Smart Specialization Concept with Some Evidence for the Regional Development in Romania

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Abstract: *The aim of this article is to study the concept of Smart Specialization and to explore some evidences of how it is implemented in the regions from Romania. The concept refers to investments in knowledge activities and not in sectors. There are defined specific policy objectives that will have a specific impact in scientific and economic domains. The public resources that are invested in R&D have the purpose to stimulate the public-private partnerships, to foster innovations and to create a pool of knowledge and spill-overs to the targeted regions. The regions from the states from European Union need to apply RIS3 strategies for investments in R&D and innovation due to pre-existing conditions to access funds from European Regional Development Fund (ERDF). The European Commission launched an on-line Smart Specialization Platform (S3platform) to assist the members to develop, implement and compare smart specialization strategies and to offer data for national and regional authorities to identify the specific activities with high-added value to improve the regional competitiveness. Some indicators are presented to show the Romanian efforts for R&D and private innovation capabilities, the pre-identified potential for smart specialisation within the regions and some current evidence available on the S3platform.*

Keywords*:* smart specialization, research&development, innovation, regional development

JEL Classification: L52, O38, R11

1. Introduction

The purpose of the Smart Specialization concept is to support regional innovation strategies. After identifying some competitive advantages of each region, some strategies are designed to foster the development of the stakeholders and efficient resource utilization. Smart specialization is also about improving innovation structures by positive knowledge externalities and diffusing innovations through the regional economic system. The regions and European Member states need to have Research and Innovation Strategies for Smart Specialisation (RIS3) strategies for their investments because it is a pre-condition to access funds from European Regional Development Fund (ERDF).

Foray and Van Ark (2007) argue that creating true "centres of excellence" with narrow and deep specializations in a few scientific fields will create more benefits in the long term than if each individual country would have low-level expertise in many scientific fields. The author arguments that is better to choose an investment policy to support programs that will complement the region's or country's capabilities with a bigger impact in a certain area. A less effective policy means several investments in some technological fields which would not make any impact to the field or to the region. In this framework, public policies will generate a growth path by enhancing the levels of productivity and competitiveness of a region. Directed R&D and innovation investments will influence the scientific and technologic path and specialization of a region.

The purpose of Smart specialization is to invest public funds more efficient into research. After the regional strengths of a region are analyzed, it will access funding for R&D and create a network between research entities, universities, research hubs and local business environment. The focus is to obtain specific and specialized knowledge within an area which is unique and close to the knowledge frontier of the world. The European Commission launched a Smart Specialisation Platform (S3Platform) with the purpose to assist European members to develop, compare and implement smart specialization strategies and to offer data for regions to identify activities with high-added value to enhance their competitiveness.

2. Literature review

In the smart specialization concept, European regions are constrained to identify specific activities, domains or technological fields where they could benefit from specific competitive advantages and they will direct regional policies to enhance and diffuse innovations in these areas. The Smart Specialization concept is the vision in which local companies can direct their entrepreneurial effort in a specific direction of innovation. Foray (2009) argues that this concept is not a form of centralized industrial policy related to some form of subsidies directed to some random sectors from a top-down perspective.

Sandu (2012) considers that the system of indicators to measure smart specialization in a region could be composed of:

- Indicators which describe the potential for RDI of a region, the current level of R&D and the level of technologic specialisation. In this case, already existent indicators consist of RDI expenditures, patents, publications, new products and technologies, RDI human resources, etc.;

- Economic indicators to find new opportunities of development of new industries based on R&D with good development perspectives measured with increasing productivity, market share, turnover, profit etc.;

- Indicators to measure the relationship and the level of cooperation between companies oriented towards R&D and other stakeholders which yield a certain number of cooperation agreements, spin-off companies, inventions, clusters, public-private companies etc.

Zaluska and Soltys (2016) analyzed the dynamics of the fields of smart specialization within the Pomeranian Voivodhip in Poland. The authors identified the smart specialisation components within the region, discussed some challenges and problems which occurred during the process and made some personal observations.

3. The progress towards smart specialisation in Romania

The Smart Specialisation concept is a process of discovery driven by market forces (Foray et al., 2009). In this view, the policy does not enforce a top-down approach in which economic agents are constrained to specialize ex-ante in some specific activities. The purpose is to develop a region at the highest possible level from a science and technology point of view. An entrepreneurial learning process of self-discovery will take place and specific innovations will occur. Economic agents will use the local/regional resources and they will use the benefits of networking and cooperation to gain heterogeneous social capital. Policy makers are gathering information with respect to what particular field could excel from a region, but they are coordinating the local economic agents to create and maintain relationships for the self-discovering innovating activities. There is a certain degree of uncertainty and risk, and local entrepreneurs are motivated in finding appropriate technologies, processes, resources, products and ways to become more competitive and to be situated on the frontier of S&T developments.

Smart Specialisation is about a strategic vision for a diversity of heterogeneous and particular specialisations. The specialisation does not have specific targets but rather to stimulate the creation of new or innovative activities within a network which is by itself based on knowledge. Economic agents will find heterogeneous means of productions, processes or products by identifying particular solutions for a specific diversification. In the past, public policies were oriented in creating homogeneous research facilities of activities. The purpose is supporting advanced knowledge networks which can compete internationally on the long-term. In the smart specialisation concept, the scope is to regionally direct resources in ways that will generate specific activities that are situated on the technology frontier.

Smart specialisation requires a certain amount of flexibility to choose which innovations should be supported and which ones should be terminated. Benchmarks are needed to determine if a certain path of activities is productive or the subsidies could be wasted. The policy maker should decide if the criteria are viable and can be accomplished before the R&D investments are started. The question is if the regional actors are capable of generating spill-overs and a sustainable network and innovations. Measurable goals and objectives are needed for an efficient

evaluation of the directed subsidies. For example, is the sector of economy large enough to sustain innovations and to benefit from the spillovers from the development of the new activities? (Foray et al., 2009)

In many regions we can find a lack of resources in the R&D activities which will negatively influence the evolution of structural changes within the economy to become more innovative. Although smart specialisation is directed towards the development of the local economy and creating a pool of knowledge, the public sector should become more competitive at the international level. Local companies can become more innovative and more knowledge-oriented if they subcontract and develop public-private contracts and benefit from the spill-overs. A sustainable economic development could be obtained if the research hubs and Universities become more active on the knowledge market.

Jucevičius and Galbuogienė (2014) discussed some applications of the smart specialisation for a better understanding of the less developed regions with respect to their competitive position within an economic system:

- The fields in which a region has comparative advantage related to other regions;
- Competitive strategies targeted to enhance the heterogeneous strengths;
- A vision of improving the quality of the business sector by particular activities that will deepen the specialisation towards some technological domains;
- A local culture of innovation that will enhance knowledge generation for all the local stakeholders;
- A better coordination of concentrating all available resources from regional, national and European Union sources.

Table 1 - Indicators for the RDI progress in Romania

	2011	2012	2013	2014
Romania GDP in Current prices, million Euro *	133306	133511	144254	150358
Scientific evidence				
Total R&D spending of government sector as a share of GDP (%) *	0.20	0.20	0.19	0.16
Total R&D personnel and researchers full-time in government sector, as (%) of active population *	0.12	0.13	0.14	0.13
Venture capital investment as % of GDP *	0.04	0.02	0.03	0.03
Number of project for R&D activity according NABS **	9518	8394	7421	8143
Spill-over in the private sector				
R&D spending of the business sector as a share of GDP (%) *	0.17	0.19	0.12	0.16
Total R&D personnel and researchers full-time in business enterprise sector, as (%) of active population *	0.11	0.12	0.12	0.12
Number of patent applications to the EPO by priority year *	60	72	85	102
Number of patents granted by the USPTO by priority year *	48	-	-	-
Number of European Union trade mark (EUTM) publications *	410	394	358	475

Economic impact				
Innovative enterprises that received funding from the European Union as (%) of funded companies *	-	11.10	-	8.30
Innovative enterprises that received funding from central government as (%) of funded companies *	-	7.00	-	14.70
Innovative enterprises that received funding from local or regional authorities as (%) of funded companies *	-	3.50	-	3.00
Innovative enterprises that received funding from the 7th Framework Programme as (%) of funded companies *	-	2.10	-	3.20

Source: Eurostat http://ec.europa.eu/eurostat/data/database and http://statistici.insse.ro/shop/***

The challenges for Romania are both for the R&D structure and to the business environment. Although the GDP is increasing between 2011 and 2014, the share of R&D investment for the government sector and researchers is either decreasing or remaining at a modest level. Also, the number of R&D projects and venture capital investments is remaining approximately the same. In the business sector there is no significant change of the R&D investments and number of researchers employed in the business sector. However, some positive changes are in the number of patent applications and the number of companies that received funding from the government.

Several indicators were used to measure the progress towards smart specialisation in Romania. For example, when the number of researchers is increasing in the private sector the opportunities are growing towards the knowledge output that can result, and companies are becoming more competitive. Spill-overs from Universities can be faster adapted to the local needs and the demand is created within regional companies. Private researchers will cooperate more with public entities resulting in more innovations for the companies. Knowledge and innovation activities have particular attributes which are related to cooperation and public-private partnerships. A knowledge-based company will use more licenses and patents and will contribute more to the regional economy.

Romania has the lowest intensity in R&D from European Union and there is no progress in reaching the national R&D investment target. In the European Union there are increasing efforts of cooperation between the academic and business environment. Romania should strengthen the relationship between R&D from research facilities and the business environment in order to benefit from an increasing amount of spill-overs that will generate innovations. The increasing number of patent applications in the Romanian private sector is a sign of the innovation oriented business environment.

There are several implications from the evidence related to the link between R&D activities and business environment and several issues can be addressed:

- How to reduce the barriers in the cooperation between research centers and the private sector;

- How to increase the funding for R&D

from central and local authorities to the private companies;

- How to support the SMEs in activities for the transfer of knowledge;

- How to support the activities of R&D in the private companies;

- How to foster a culture for innovation in entrepreneurship and high-technology transfers;

- How to increase the venture capital investments and to increase the rate of innovative enterprises.

In order to improve the policy coordination of the RDI system and to boost the innovation performance, there were made several recommendations by the European Commission, within the country report of RDI fo Romania in Horizon 2020:

- To create a coordinated structure for the R&D system that will increase the availability of the resources in the next years;

- To create research capacities in the-approach for smart specialisation that will increase the competitiveness of regions and high-quality human resources;

- To support partnerships between Universities and business environment.

4. The RDI strategy and the areas of smart specialisation in the regions of Romania

In "Analysis and Evidence Base of the R&D&I Market in Romania" (2013) we find an exhaustive approach that uses the elements and priorities of the smart specialization concept. The supply side is the R&D component which is measured by the degree of scientific knowledge creation. The demand side is measured by the degree of competition within an economy. There is a strong connection between the supply and demand-side which has an economic impact to the innovation structure of the business sector.

The areas for smart specialisation which resulted from the process of selection by experts and which are found in the Romanian National Strategy for RDI are:

- Bioeconomy;
- Information technology, space and security;
- Energy, environment and climatic changes;
- Eco-nanotechnologies and advanced materials. Along with these four smart specialisations, there were identified three national priorities:
- Health;
- Patrimony and cultural identity;
- New and emerging technologies.

However, effort is made in Romania towards implementing the smart specialization concept. The National Strategy for RDI, 2014-2020 was designed as a foresight exercise to identify the prioritization domains for investing in R&D. An important group of stakeholders and experts were mobilized to select the strategic domains and the strategic objectives for 2014-2020. In the strategy we find elements regarding R&D and innovation issues, from the structures of investments regarding the smart specialisation priorities, to interests of public priorities and to domains of research. The specialisation priorities are seen as a process, which were identified and selected in steps by the stakeholders and experts, according to the opinions of the specialists from the fields of interest.

The Romanian strategy for R&D and innovation, 2014-2020 includes several important components:

- The vision for Romania for 2020;
- The selection of the important and limited domains for Smart Specialisation and the fields of public interests;
- The Plan for the implementation of the Strategy and the Operational program for R&D and innovation;
- The governance model for the implementation of the ecosystem for R&D and innovation.

5. Areas with potential for smart specialisation in the Romanian regions

Smart specialisation refers to investments of knowledge resources in activities, not in sectors. The priority of investments is to enhance specific activities to gain more productivity levels. Although sectors are important, the focus of R&D is on activities so that local companies will become more competitive. Within the production process, local companies are creating spill-overs and positive knowledge externalities to generate more local scale economies for the particular activities. The priorities are related to the existing facilities of production with respect to innovative activities which are seen as complementary. A combination of innovative processes with the regional strengths will enhance the sustainability and competitiveness of the regional economy. The purpose of the smart specialisation is to improve the unique characteristics of the regional economy, to integrate in the local structures and patterns of growth. The purpose is not the imitation of other regional structures, processes, production facilities etc.

Within the "Analysis and Evidence Base of the R&D&I Market in Romania" (2013) are identified the unique particularities and assets of each region, the competitive advantages are emphasized and regional actors and resources are brought together in a vision of excellence. The basis for the future smart specialisation resulted from workshop discussions related to the sectors and research themes for each region. Several indicators related to the number of companies, income and added value were benchmarked to other member states from European Union. The regional context and the potential of innovation is also analyzed, and a profile of development was created for each region of Romania. The following perspectives on the areas of target for smart specialisation were considered by the selected experts:

Table 2 - Potential of smart specialisation in Romanian regions

Region	Sector	Innovation	Smart
Center	Energy	Biomass	Automated combustion system for biomass derived from energy plantations
North-East	Textiles	Technical Textiles	Multifunctional textiles for protective garments
South-Muntenia	Automotive	Research nuclei	Materials Experimental studies Modernised components; Fabrication technologies; Passive Safety.
Bucharest- Ilfov	Electronics	Mechatronics	Intelligent marine energetic systems
	Machinery and Equipment	Agricultural machinery	Intelligent Agriculture
	Textiles	Technical Textiles	Technical textiles for health, automotive, Agrofood
South-West Oltenia	Tourism	Danube Strategy	Danube Tourism, tool for Regional Economic Development
West	Agro Food	Biotechnology	Detection and quantification of genetically modified organisms in agricultural products and food
	Energy	Renewable Energy	Solar power for use with irrigation systems
	IT	IT for non IT	Personalised IT business solutions

Source: http://www.poscce.research.gov.ro/uploads/programare-2014-2020/final-report-12-aprilie.pdf

6.The policy goals and some evidence for Romanian regions from the Smart Specialisation Platform

On the smart specialisation platform available online, data for public investment priorities for innovation can be accessed for regions across Europe. Smart specialisation is both a policy objective to constrain the regions to invest and a process to assist policy-makers to identify the activities and domains for potential specialization (Foray and Goenaga, 2013). The government has the challenge to vertically choose the policy objectives regarding the technological domains of interest. The contradictions may appear between the allocation of resources from the market and the technological activities which are publicly funded. However, this policy is about combining the intervention of the R&D resources with the activities and the fields identified by the private sector.

The principles of policy objectives for smart specialisation can be described as: (Foray and Goenaga, 2013)

- A non-neutral policy;
- A process of entrepreneurial discovery;

- A process of interaction between policy-makers and the business sector;
- The intervention is oriented towards activities;
- Changing priorities in time;
- An experimental component of the policy;
- The areas of interventions are revealed within a process.

The goals of the policy are oriented towards: (Foray and Goenaga, 2013)

- supporting the emergence of new activities that could generate important innovations and spillovers;
- a diversification of the regional structure of the economy by generating new possibilities;
- fostering a diversified structure of clusters and networks with a critical mass.

Table 3 - Some evidence for Romanian regions from the Smart Specialisation Platform

Region	Sector	Policy Objectives	Date of Source
North-East	Textile	Other	2014
	Healthy Ageing, Healthy Living and Tourism	Industrial biotechnology, Nature & biodiversity, Social innovation etc.	2014
	Agro-food	Public health & security	2014
	Biotechnology	Other	2014
	Energy & Environment	Sustainable innovation	2014
	ICT and ICT - creative media	Digital transformation and Cultural & creative industries	2014
Bucharest-Ilfov	Tunable graphene plasmonics, metamaterials	Advanced materials	2014
West	Eco building & eco construction	Sustainable innovation	2012

Source: http://s3platform.jrc.ec.europa.eu/map

It beyond this purpose of this article to discuss the exhaustive data corresponding to each variable: Sector and Policy objectives. However, all the Romanian regions which have data from the smart specialisation platform can be seen here: North-East, Bucharest-Ilfov and West. The tool has been fully upgraded in 2017 and data are permanently updated by the national and regional authorities and the stakeholders within the entrepreneurial discovery process. Comparing the data from Table 2 with data from Table 3 we can find several differences between the potential of the regions and what was uploaded on the S3platform. For the North-East region we find that Textiles sector is developing its potential, but new sectors occurred in Agro-food, Biotechnology etc. Bucharest-Ilfov has potential in Electronics, Machinery equipment and Textiles but in Table 3 we find developments for Tunable graphene plasmonics and metamaterials. In West region

we find potential for Agro food, Energy and IT and the uploaded data on S3platform shows developments for Eco building & eco-construction. However, on the platform is not specified if the regions did not update the data for their sectors of activities, the available data could be incomplete, different paths of innovation were discovered by the market forces or projects are currently under development.

Future research could be done to analyze the economic development related to scientific domains and policy objectives and how all the Romanian regions will future develop in relation with the policy objectives.

7. Conclusions

Romania is currently a modest innovator with low R&D results and spillovers to the private sector. An increased public spending in R&D is needed which means a bigger budget from GDP. The regions are developing with respect to knowledge creation and innovation when public-private partnerships are created, which means fostering the private demand for research and scientific oriented activities. Romania has made progress towards smart specialisation by defining the fields of specializations within the Romanian National Strategy for RDI.. There is a weak relationship between Universities, Research Hubs and private sector which limits the flow of knowledge, from R&D to innovation. Comparing the data for the for smart specialisation in the regions from Romania show differences between the pre-identified potential and the current development of the economy available on the S3platform.

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