(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 6, Issue 3, 2016

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Fields of Smart Specializations and the Romanian Research

Codruța Ilinca DRĂGOIU

National Scientific Research Institute for Labour and Social Protection – INCSMPS

Abstract. *This article aims at identifying the presence of the smart specialization fields in the Romanian research and the strategies related to this field. By reviewing policies regarding EU and Romanian research, we outlined a succinct picture of national goals and developing smart specialization fields in Romanian research.*

Keywords: RD&I strategies, fields of smart specialisation, the national R&D system.

JEL Codes: I23, O31, O38.

1. EU's strategies for research, development and innovation

The EU Cohesion Policy 2014-2020 foresees the need for regions and member states to channel EU investment into four key fields for economic growth and employment creation: Research, Development and Innovation (RD&I); Information and Communication Technologies (ICT); Enhancing the competitiveness of small and medium-sized enterprises (SMEs); supporting the shift towards a low-carbon economy.

Launched in January 2014, with a funding of 80 billion Euros over the 2014 to 2020 period, Horizon 2020 Program is EU's most comprehensive research and innovation program. Being a means of stimulating economic growth and creating employment, it is placed at the heart of the Europe 2020 strategy for smart, sustainable and inclusive economic growth. Strengthening EU's capacity for the scientific field and industrial innovation (investing in key technologies, facilitating access to capital and supporting SMEs) is one of the objectives of this integrated program. The importance of innovation is also highlighted through the increase of investments in innovation in 2017 by 51.6 million Euros [1]. The Horizon 2020 work program for 2016-2017 was updated on July 25th, 2016. Thus, its budget was increased for investment in SMEs innovation, with four themes: Healthcare and biotechnology; Sustainable agriculture, forestry; Blue growth (sustainable development of the entire marine and maritime sectors); Climate, environment, raw materials, and efficient use of resources.

2. Romanian Strategies for RD&I

National Research, Development and Innovation Strategy (SNCDI) 2014-2020, in force from 28.10.2014, through the publication of GD no. 929/2014 in the Official Gazette, Part I no. 785 / 28.10.2014,

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 6, Issue 3, 2017

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

identified two types of priorities: *smart specialization* and *public relevance*. Smart specialization priorities imply the consolidation of high competence areas with real/potential comparative advantages that can make a significant contribution to GDP. By concentrating resources and mobilizing a critical mass of researchers, these fields can ensure competitiveness on regional and/or global added value chains [1], through their regional dimension as well, while priorities with public relevance aim at allocating resources in fields where research and technological development respond to concrete and pressing social needs. These priorities imply the development of the public sector's ability to oversee emerging technologies and to demand innovative solutions from public and private RD&I operators. Within the National Research, Development and Innovation Strategy (SNCDI) 2014-2020, fundamental research remains a priority, including humanities and socio-economic disciplines as a source for border and interdisciplinary research [1]. The orientation of RD&I policies towards research activities of economic relevance is supported by smart specialization, which targets all scientific disciplines, involving the stimulation of regional or global oriented economic behaviour, the understanding of the social impact of science, technology and economic activities in the relevant sectors and interdisciplinary research and development. Smart specialization is a dynamic process that involves collecting and analyzing data at regional and national level, based on a comprehensive monitoring mechanism. Also, according to paragraph 4.2 "Supporting smart specialization" of the SNCDI 2014-2020, "smart specialization is supported by a set of tools covering the whole spectrum of creative activities, from idea to market, and highlights collaborations, as well as partnerships between various operators". [1]

Following a consultation process, on the basis of their scientific and commercial potential, the fields of smart specialization for the 2014-2020 Strategic Cycle were identified: Bioeconomy[1]; Information and communication technology, space and security[2]; Energy, environment and climate change[3]; Eco-nanotechnologies and advanced materials[4].

The National RD&I Plan 2015-2020 and the Competitiveness Operational Programme (POC) – the goal "Increasing the capacity of the RD&I system for 2014-2020" represent two of the main instruments by which SNCDI 2020 is implemented. After the 2007-2013 programming period aimed at increasing RD&I capacity, stimulating cooperation between RD&I institutions and enterprises and increasing RD&I access to companies, the POC 2014-2020 aims at developing scientific expertise, entrepreneurship initiatives and financial opportunities, strongly tied to the fields of smart specialization relevant for Romania and mentioned above, to which national health sector has been added. [2]

[1] This domain benefits from the huge potential of Romanian agriculture in the context of a growing local food industry and growing standards of successful applied research in this field and in the pharmaceutical industry, as well as in the context of global trends such as the high demand for food.
[2] This domain is one of the most dynamic in the country. Software development, technologies for the internet of the future and high-performance computing, all play a central role in solving major societal problems.
[3] Energy research supports the reduction of Romania's energy dependence, by the high exploitation of fossil fuels, the diversification of national (nuclear, renewable, clean), multi-purpose (smart grids) and increased efficiency for the consumer.
[4] The domain belongs to Generic Essential Technologies (TGE), a priority at European level, which uses intensive RD&I. The field is driven by the international competitiveness of the Romanian automotive industry, the high capital inflow and the dynamics of exports in this sector. Nanotechnologies have great innovative potential, support SMEs and ensure Romania's technological competitiveness.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 6, Issue 3, 2016

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

3. The fields of smart specialization and Romanian research

In Romania, the research and development activity is a national priority. It has a decisive role in the sustainable economic development strategy (Article 3, paragraph 1, of GEO No. 57/2002 on scientific research and technological development, with the subsequent modifications and completions[5]), and the right to carry out research, development and innovation activities is recognized to any natural or legal person (Article 5, paragraph 1, GEO No. 57/2002). According to the same normative act, Article 1 states that "Scientific research, experimental development and innovation are the main activities creating knowledge and generating economic and social progress, encouraged and supported by the state according to the Romanian Constitution, republished, and the present ordinance."

The national research and development system consists of all units and public law institutions[6] and private law institutions[7], which target research and development. Other types of organizations (such as catalysts – technology transfer, business centres, technology information centres, technology parks, hospitals, NGOs) play an important role, as well.

The public authority institutional collaboration – the private sector–public research sector – is realized through the National Council for Science, Technology, and Innovation Policy (CNPSTI), under the direct supervision of the Prime Minister, and other consultative bodies with a tripartite composition (representatives of the public authorities, the private environment and the research sector).

The process of smart specialization is dynamic and involves the collection and ongoing analysis of data, at regional and national levels, as well as a monitoring mechanism within the strategic cycle. Smart specialization is supported by tools that cover the whole spectrum of creative activities[8], from idea to market, and that highlights collaborations and partnerships between different operators. [1] In Figure 1 are presented the main fields of smart specialization existing in the Romanian research system, with their development priorities.

Smart specialization fields are open, in principle, to any scientific discipline. In a narrow sense, for example, the field of research of the National Research and Development Institutes (INCD) under the

[5] L no. 324/2003; GO nr. 86/2003 ; GO no. 38/2004 ; L no. 230/2004 ; L no. 381/2005 ; GO no. 58/2006 ; GEO no. 88/2006 ; GEO no. 4/2009 ; L no. 305/2009 ; GEO no. 114/2009 ; GEO no. 74/2010 ; GO no. 6/2011 ; GEO no. 92/2012 ; GO no. 41/2015.

[6] The national research and development system comprises the following categories of units and institutions of public law according to the provisions of Art. 7 from GEO no. 57/2002: national research and development institutes; accredited state higher education institutions or their research and development structures, without no legal entity, established according to the University Charter; institutes, centres or research-development centres subordinated to the Romanian Academy or their branches; other institutes, centres or research-development centres organized as public or public law institutions; international research and development centres established on the basis of international agreements; institutes or research-development centres organized within national societies, national companies and autonomous administrative divisions; other public or public law institutions, which have as their subject-matter the research and development or their legally constituted structures. (Article 7 of GEO No. 57/2002)

[7] The following categories of private law units and institutions are also included in the national research and development system: accredited private higher education institutions or their R&D structures, with no legal entity, established under the University Charter; institutes or research-development centres without patrimonial purpose, recognized for public use; other institutes, centres or research and development centres organized as private legal entities without patrimonial purpose; other non-governmental organizations, without patrimonial purpose, which have as object of activity the research-development or their legally constituted structures; companies whose main activity is research and development; companies that have their business and research-development or their legally constituted structures. (Article 8 of GEO No. 57/2002)

[8] And areas such as the preservation of cultural heritage and national identity, for example, become in the era of globalization and accelerated development of the knowledge society, increasingly convergent with the development of social cohesion, with the expansion of societal openness and intercultural communication.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 6, Issue 3, 2017

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

coordination of ANCS includes the following fields of intelligent specialization: Physics, Chemistry, Biology – Medicine, Microtechnology, Geology and Technical.

SMART SPECIALISATION FIELDS	PRIORITY FIELDS OF SMART SPECIALISATION
BIOECONOMY	Bioenergy - biogas, biomass, biofuel Bionanotechnologies Industrial biotechnologies Environmental biotechnologies Agri-food biotechnologies Medical and pharmaceutical biotechnologies
INFORMATION AND COMMUNICATION TECHNOLOGY	Technologies, tools and methods for software development
ENERGY, ENVIRONMENT AND CLIMATE CHANGE	Increasing energy efficiency to the consumer Optimal use of conventional and unconventional water resources Smart city
ECO-NANOTECHNOLOGIES AND ADVANCED MATERIALS	New generations of environmentally friendly and energy-efficient vehicles and technologies Innovative technologies, equipment and systems for the production of food and non-food bioresource
HEALTH	• Reproductive, maternal-fetal and perinatal medicine • Early diagnosis, personalized treatment, monitoring and prognosis in oncology • Healthy aging, lifestyle and public health • Personalized / group therapy and therapeutic monitoring • Quantitative systemic pharmacology and systemic toxicity: correlation, modelling and prediction • the elaboration of the national strategy
SPACE AND SECURITY	Integrated space technology applications Innovative methods and technologies for cross-border fight against terrorism, organized crime, human and goods trafficking

Fig. 1: Smart Specialisation and the Romanian Research
Source: Selection made by the author from the Detailed description of selected priorities (December 2013 version), The Elaboration of the National Strategy for Research, Technological Development and Innovation 2014-2020, MENCS. [3]

Despite the economic competitiveness gap that Romania faces, it has significant potential for regional clusters in Information and Communications Technology (ICT), nanosciences and nanotechnologies, automobiles, computer security and production technologies, which are based on the existence of a scientific and technological capacity. [4] Promoting economic growth by strengthening research, technological development and innovation is one of the development goals that the European Commission

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 6, Issue 3, 2016

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

has proposed in the 2014-2020 Partnership Agreement for Romania for the planning and use of structural funds. It is therefore expected that RD&I oriented industries are particularly encouraged. Romania will be able to improve its long-term competitiveness by implementing a national strategy for industry and innovation that includes coherent and coordinated policies and priorities by concentrating resources on areas of comparative advantage. The country report of the European Commission on Romania for 2016 has highlighted a number of issues that require special attention for RD&I policy. Insufficient RD&I investments, unfavourable business environment and the limited number of highly qualified workers are among the factors contributing to the low share of exports of high technology products. The importance of high-tech products has declined since 2011, when it reached a record – 10% of exports. Romania is far behind other EU member states in terms of resources invested in RD&I. Research and innovation activities are mainly burdened by the insufficient level of funding, to which the reduced collaboration between the public sector and the private sector is added and the fragmented institutional framework. [5]

Romania's 2% GDP target for spending on RD&I (1% of GDP in public spending and 1% of GDP in private expenditure) is difficult to achieve given the lowest level in the EU is that of just 0,38% in 2014 (see Fig. 2), a year in which the RD&I public spending intensity continued the declining trend started in 2007. It is only the investments of enterprises in RD&I that increased to 0.16% of GDP in 2014 (27th place in the EU) [6], but this still remains insufficient.

	What Romania has assumed through the Europe strategy 2020	Level achieved by Romania in 2014	What EU has assumed through the Europe strategy 2020
RD&I expenditures (%GDP)	2%	0,38%	3%

Fig. 2 RD&I expenditures – assumed and achieved
Source: The Europe 2020 strategy and the EU Country Report – Romania 2016 [6]

The same document identified that the low business environment complexity and the generally low quality of the science base[9] affects Romania's capacity to attract business investments into RD&I and to stimulate cooperation between the public sector and the private sector in the field of research and innovation. In the recent years, several new technology enterprises have been set up around some ICT entrepreneurs, but this phenomenon remains limited.

Romania's results are also well below the EU average in terms of the share of enterprises that have introduced technological innovations (34% of the EU average) and non-technological innovations (63% of the EU average) in the market or within their structures, with a strong decline in 2014 compared to the previous year for SMEs that are innovating using internal resources.

[9] The low quality of the Romanian scientific base is evidenced by the quotation of Romanian scientific publications among the 10% of the world's most cited publications, where Romania ranks 25th among EU member states.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 6, Issue 3, 2017

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

In order to develop and maintain sound innovation governance, measures have been taken to facilitate SMEs' access to credit and to support start-ups based on knowledge. Thus, Law no. 20/2015 on the *stimulation of individual* investors – *business angels* was adopted [7]. Moreover, for entrepreneurs with innovative ideas, the creation of two investment funds is considered, one with capital at its establishment and seed capital and innovative start-ups, one with venture capital and growth capital. However, in order to make these measures achieve their goal, the European Commission's Country Report of Romania for 2015 considers that "a coordinated and integrated perspective on the RD&I system in the context of an approach that promotes intelligent specialization, supported by stability and the predictability of resources and a more effective partnership between the public and private sectors" is necessary.

The amendments made to the SNCDI 2020, at the beginning of 2017[10], mainly aim at a better representation of the nuclear energy field, important sector for research activity in Romania, which contributes to meeting the objectives of the documents underlying the national development strategy. Among the eight new provisions it introduced, we underline:

–inclusion as a priority of the consolidation of the integration in the European research field, including through support of the participation of the research organizations and university centres in specialized structures, thematic networks or European technological platforms of interest for Romania;

–promotion and support of the research component in Romania's strategic partnerships;

–supporting participation in activities of international organizations or initiatives (CERN, ESA, IAEA, NEA, etc.), which require affiliation or scientific cooperation agreements based on integrated participation plans;

–development and support of scientific and technological cooperation under the strategic partnership with the US.

4. Final remarks

As a result of the proposed approach, namely identifying the areas of smart specialisation presence in the Romanian research and strategies in the field, we can highlight the following remarks, also extracted from all of the documents considered.

The development of intelligent strategy fields is a priority in the Romanian political strategies and is the subject of research in many institutions.

The field of eco-nanotechnologies and advanced materials is supported by a developed technical education system, with important contributions to the development of the mentioned industrial sectors. There are a large number of national institutes of Research and Development, institutes of the Romanian Academy, other types of organizations, which have at least one of the main fields of research in the field of advanced materials. These institutes have benefited in the recent years from major infrastructure investments through national and international funding programs, and have the material basis for conducting significant research with high economic potential [1].

[10] Fundamental Note – GD no. 81 / 27.02.2017 for the modification and completion of the National Strategy for Research, Development and Innovation 2014-2020, approved by the Government Decision no. 929/2014

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 6, Issue 3, 2016

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Considering the recent amendments made to the SNCDI 2020 by the Romanian Government[11], the synergistic correlation of RD&I policies with the policies of other sectors, namely the energy sector, nuclear energy with priority, through effective recognition of the priority status of real promoter of economic and social development, ensuring a diversified energy mix is required. The Regional smart specialization strategies must be correlated with the Energy Strategy, the National Strategy for nuclear safety, as documents that have included research objectives.

Both smart specialization priorities and those with public relevance take into account, besides the development of innovative technologies and solutions, the stimulation of certain types of behaviour of relevant operators and the understanding of the social impact of science, technology and economic activities in the targeted sectors. Thus, these two priority classes imply interdisciplinary research and development activities, beyond traditional disciplinary demarcations [1].

5. Acknowledgements

This work was supported by a grant of the Romanian National Authority for Scientific Research ANCS, Nucleus Program – PN 16440101 (The New Geography of Jobs in Romania – Labour Market Spatial Perspectives), Acronym: Nucleu 17N/11.03.2016; Research contract 44N/2016, ANCS.

6. References

[1] Strategia Naţională de Cercetare, Dezvoltare şi Inovare (SNCDI) 2014-2020, HGR nr.929/2014. Available at http://lege5.ro/wpnative/Mobile/App/Document/gqydmnzugq/strategia-nationala-de-cercetare-dezvoltare-si-inovare-2014-2020-din-21102014.

[2] Fonduri-structurale.ro; available at: http://www.fonduri-ue.ro/

[3] The Elaboration of the National Strategy for Research, Technological Development and Innovation 2014-2020, MENCS; available at: http://www.cdi2020.ro/wp-content/uploads/2014/06/Descrierea-detaliata-a-prioritatilor-selectate.pdf

[4] The 2014 Report of the Ministry of National Education and Research (MENCS) – Research Activity, Government Policy on Research, Development and Innovation in Romania (most recently available), www.edu.ro

[5] European Commission, Romania Country Report for 2015, Commission Staff Working Paper, p. 31.

[6] European Commission Country Report on Romania for 2016 – Commission staff working document Country Report Romania 2016 Including an In-Depth Review on the prevention and correction of macroeconomic imbalances, Brussels, 26.2.2016 SWD(2016) 91 final; Available at http://ec.europa.eu/europe2020/pdf/csr2016/cr2016_romania_ro.pdf

[7] Legea nr. 120/2015 privind stimularea investitorilor individuali – business angels, publicată în Monitorul Oficial, Partea I nr. 382 din 2 iunie 2015

[11] Fundamental Note – GD no. 81 / 27.02.2017 for the modification and completion of the National Strategy for Research, Development and Innovation 2014-2020, approved by the Government Decision no. 929/2014