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Analysis and Evidence Base of the R&D&I Market in Romania

Recommendations Report

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1 Background

1.1 Introduction

OVE ARUP and Partners Ireland (Arup) has undertaken an assignment under the Framework agreement for technical assistance to JASPERS beneficiary countries to support the review and analysis of the Research, Technological Development and Innovation (RDTI) based activities within Romania referred to as the 'Analysis & Evidence Base of R&D&I Market in Romania'. This assignment is within the context of establishing a Smart Specialisation Strategy (RIS3), which is a pre-condition for accessing funding under the thematic priority for research and development within the 2014 to 2020 European Structural Funds.

This strategy development will be led by the Romanian organisation Autoritatea Nationala pentru Cercetare Stiintifica (ANCS) who currently have responsibility for the Research and Development thematic priority of the structural funds. The final report and its appendices along with this recommendations report on the analysis of the RDTI market in Romania has been based on desk research undertaken in November and December 2012 and February 2013 and four stakeholder workshops delivered in Bucharest, Romania on the 12th and 13th February 2013.

The ARUP assignment has analysed the evidence base of Romanian research and development expertise (supply side) and the competitiveness of the Romanian economy (demand side), to understand the linkage and correlation between research and development with business performance within the innovation system.

The analysis undertaken in this report is based on the existing and available data at the time of writing. It should be noted that the availability and quality of data has been limited, and in certain instances data is only reported up until 2008/2009. To help address this issue, the report has also considered alternative sources of information that provide a more up-to-date assessment of sector activity, such as news reports and research publications, as well as the expert opinions of the stakeholders gathered during the four workshops.

The methodology adopted for this assignment has directly addressed the principles and priorities of the smart specialisation approach and communication from the European Commission to Romania regarding the thematic priority for research, technological development and innovation through a multi-method approach with a specific focus on the competitiveness of sectors at a national level, the capability and competitiveness of clusters at a regional level and the investment in funding for research and development based on established national

priorities, engagement in Framework 7, the profile of individual institutions and the outcomes of research based on publications and patents.

This recommendations report is the output of task 2 of this assignment and is based on the original desk research and analysis activity undertaken in task 1 and the final report delivered within task 3. The report provides a series of key recommendations for progressing the identification of areas for smart specialisation within Romania and supporting recommendations that will aid the successful delivery of the thematic priority for research, technological development and innovation and the monitoring of activity.

1.2 Smart Specialisation Overview

In the European Commission's proposal for cohesion policy in 2014-2020 it is a precondition for using the European Regional Development Fund (ERDF) that investment in research, development and innovation are made based on a smart specialisation strategy that supports integrated, place-based economic transformation. The adoption of a smart specialisation strategy will:

- Focus policy support and investments on key national/regional priorities, challenges and needs for knowledge-based development.
- Build on each country or region's strengths, competitive advantage and potential for excellence.
- Support technological as well as practice-based innovation and stimulate private sector investment.
- Engage stakeholders and encourage innovation and experimentation.
- Be evidence-based and include sound monitoring and evaluation systems.

Promoting "Smart Specialisation" strategies is a novel way national and regional governments are attempting to enhance the competitiveness of firms and clusters. As highlighted in the European Commission Guide to Research and Innovation Strategies for Smart Specialisation (RIS3) (European Commission, 2012)"Priority setting in the context of RIS3 entails an effective match between a top-down process of identification of broad objectives aligned with EU policies and a bottom-up process of emergence of candidate niches for smart specialisation, areas of experimentation and future development stemming from the discovery activity of entrepreneurial actors. It is of crucial importance that RIS3 governance bodies focus on a limited number of innovation and research priorities in line with the potential for smart specialisation detected in the analysis phase."

The European Commission Guide to Research and Innovation Strategies for Smart Specialisation (European Commission, 2012) outlines the development of a strategy as an economic transformation agenda based on four general principles:

1. *(Tough) Choices and Critical mass:* limited number of priorities on the basis of own strengths and international specialisation – avoid duplication and fragmentation in the European Research Area – concentrate funding sources ensuring more effective budgetary management.
2. *Competitive Advantage:* mobilise talent by matching RTD + I capacities and business needs through an entrepreneurial discovery process.
3. *Connectivity and Clusters*: develop world class clusters and provide arenas for related variety/cross-sector links internally in the region and externally, which drive specialised technological diversification – match what you have with what the rest of the world has.
4. *Collaborative Leadership:* efficient innovation systems as a collective endeavour based on public-private partnership (quadruple helix) – experimental platform to give voice to unusual suspects.

1.3 Summary of Final Report Conclusions

The aim of the final report was not to set the priorities for Smart Specialisation in Romania but to highlight areas of interest that can be analysed and investigated further, supported by the involvement of stakeholders and the development of a vision for innovation at a regional and national level.

Section 3, 4 and 5 of the final report considered the potential areas for specialisation based on data relating to economic sectors at a national and regional level and considering both business and research activities.

The European Commission communication to Romania specifically identifies the role of the rural economy, agriculture, agrofood, green growth and the transition to a low carbon economy and maritime and marine related industries.

Our analysis has specifically identified the importance of food and agriculture in the Romanian economy and its significance in terms of employment and GVA at both a national and regional level. It is also relatively significant in research in both agriculture overall and biotechnology. This report recognises that agriculture within European Commission documentation is reflected as low technology and low skill, however by considering this within the context of agrofood and agricultural biotech as a potential smart specialisation this would reposition this activity as higher-skill and higher-tech.

The ICT sector overall is well reflected in economic activity in both telecommunications and software at a national and regional level which established clusters across Romania. In addition ICT has a strong research profile at a national and European level in terms of project profile and relatively significantly in terms of publications. Given the fundamental importance of this sector it should be a focus for smart specialisation and a number of research areas are identified in the final report that could form the basis for this specialisation.

The field of engineering and technology is the most diverse of all the sector areas incorporating motor vehicles, other transport, electronics, machinery and equipment and technical textiles. At a business level these are the areas in which the largest level of business expenditure in research and development can be seen and in which there are significant foreign owned businesses.

It is in this area that the linkage between foreign owned firms and SMEs, increasing high-technology exports and cross-sectoral linkages identified by the European Commission in their briefing to Romania should be focussed. From a research perspective this is also the most diverse area of activity incorporating electrical and electronic engineering, nanotechnology, materials (specifically electronic, optical and magnetic materials, materials chemistry, materials science and metals and alloys) and mechanical engineering, motor vehicle transport and other transport. There is a clear argument for smart specialisation in this field, however further investigation and discussion is needed with research and business stakeholders to highlight specific areas of activity. This may for example lead to a focus on motor vehicles and other transport which would bring in the specialisms of electronic engineering, material, machinery and equipment.

Energy and the Environment are reflected in the European Commission communication which highlights the transition to a low carbon economy and green growth. At an economic level in Romania the potential of this sector can be seen in investment in renewable energy however in research terms while this is a growing area it is one that needs a significant increase in research infrastructure capacity and capability based on the level of publications in this field to date.

Environmental research is however a strong area in Romanian research particularly in areas of environmental engineering, pollution and environmental engineering. The combination of these research themes is seen as a positive basis for potential specialisation.

In addition there are other sectors that are worthy of consideration for a potential focus on smart specialisation including:

- Textiles - ranked strongly in employment, wages and salaries, specialisation and comparative advantage
- Machinery and Equipment – ranked strongly in wages and salaries, value added and employment
- Wood and Furniture – ranked 1st in comparative advantage and high in number of businesses

These sectors of the economy are not as highly ranked as ICT, Agriculture and Food and Motor Vehicles and Other Transport. However Romania does have

regional differentiation and it should be considered that such sectors are an appropriate focus at an individual regional rather than national level

1.4 Next Steps

As has been highlighted in our work the analysis of the Romanian Research Technological Development and Innovation market is a starting point for the development of a Smart Specialisation Strategy both at a national level but which also reflects the differentiation of priorities and growth potential at a regional level.

This strategy development will be led by the Romanian organisation Autoritatea Nationala pentru Cercetare Stiintifica (ANCS) who currently have responsibility for the Research and Development thematic priority of the structural funds. The next section of this report will detail specific recommendations that are designed to support the ongoing development of the strategy, its implementation and review.

2 Recommendations

2.1 Introduction

The European Commission Guide on regional/national Research and Innovation Strategies for Smart Specialisation (RIS³) (European Commission, 2012) is targeted at Structural Funds Managing Authorities, policy-makers and regional development professionals (REF). It sets out the concept of smart specialisation and provides orientations on how to develop research and innovation strategies for smart specialisation (RIS3).

Guidance is structured around a 6 practical steps:

1) Analysing the innovation potential
2) Setting out the RIS3 process and governance
3) Developing a shared vision
4) Identifying the priorities
5) Defining an action plan with a coherent policy mix
6) Monitoring and evaluating

The recommendations provided within this section of this report are based on the work of the ARUP project team in undertaking the initial analysis of research technological development and innovation, the series of stakeholder workshops delivered in February 2013 and their views on how the smart specialisation strategy should progress.

2.2 Recommendation 1: Review the 'Analysis and Evidence Base of the Research, Technological Development and Innovation Market' Report

The final report concluded by the ARUP team provides a starting point for discussion. It highlights key potential focus areas namely; food and agriculture, ICT, motor vehicle manufacturing and other transport and energy and the environment. But it also reflects that there is regional differentiation. Both enterprise activity and R&D capability in a number of sector and sector specialisation areas varies across the Country.

The assignment delivered by ARUP has been delivered directly in line with the guidance for Step 1 'analysis of the regional context and potential for innovation'. The ARUP team utilised several methods to support the identification of potential niches for smart specialisation. These include an analysis of scientific and technological specialisation, an analysis of regional economic specialisation and a cluster analysis.

An important step in the process is to reflect on the findings of the final report and utilise the input of local stakeholders at a national and regional level to further consider the importance of:

- regional assets, such as technological infrastructures,
- linkages with the rest of the world and the position of the region within the European and global economy, and
- national and regional factors which affect the dynamics of the entrepreneurial environment and capacity for enterprise creation.

Additional methods including Foresight can be utilised to continue the process of considering future and emerging trends and their influence on science, technology and society. Overall the importance of this recommendation is to ensure that the stakeholders are comfortable with the initial analysis which explores the analysis of research and innovation and potential areas for concentration.

2.3 Recommendation 2: Establish Key Stakeholder Groups at Regional and National Level to support the Strategy Process

The engagement of stakeholders is crucial to the development of the areas for Smart Specialisation. The ARUP Assignment included 2 days of stakeholder workshops and this represented an important engagement which should be extended in the development of the strategy. The stakeholders engaged represented a national level, regional level and business level. The RIS3 guidance (European Commission, 2012) specifically identifies the importance of local, regional and national policies in the context of developing the strategy and the need to include stakeholders and decision makers from these levels.

The regional level is considered as most important for establishing a strategy given the commitment and knowledge that individuals and organisations have at this level to improving the innovation and economic environment of their 'home' region. The regional variation noted in 2.2 makes this doubly important. The final report specifically included an examination of economic performance, human resources in science and technology, and research and development at a regional level. In addition regional engagement was achieved both at a Government level and at a cluster level through the stakeholder workshops. However in the context of the wider strategy development this is not sufficient. Consideration should be given to establishing governance structures and processes at a regional level for the development of a smart specialisation strategy.

The RIS 3 guidance (European Commission, 2012) identifies the most important types of organisation that need to be involved in the RIS3 process as "public authorities, universities and other knowledge-based institutions, investors and enterprises, civil society actors, and international experts who can offer benchmarking and peer review services". Of particular importance is the inclusion of the 'demand' side perspective in the form of businesses and cluster associations. These will be the organisations who are the beneficiaries of funded projects and where the impact of the strategies will be seen. Increasingly the

perspective of users, citizens and societal stakeholders is being considered within strategic developments of this type.

Linked importantly to the engagement of stakeholders is the establishment of a regional 'vision' for economic renewal and transformation which the stakeholders should see as an aspirational but attainable target that they can input into and benefit from.

In the Romanian context, given the focus of technology and skills, the focus should be on 'supporting socio-economic transformation (reconversion or identification of a new frontier)'; and 'Catching up: towards the creation of knowledge-based capabilities' (European Commission, 2012).

2.4 Recommendation 3: Identify specific key areas for prioritisation

The development of Regional Innovation Strategies from the mid 1990s to the beginning of the 2000s followed a generic methodology. For many regions in Europe this resulted in a focus on a large number of sectors that could be observed at a regional level but which were presented at a high-level, resulting in a very similar set of regional profiles across the European Union member states.

Smart specialisation by its nature seeks to identify a limited number of specialist areas where real differentiation at a regional level and within a National, European and Global level can be seen. Such prioritisation is a difficult process and as can be seen in the final report for this assignment. There can be multiple arguments as to why a particular field should be included.

Prioritisation should be undertaken by considering available information but also importantly through stakeholder dialogue. The RIS 3 guide (European Commission, 2012) specifically identifies how to filter the range of possible priority areas down to only a few priorities. The key criteria are:

- the existence of key assets and capabilities (incl. specialised skills and labour pools) for
- each of the areas proposed and, if possible, an original combination of these (cross-sector;
- cross-cluster),
- the diversification potential of these sectors, cross-sectors or domains,
- critical mass and/or critical potential within each sector,
- the international position of the region as a local node in global value chains.

The final report of this assignment provides a strong basis for prioritisation. However the prioritisation process needs to be the subject of significant dialogue at a regional and national level in Romania. As highlighted in the RIS 3 Guidance (European Commission, 2012), 'all this relevant information is to be examined by

decision/policy-makers in order to select a few priorities focusing on the existing strengths of the economy but also on emerging opportunities. A good smart specialisation strategy will catalyse structural change and the emergence of critical clusters so that agglomeration externalities, economies of scale, economies of scope and local spillovers can be fully realised in the process of knowledge production and distribution'

2.5 Recommendation 4: Develop effective mechanisms for interaction between academia and industry

Prioritisation is important within the context of developing the strategy. Once prioritised the consideration of how activity will be delivered is fundamental. The RIS 3 guide identifies that it is vital that "broad action lines corresponding to the prioritised areas and the challenges faced within these areas (are defined). These should include;

- Definition of delivery mechanisms and projects;
- Definition of the target groups;
- Definition of the actors involved and their responsibilities;
- Definition of measurable targets to assess both results and impacts of the actions;
- Definition of timeframes;
- Identification of the funding sources, targeted to the several groups and projects

Of these the most important are the delivery mechanisms, the target groups, the actors involved and the measurable targets. In this case the timeframe and funding is defined by the structural funds.

The target groups will have been identified as part of the prioritisation task and the actors involved will be reflected in the regional stakeholder groups and in the profile of leading institutions. A key issue will be the delivery mechanisms and project approach adopted. In this context Romania has traditionally utilised approaches which support the creation of new research infrastructure, cooperation between academia and industry and direct support to companies.

From the work undertaken in this assignment it is clear that there are severe limitations in the mechanisms through which academia interacts with business in Romania. Section 6 of the final report highlighted that there are alternative approaches that can be considered. In order for a Smart Specialisation approach to work in the Romanian context driven by the Research, Technological Development and Innovation thematic priority of the European Structural Funds, new programme and project based delivery approaches must be adopted.

There must be a move away from 'pure research' to 'applied research' that is near market or at the current stage of market development where the approach is focussed on how new approaches (e.g. technologies, approaches) can be adopted for commercial benefit. Such approaches may include new facilities which showcase new technology and provide a mechanism for companies to assess its viability; combined business incubators, laboratory space and business support environments; consultancy type projects which undertake a business diagnostic and provide specialist support in the transfer of knowledge to business in new technologies, eco-innovation, ICT; collaborative projects which encourage companies in value chains to work together; open innovation projects that link SMEs, universities and research institutions with larger organisations and multi-national businesses and projects which support students, recent graduates and academic staff to work on joint innovation projects with industry.

As highlighted in the RIS 3 guidance (European Commission, 2012), this planning process involves both the incorporation of existing programmes and instruments, on the basis of evidence on their effectiveness and relevance for the prioritised areas, and inclusion of new instruments, justified according to their contribution to the overall strategy goals. There is a wide menu to choose from in order to compose a balanced and appropriate policy mix.

2.6 Recommendation 5: Identify the data collection and reporting requirements needed to monitor implementation

The RIS 3 guidance (European Commission, 2012) identifies that "establishing monitoring indicators and planning evaluations are important elements". The guidance identifies that "the monitoring system of these strategies may encompass 3 types of indicators":

- Context indicators scoring the region against the average score of its Member State or other similar regions. These indicators are usually attached to the overall objectives of the strategy.
- Result indicators selected for each component of the strategy contributing to the overall strategic goals, e.g. important actions funded by the Structural Funds. These indicators allow verifying whether these actions are successful or not, i.e. whether they lead to the expected change for which purpose they were designed.
- Output indicators measuring the progress of the actions undertaken in order to achieve the expected results.

The output and result indicators can be considered at both a project, thematic priority and programme level in the context of the European Structural Funds. Regarding context indicators, the final report for this assignment has been based on desk research utilising existing research publications and policy reports,

existing data and new data analysed in relation to research publications and the reanalysis of economic and science and technology data. It was noted that the availability and quality of data for Romania and at a regional level has been limited both at a national and European level.

In particular there are issues with the availability of data over time for a variety of science and technology indicators. There are also missing values in data and a lack of data at a regional level for particular indicators. To be able to define contextual indicators it is vital that an analysis of the key statistics relating to Smart Specialisation in Romania is defined and that resourcesare provided to enable a full set of data to be collated.

2.7 Recommendation 6: Engage with the Community of Interest at a European Level on Smart Specialisation

The final recommendation regards the engagement of Romania and the Romanian regions with the work of the European Commission Smart Specialisation Platform.

The S³Platform (European Commission) has developed its own tailored methods for reviewing RIS3 and organises regular workshops for registered regions and countries. The Platform organises two main types of events: Outreach seminars in different European locations explain and promote the concept of smart specialisation to all interested regions and institutions; Workshops for registered regions address specific aspects of concern to regional policy makers. In addition, the Platform will support Member States in organising national events on smart specialisation.

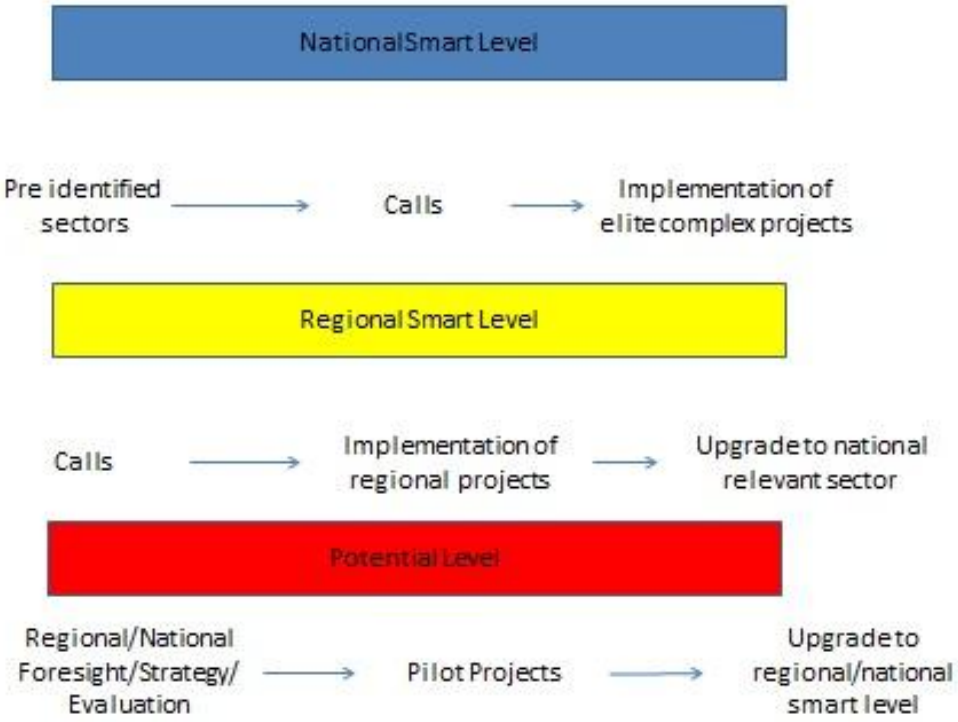
Engagement with the platform is important both in the strategy development stage but also in its implementation and monitoring. The utilisation of technical assistance budget to support this interaction is recommended.

2.8 Recommendation 7: Set up a flexible financial support system

Structural funds will continue to be in the next programming period the main source of financing structural changes of Romanian economy. One of the reasons for the poor absorbtion rate of the current period is to be found in the scattering of financial ressources and their lack of integration into a coherent approach. Therefore, more than identifying fields of competitive innovative advantage, the elaboration of the smart specialisation strategy has to be endowed with an appropriate financial mechanism where different type of funds (ESF, ERDF) can be combined into large scale integrated projects able to bring the required added value and appropriate leverage effects.

In that regard, both national and regional levels should be considered. As our analysis has revealed it there are sectors of high importance at national level (automotive, ICT etc) and others which show a clear regional dimension (wood). The latter should not be excluded, but given the chance to bring their contribution to the regional and national economy.

Although it is off the main scope of the current paper, we think in general terms that a three layer financing scheme could be appropriate for the Romanian situation as showed in the figure below:



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