic environments” (Molas-Gallart *et al.*, 2002, cited in Carrión *et al.*, 2012, pp. 1218). The “Triple Helix” model articulating the resources specific to the three types of organizations aims at finding new elements of knowledge, developing new technologies that are disseminated to potential users. To succeed in innovation, companies in different industries need continuous contact with universities or their involvement in business activity, a finding that is supported by empirical studies from several countries (Freeman and Soete, 1997).

Another opinion taken into consideration is the perspective related to the tasks of the university. There is a “need to define another mission from the complexity of tasks” (Cross and Pickering, 2008; Daxner, 2010; Goddard and

Puukka, 2008; Mahrl and Pausits, 2011, cited in Pausits, 2015, pp. 270). There is also “the need for greater contextualization of research and opening in the direction of the markets” and society (Gibbons *et al.* 1994, cited in Pausits, 2015, p. 271).

The trend of decentralization, transfer of responsibilities from the central level to local levels has given universities the freedom to redefine their mission. Entrepreneurial response has become a necessity for universities that want to be a viable component of the fast-growing world of knowledge (Clark, 2001).

In this context, the entrepreneurial component is a new dimension to the university that meets the third mission. The term „entrepreneurial university” was first used by Burton Clark (1998a) in his book „Creating Entrepreneurial Universities: Organizational Pathways of Transformation.” Lazzeroni and Piccaluga analyze the course of universities towards an entrepreneurial model characterized by their direct involvement in the exploitation of research results, more intense collaboration with industry and involvement in regional economic development (Lazzeroni and Piccaluga, 2003). Assessing the challenges of HEIs in achieving the third mission, Rubens, Spigarelli, Cavicchi and Rinaldi, 2017, saw that smaller universities implementing the third mission gives to the economic development a more regional or local approach (Rubens *et al.*, 2017).

3. Research Methodology

The main research question is if the active involvement of universities in S3 implementing creates effects on their entrepreneurial potential.

The research methodology is based on a qualitative approach, using an analysis in terms of universities’ contribution to regional development. In the framework of indicators proposed by Regional Innovation Scoreboard, the analyse assessed the contribution of the universities from North-East region of Romania to regional innovation. The methodology is designed to look for a set of indicators from all of the 8 development regions in Romania, relevant for universities contribution to regional development. The selected indicators also reflect the capacity of HEIs to assume the third mission, that is to be able to adopt the entrepreneurial approach and to become a knowledge provider for regional economy. Universities can influence regional economic growth by disseminating their knowledge to the private market. The entrepreneurial university is defined by activities that can generate entrepreneurship such as patenting, licensing, creating new companies, facilitating technology transfer through incubators and science parks and facilitating regional economic development (Rothaermel *et al.*, 2007, pp. 707).

In this context, the analysis is looking for identifying the regional differences within the countries, but also to look for best performances from Europe and take them as a benchmark. Regional Innovation Scoreboard is a tool derived from the European Innovation Scoreboard aiming at performance assessment of regional innovation systems, across the European Union states. 27 indicators grouped into



four main types – Framework conditions, Investments, Innovation activities, and Impacts, and 10 innovation dimensions, measure the performance in innovation. Regional Innovation Scoreboard for 2017 is using the same measurement framework as European Innovation Scoreboard (EIS), but is limited to using regional data for 18 of the 27 indicators used in the EIS.

Measuring regional innovation performance emerged as a result of the importance given to regions, the “engines of economic development” in European Union. Regional Innovation Systems need better monitoring, therefore Regional Innovation Scoreboard provides the statistical facts reflecting region’s profile in innovation.

The RIS framework is grouping Europe’s regions into four innovation performance groups, according to their performance on the Regional Innovation Index, relative to that of the EU. This groups are: the Innovation Leaders, the Strong Innovators, the Moderate Innovators and the Modest Innovators. Their performance on innovation varies between more than 20% above the EU average (for the Leaders) and below 50% of the EU average (for the Modest group).

The regional performance is evaluated based on the indicators presented in the table below. The selected indicators for the present analyse are also indicated in the same table.

Table 2. Regional Performance Indicators

Regional Performance Indicators	Selected Indicators
Population having completed tertiary education	✓
Lifelong learning	✓
International scientific co-publications	✓
Most cited scientific publications	✓
R&D expenditures in the public sector	✓
R&D expenditures in the business sector	✓
Non-R&D innovation expenditures	✓
SMEs with product or process innovations	✓
SMEs with marketing or organisational innovations	✓
SMEs innovating in-house	✓
Innovative SMEs collaborating with others	✓
Public-private co-publications	✓
EPO patent applications	✓
Trademark applications	✓
Design applications	✓
Employment in medium-high tech manufacturing and knowledge-intensive services	
Exports of medium-high technology-intensive manufacturing	
Sales of new-to-market and new-to-firm innovations in SMEs	

Source: European Commission, The Regional Innovation Scoreboard report, 2017

The data collected from the Regional Innovation Scoreboard webpage are referring to 2017, the most recent available report. The qualitative approach consisted in analysing the selected indicators, relevant for Romanian universities, included in the above report for 2017 and identifying their main challenges within the contribution to regional innovation, particularly to implementing the Regional Smart Strategy (RIS3). On the other hand, secondary data from official sources (North East Regional Development Agency, Eurostat) were used for empirical analysis carrying out.

4. Results

Using Regional Innovation Scoreboard we find a comparative assesment of 220 regions within European Union, Serbia, Norway and Switzerland.

Europe's regions have been classified into regional Innovation Leaders (53 regions), regional Strong Innovators (60 regions), regional Moderate Innovators (85 regions), and regional Modest Innovators (22 regions).⁴

North-East region is one of the Romania's and European Union's lagging regions.

The selected indicators reflecting research and education contribution on the innovation dimensions are presented below:

Table 3. Research and education contribution on the innovation dimensions

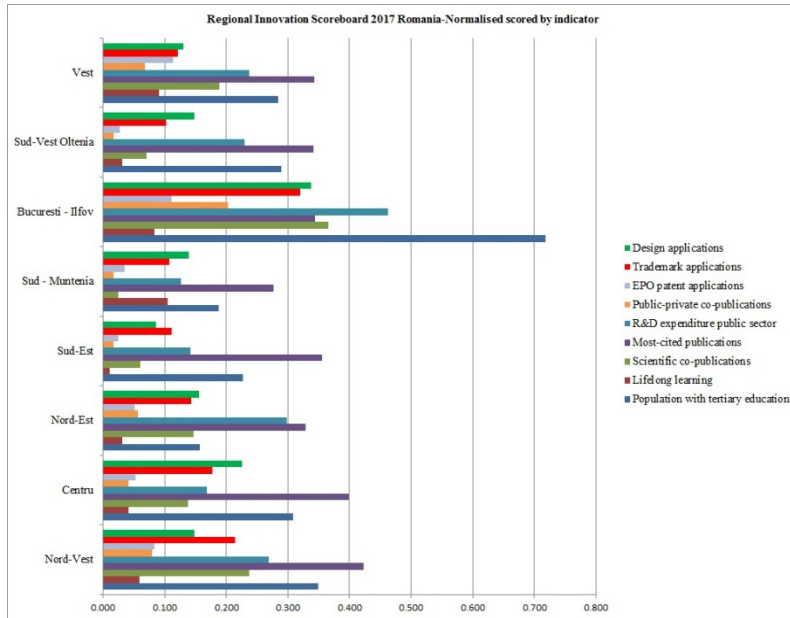
Innovation Dimenssion	Indicators
Framework Conditions	Population aged 25-34 with tertiary education
	Lifelong learning
	International scientific co-publication
	Most-cited co-publication
Investments	R&D investments in the public sector
Innovation activities	Public-private co-publications
	EPO patent applications
	Trademark applications
	Design applications

Source: Regional Innovation Scoreboard Report, 2017

Nord-Est region of Romania is a Modest innovator, compared to the country, and also the EU. Comparative to country, the region has the lowest score for population with tertiary education, and among the lowest scores for life-long learning indicator. An advantage is high score for R&D expenditures, second place after București-Ilfov region. The figure below illustrate the scores for above selected indicators, for each of the development regions in 2017.

⁴ Read more at https://ec.europa.eu/growth/industry/innovation/facts-figures/regional_en.



Figure 3. Regional Innovation Scoreboard 2017 Romania

Source: own representation

According to the objectives of Europe 2020 Strategy, E.U. will allocate 3% of GDP to R&D activities. Eurostat data shows, that even if in 2016 the Gross Domestic Expenditure on the R&D in the EU-28 increased with 0.4% comparative with 2015, the gap between EU and USA remains. In this regard, for 2015 the level of expenditures was equal to two-thirds (66.6 %) of that recorded by the United States. Research and Development Intensity (defined as a R&D as a percentage of gross domestic product).

The highest R&D intensity in EU-28, in 2016, is in Sweden (3,25%) and Austria (3,09%). Together with Cyprus and Latvia, Romania is characterized by smallest ratios in EU (with less than 0.5% R&D intensity, according to Eurostat data for 2016).

If we correlate this information with Regional Innovation Scoreboard for 2016 and 2017 results, we see that Stockholm region in Sweden is the most innovative region in European Union. Also, Austria has two regions (Südösterreich and Ostösterreich) situated in top- 3 Strong Innovators.

From exploring of official statics, some relevant data for Regional Innovation System of North- East development region of Romania are presented below:

-With a population of 3,221,183 inhabitants, as of 2018 (Eurostat, January 2018), representing 16.49% of the total population of the country, the North-East Region has the largest number of inhabitants among the eight development regions.

-The North-East Region has the lowest GDP per capita among all the Romanian regions, with €5,900 per inhabitant as compared to €9,600 in Romania as a whole and just 39% of the EU average (Eurostat, 2017).

The region is considered a large higher education community, with local HEIs having high positioning in the national rankings. The region educates 13% of the national population enrolled in HEIs by using 18% of the country's teaching staff (Marinelli *et al.*, 2017).

During 2014-2016, from the analysis of the regional context regarding the R & D sector and the innovation potential for the period included in the "Regional Framework Document for the Strategy for Regional Research and Innovation through Intelligent Specialization NORD-EST", there are some aspects specific to the region, such as:

- public universities are leaders in terms of both student enrolment and research „production” and are the only ones that benefit from institutional public funds;
- higher education institutions (compared to other public research organizations) annually conclude most major research agreements with regional firms (approximately 65 per year between 2014 and 2016);
- there is a growing tendency for consultancy agreements with regional firms;
- the ability to transfer inventions to the economy and to capitalize on them is rather low;
- the limited motivation to set up spin-offs founded by faculty members, with only two such structures in the region, one explanation being that the legal framework in place in Romania is quite unclear.
- positive dynamics of centres of excellence and higher education research in the region (12 centres of excellence and 79 research centres were created after 2007);
- the presence of 9 regional clusters, most of them are affiliated to the Cluster Association of Romania (CLUSTERO).

The North-East region of Romania was one of the case studies included in the project Higher Education and Smart Specialization (HESS). The project developed for one year starting with 2016, by Joint Research Council (JRC) of European Commission, was concentrated on exploring the contribution that Higher Education Institutions (HEIs) can have on Smart Specialisation Strategies (S3). The JRC Report regarding the North East region outlines for HEIs both challenges related to S3 achievement and support activities to be developed in S3, in the context of a region with an early stage of the regional innovation system. (Marinelli *et al.*, 2017).

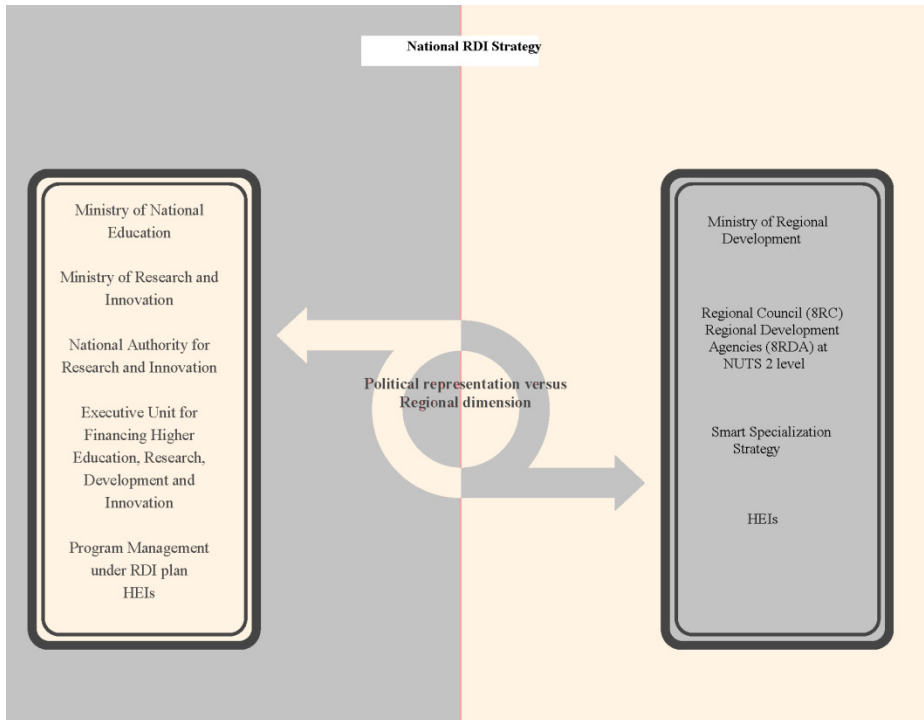
Relevant for this study, here are some challenges for HEIs concerning development of S3, included in the above Report:

- The main educational policy drivers are Ministry of Education and Ministry of Research and Innovation, top decision makers representing a higher education system strong centralized on the national level; on the other side, the eight development regions of Romania have only an administrative role, with limited



power in the field of education, research and innovation policies. These development regions are subordinated to Ministry of Regional Development and Public Administration. Therefore, there is a “fragmentation of the governance of regional innovation system” (Marinelli *et al.*, 2017) which generates specific challenges for achieving S3 (figure 3);

- The universities in the region are supporting smart specialization process mainly through teaching activities, which are connected to the regional innovation needs. However, the competencies for entrepreneurship have not enough representation in the curricula. They agreed on the demand for entrepreneurship and business management courses;
- Technology transfer activities are low developed. Universities have not improved yet the administrative capacity for supporting technological transfer activities. On the other side, the university-industry collaboration is at the beginning, as the region is in it's early regional innovation development, therefore the channels for knowledge exchange must be improved;
- Continuous education and long-life learning is a critical subject for achieving S3 in the region. HEIs must adapt their teaching activities in order to respond to the workforce needs and develop new competencies;
- There is a need for social engagement with business communities when designing the study programmes. Developing master studies addressing S3 priorities would be beneficial for graduate's access to labour market;
- There is no specific funding for research activities within S3 priority areas. Intra-regional and interdisciplinary collaboration among HEIs are important in the context of demands of S3 priorities related to the social and economic facts;
- Legislative, economic and cultural factors are the main barriers identified by the universities related to development of the technology transfer activities in the region, as following:
 - Legislative: even if the national education legislation provides technology transfer among the HEIs missions, there is no state funding allocated for these kind of activities;
 - Economic: the low-tech character of the local/regional economy and also the lack of the awareness of regional firms about potential benefits of engagement in knowledge transfer activities;
 - Cultural factors related to low capacities of HEIs in applied research and on the other side, the business culture of companies, which prefer ready-made solutions.

Figure 4. Political representation versus Regional dimension in North-East S3

Source: own representation

S3 priorities in North-East Romania are the result of a direct involvement of HEIs in the region to identification and selection of priorities, throughout the Entrepreneurial Discovery Process (EDP). The NE Romania S3 is based on horizontal and thematic (vertical) priorities, as presented in the Table 3.

The effects on the entrepreneurial potential of the universities involved in S3 implementing can be estimated using the structuring of third missions activities into three dimensions (Carrión *et al.*, 2012, p. 1219)

The three dimensions which are characterizing third mission activities are: Continuing Education, Technology Transfer&Innovation and Social Engagement.

Continuing Education is including „all learning activities undertaking through life, with the aim of improving knowledge, skills and competences with a personal, civic, social and/or employment related perspective (European Commission, 2001, cited in Carrión *et al.*, 2012, p. 1219).

Technology Transfer&Innovation is related to „the movement of an idea, tacit knowledge, know-how, technical knowledge, intellectual property, discovery or invention resulting from research carried out at universities into a non-academic environment, where it can lead to social and commercial benefits at local, regional, national or global levels (Carrión *et al.*, 2012, p. 1219).



Social Engagement is referring to “the role of universities to engage with its civic, cultural, industrial and business communities and the main activities that the university organises aimed to society at large or to specific sectors of the society to enrich them on the cultural or developmental field” (Carrión *et al.*, 2012, p. 1219).

The main smart specialization fields for North-East Region of Romania, included in S3 are: Agrofood, Biotechnologies, ICT, Textiles and New materials, Tourism, Environment. These are connected to “third mission” dimensions: Continuing Education, Social Engagement, Technology Transfer&Innovation. Therefore, S3 priorities are related to all three dimensions above described, which are characterizing third mission of the universities (see Table 4 in the Annex).

Conclusions

The Regional Innovation Scoreboard proved that performance over time changes. The assesment provided by Regional Innovation Scoreboard (2017 Report) shows that Nord-Est region of Romania is a Modest innovator, compared to the country, and also the EU. On the other hand, the North-East Region has the lowest GDP per capita among all the Romanian regions and just 39% of the EU average. Despite of the low level of economic development, the region has an important endogenous potential given by the demographic profile, but also by the research development field.

Although universities made efforts to adapt after 1990 to a new role as RDI players, the links between universities and industry remain weak. Taking into consideration the chronic underfunding of research, R&D activities in the academic environment depend only on project funding.

Higher Education Institutions (HEIs) were directly involved in S3 development, through the Entrepreneurial Discovery Process. The governance structure of S3 includes HEIs. Still, the separation between political representation and regional dimension in governance of regional innovation system, could generate challenges in achieving S3 objectives.

A series of legislative, economic and cultural factors were identified by the universities as the main barriers to development of the technology transfer activities in the region: no funding allocation for technology transfer activities, the low-tech character of the local/regional economy, low capacities of HEIs in applied research and on the other side, the business culture of companies, which prefer ready-made solutions.

Universities can support the regional innovation in general and S3 (RIS3) in particular by fulfilling education and research missions but also their „third mission”.

HEIs would increase the impact of their third missions if they integrate the regional dimensions into their education and research activities and engage more actively with civic, cultural and business communities.

Universities involvement in Regional Smart Specialization process can improve their capacity of assuming the „third mission”, through activities mainly centred on the following dimensions:

- Continuing education, by providing life-long learning services to meet workforce needs,
- Technology transfer and innovation, by improving their administrative capacity for technology transfer activities,
- Social engagement, by participating in decision-making together with local administration, but also by collaborating with business community.

North-East regional S3 priorities indicates that universities in the region can create regional innovation and development through their third mission achievement, therefore, there is a positive effect on their entrepreneurial potential. The main limitations of the study are related to a restricted approach for conceptual insights into regional innovation systems and contribution of universities' to smart specialization process.

Future research should address a more detailed analyses of the strong decline in innovation performance of North-East Region of Romania and how universities can contribute to gap reducing.

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Annexes

Table 4. North-East S3 Priorities and „Third Mission” dimensions

Horizontal Priorities	Vertical Priorities	S3 Result Indicators	Dimensions related to “third mission” supporting S3
Orizontal Priority 1 Development of Innovation competencies developing among new generation Measure 1.1 Promoting partnerships between regional education institutions to synchronize training offer with the current level of innovation in smart priority areas Measure 1.2 Promoting partnerships with regional education institutions to develop extracurricular activities, promoting creativity and innovative attitudes Measure 1.3 Promoting partnerships with regional education institutions to develop extracurricular activities, promoting creativity and innovative attitudes	Agrofood Biotechnologies ICT Textiles and new materials Tourism Environment	Number of functional „curricula partnerships” in the region in smart domains Number of „interdisciplinary curricula” developed in state universities Number of pre-university and university teachers who participated in study visits / technology fairs in smart domains Number of students and master students who participated in study visits/ training / internships in smart enterprises Number of students and master students participating in competitions of innovative ideas and projects organized in the Region Number of students and master students participating in competitions of innovative ideas and projects organized nationally or internationally	Continuing Education Continuing Education Continuing Education Social engagement Social engagement Social engagement
Orizontal Priority 2 Supporting innovative enterprises in North	Agrofood Biotechnologies ICT		

Horizontal Priorities	Vertical Priorities	S3 Result Indicators	Dimensions related to “third mission” supporting S3
East Region Measure 2.1 Support for turning innovative ideas into business ideas Measure 2.2 The development (creation, extension, endowment and accreditation) of Technology Transfer and Science and Technological Parks infrastructures and the skills of their own staff to diversify the supply of technology transfer services to market the results of the research Horizontal Priority 3 Supporting the initiatives of clusterization and internationalization Measure 3.1 Creating and strengthening business networks and clusters	Textiles and new materials Tourism Environment Agrofood Biotechnologies ICT Textiles and new materials Tourism Environment Agrofood Biotechnologies ICT Textiles and new materials Tourism Environment	Number of new innovation incubators and living labs Number of companies engaged in business support structures in the North-East Region Number of „simulated enterprises” that translate into practice innovative ideas of students Number of innovation infrastructure and technology transfer created / expanded or upgraded Number of companies engaged in TT entities Total number of companies integrated into business networks and / or clusters set up at regional level Number of inter-cluster and inter-network cooperation actions Number of people within business networks and clusters participating in training projects in management Number of projects developed in partnership on Smart	Technology Transfer&Innovation Technology Transfer&Innovation Technology Transfer&Innovation Technology Transfer&Innovation Technology Transfer&Innovation Social engagement Social engagement Social engagement Social engagement Social engagement



Horizontal Priorities	Vertical Priorities	S3 Result Indicators	Dimensions related to “third mission” supporting S3
Measure 3.2 Promoting interregional cooperation (especially thematic platforms S3) and international businesses Horizontal Priority 4 Technical assistance Measure 4.1 Developing the implementation, monitoring and evaluation systems of the S3 strategy Measure 4.2 Improving the administrative capacity of North-East Regional S3 governance structures Measure 4.3 Developing a continuous system of entrepreneurial discovery at the regional level		domains Number of projects promoted in the region Number of monitoring reports Number of participants in the evaluation and knowledge transfer activities Number of smart development solutions as a result of EDP	Social engagement Social engagement Social engagement

Source: North -East Region S3⁵

⁵ Read more at http://adnorddest.ro/user/file/news/17/RIS3_Nord-Est_05_12_2017.pdf.