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Conference Paper

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55th Congress of the European Regional Science Association: "World Renaissance: Changing roles for people and places", 25-28 August 2015, Lisbon, Portugal

Provided in Cooperation with:

European Regional Science Association (ERSA)

Suggested Citation: Golejewska, Anna; Czyżewska, Dorota (2015) : The least innovative regions in Poland and in France in the process of smart specialisation, 55th Congress of the European Regional Science Association: "World Renaissance: Changing roles for people and places", 25-28 August 2015, Lisbon, Portugal, European Regional Science Association (ERSA), Louvain-la-Neuve

This Version is available at:

<http://hdl.handle.net/10419/124697>

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Dorota Czyżewska¹, Anna Golejewska²

The least innovative regions in Poland and in France in the process of smart specialisation

Abstract

The progress of identifying regional smart specialisations is diverse in selected Polish and French regions. The empirical analysis has shown that there is no great difference in the selection methods of smart specialisations implemented by catching-up regions in Poland and the best performing developed regions in France [Czyżewska, Golejewska 2014]. The main objective of the paper is to assess the advancement of the least innovative Polish and French regions in the process of smart specialisation. As research methods, the authors used descriptive analysis, analysis of strategic documents, case studies analysis and statistical analysis.

Keywords: national and regional smart specialisation, innovation policy, France, Poland

JEL codes: R58, L52

1. Introduction

The notion of smart specialisation is an important framework in the structural funding period 2014-2020. Although the original academic concept of this policy was sectorally oriented and focused on the productivity gap between the EU and the US, it is increasingly applied to regional innovation context³. Having scarce resources and limited budgets, regions should allocate them taking into account external influences (e.g. global competition) and internal factors (e.g. sectoral specializations, university-industry linkages, innovation infrastructure). Within the smart specialisation process, every region should nominate activities that aim at exploring and discovering new technological and market opportunities in order to open perspectives for regional competitive advantage [Foray et al. 2009, quoted by: Baier, Kroll and Zenker, 2013, p. 1]. The initial concept of smart specialisation is thus connected with the

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³ The theoretical framework of the smart specialisation concept has been developed in particular in the following papers: [OECD 2013], [Foray, David, Hall, 2009], [McCann, Ortega-Argiles 2013], [Camagni, Capello, 2013].

concentration of public resources in knowledge investments on particular activities in order to strengthen comparative advantage in existing or new areas [OECD 2013, p. 11]. The smart specialisation concept expands its influence to regional innovation policy making as the elaboration of smart specializations at regional level is seen as an *ex-ante* conditionality for the cohesion policy programmes in the perspective 2014-2020. Regions are thus invited to design regional innovation strategies for smart specialisation (RIS3) as a translation of the principles of smart specialisation into operational elements of regional innovation strategies [Czyżewska, Golejewska 2014]. In other words, smart specialisation can be considered as a regional policy framework for innovation driven growth.

It is highlighted in the European Commission's documents that the process of smart specialisation can be applied in all types of regions: the most developed ones as well as the least innovative ones [European Commission 2010; Asheim, Grillitsch 2015, p. 3]. The smart specialisation approach suggests regions that are not leaders in any of the main science and technology domains to focus in R&D and innovation on few key priorities [OECD 2013, p. 28]. The innovation challenge in regions with different level of innovation performance will vary taking into account their economic structure and specialisation of key regional agents: firms, universities and public research institutions [OECD 2013, p. 28]⁴. Research on the smart specialisation process is in many cases devoted to the best performing European regions. It seems thus more important to focus the scientific attention on the least developed regions that have to tackle different socio-economic and innovation challenges while participating in the smart specialisation process. This is one of the main reasons to pursue an empirical examination of the advancement of the smart specialisation process in selected regions in Poland and in France. While in theory smart specialisation should be a strategy for all regions, the practical implications are challenging for a number of the least developed regions as to whether they can gain the benefits from the efforts involved in the elaboration of the smart specialisation strategies. If smart specialisation strategy meant a high technology strategy it would not be applicable for all types of regions. There exist however wider interpretations of

⁴ There exist different classifications of innovation-related groupings of regions. According to the categorization of regions by the OECD [Ajmane Marsan, Maguire, 2011] with the use of socio-demographic, economic and innovation-related variables, different regions have different levels of innovation performance. The regions have been classified into three macro categories: knowledge hubs, industrial production zones and non-S&T-driven regions. Some OECD regions perform better than their national average, nearly all of the knowledge hubs belong to the countries that are considered to be innovation leaders. According to this ranking two French regions belong to the knowledge hubs (Ile-de-France and Midi-Pyrénées), eighteen to the industrial production zones and one into the non-S&T-driven regions (Languedoc-Roussillon). All Polish regions belong thus to the last category. The paper provides as well a review of approaches for other innovation-related groupings of regions (p. 30-31).

this notion that give opportunities for most regions [Charles, Gross, Bachtler 2012, p. 6]⁵. The two countries have been selected as examples of a well-developed and a catching-up economy. Within Polish and French regions a selection mechanism has been used to indicate the least innovative NUTS 2 regions based on the Eurostat statistics (see point 3).

The main objective of the paper is to examine the advancement of the least innovative Polish and French regions in the process of smart specialisation. In order to achieve the main objective of the paper, the following detailed objectives are expected to be met: 1. presentation of literature review of challenges for the least developed regions in Europe; 2. selection of the least innovative Polish and French regions on the basis of four indicators: GDP *per capita*, population aged 25-64 with tertiary education attainment, R&D expenditure and patent applications to the EPO; 3. assessment of the advancement in the smart specialisation process in selected regions with reference to their economic, social and innovation potential.

As research methods, the authors used descriptive analysis, analysis of strategic documents and statistical analysis. The statistical analysis is based on Eurostat Regional Statistics. The lack of actual and comparable regional data for the whole group of regions caused the choice of the year 2011, as the reference year. In case of patent applications the last analyzed year was 2010.

2. Innovation challenges for less developed regions in Europe

Regions are increasingly recognized as a relevant level of innovation policies given the weight of agglomeration economies (the more connected the firms clustered together, the greater the network and learning effects, the lower the cost of production) [OECD 2013, p. 28]. There is a vast literature testing the relevance of different theoretical concepts and challenges related to innovation and socio-economic performance in developed regions in Europe while this is much less so in the case of less developed regions in Europe, especially those with the post state-socialism background [Blažek et al. 2014, p. 13].

Regional economies of less developed regions, especially those of Eastern European countries, are integrated into European economy due to the following strengths: relatively cheap labour force (offering good qualifications) available in close geographic proximity to the West

⁵ Charles, Gross and Bachtler [2012, p. 5] do not see a great difference between the new idea of smart specialisation and previous regional innovation systems and strategies. However, according to them, the smart specialisation concept is a focus on diversity of economic activity. The most successful regions have the advantages in implementing smart specialisation and innovation which are partly connected with the diversity of regional economy. As diversity leads to greater opportunities for growth, specialisation in weak or non-innovative activities can lead to weak growth.

European market, in case of selected regions also strong industrial tradition, and the existence of basic infrastructure. Therefore, these regions were able to attract a large amount of foreign capital in the form of greenfield investment or in the process of privatization of the former state-owned companies (regions with post-socialist tradition). Consequently, these regions were able to benefit from the transfer of know-how but they became to a significant extent dependent on decision-making process of the large foreign firms [Blažek et al. 2014, p. 27].

There is a great variety of economic structures of regions with less developed research and innovation systems. Therefore, according to Blažek et al. [2014, p. 28-33], at least three broad categories of regions should be enumerated: 1. metropolitan regions with diversified economic structure, 2. old industrial regions and 3. economically weak regions (mostly peripheral and rural regions). There are however several features of economic structure of these regions. The first feature is the branch-plant character of their economic base (functional division of labour among the regions within a single industry: high-level functions such as headquarters and R&D centers are located in metropolitan regions, production of new products in highly developed industrial regions and the production of standardized goods in less developed regions). As a consequence, in most cases the less developed regions attract activities requiring low qualifications. In order to succeed in acquiring some higher level functions to less developed regions, the regional authorities should cultivate the overall environment in the region (institutions, education system, intermediary institutions) and engage all triple/quadruple helix actors. The second feature of less developed regions is that many local firms operate as lower-tier suppliers of global value chains. It is important to highlight the fact that lower tier suppliers are charged with production of large quantities of standardized goods based on a well-known technology. Consequently these companies are expected to provide mainly cost-saving measures and not any innovative solutions. The third feature of these regions is their weak endogenous sector as these regions have long-lasting low level of innovativeness and entrepreneurship (due to bureaucratic procedures, low availability of external finance, low prestige of entrepreneurs in the society and low ability to take up risks).

The main conclusion resulting from the study of Kravtsova and Radosevic⁶ [2012] is that Eastern European countries have lower productivity level that might be expected from production and R&D capabilities and lower level of science and technology outputs (namely patents and papers) given the number of their researchers. According to Kravtsova and Radosevic [2012, p. 123] there exist three main challenges for these countries. Firstly, a

⁶ This study refers to the national level of analysis but innovation challenges mentioned by the authors are the same for the regional level in Eastern European countries.

prominent policy feature of EE is the lack of vision related to its education/training systems. Secondly, a key challenge at firm level is how firms can make the transition from mastery of production to technological (R&D and innovation) capabilities as the process is not automatic and requires changes within firms and in the national innovation systems. Thirdly, a reorientation of R&D systems from the current exclusive focus on knowledge generation to knowledge diffusion and absorption orientation is suggested (as essential competence for catching-up in the knowledge based economy).

In less developed regions one can also observe the immature institutional framework, a lack of trust among regional stakeholders and a general lack of networking culture and capabilities, which can make difficult the selection of domains of potential specialisation. Another challenge is related to an immature governance system that can result in a danger of a capture of the SS process by strong actors [Blažek et al. 2014, p. 26].

Instead of developing their own research and innovation strategies based on comprehensive understanding of underlying preconditions, in many instances regions with less developed research and innovation systems design only imitative regional innovation strategies, focused on copying foreign best practices. This was often done without a proper adaptation of these best practices to the specific features of the particular region. Nowadays one can observe more strategic and adapted approaches in designing innovation strategies at the regional level [Blažek et al. 2014, p. 23].

All these observations and arguments have important implications for a suitable design of smart specialisation process in regions with less developed research and innovation systems. Moreover, in the case of many regions with less developed research and innovation system numerous barriers for innovativeness combine to create a negative synergy and regions differ in the scale of these barriers. It is thus even more important to design smart specialisations in a way it helps overcome some of the mentioned challenges.

3. The least innovative Polish regions and their advancement in the smart specialisation process

The selection of Polish and French regions that have been taken into account in the empirical analysis concerning the advancement of the smart specialisation process is based on 4 S&T related indicators:

1. Regional gross domestic product per capita (in EUR) by NUTS 2 regions in 2011;
2. Population aged 25-64 with tertiary education attainment in 2011;

3. Total intramural R&D expenditure (GERD) by NUTS 2 regions as % of GDP in 2011;
4. Patent applications to the EPO by priority year by NUTS 2 regions (number of applications per million of inhabitants), 2008-2010 average.

The regions have been ranked according to each of these four indicators. The scores in four separate rankings have been averaged and finally, a composite rank has been built for each region (Table 1). On the basis of the results, four worst performing regions in Poland have been identified: Warmińsko-Mazurskie, Opolskie, Kujawsko-Pomorskie and Świętokrzyskie. The selected regions differ in terms of the structure of the economy, geographical, historical and social conditions.

Table 1. Ranks for Polish regions

| Regions | GDP per capita, Euro, 2011 | Population aged 25-64 with tertiary education attainment, 2011 | R&D expenditure, % of GDP, 2011 | Patent applications to the EPO, number of applications per million of inhabitants, 2008-2010* average | Average | Rank |
|----------------------------|----------------------------|--|---------------------------------|---|--------------|------------|
| Mazowieckie | 1 | 1 | 1 | 3 | 1,5 | 1. |
| Małopolskie | 7 | 2 | 2 | 1 | 3 | 2. |
| Dolnośląskie | 2 | 6 | 8 | 5 | 5,25 | 3. |
| Pomorskie | 5 | 4 | 4 | 9 | 5,5 | 4. |
| Łódzkie | 6 | 8 | 7 | 2 | 5,75 | 5. |
| Śląskie | 3 | 5 | 9 | 8 | 6,25 | 6. |
| Wielkopolskie | 4 | 10 | 6 | 7 | 6,75 | 7. |
| Lubelskie | 15 | 7 | 5 | 6 | 8,25 | 8. |
| Podlaskie | 13 | 3 | 11 | 15 | 10,5 | 9. |
| Podkarpackie | 16 | 12 | 3 | 11 | 10,5 | 10. |
| Lubuskie | 9 | 14 | 16 | 4 | 10,75 | 11. |
| Zachodniopomorskie | 8 | 11 | 13 | 13 | 11,25 | 12. |
| Świętokrzyskie | 12 | 9 | 12 | 14 | 11,75 | 13. |
| Kujawsko-Pomorskie | 10 | 15 | 14 | 12 | 12,75 | 14. |
| Opolskie | 11 | 16 | 15 | 10 | 13 | 15. |
| Warmińsko-Mazurskie | 14 | 13 | 10 | 16 | 13,25 | 16. |

Source: Eurostat Regional Statistics, own calculations

In the Warmińsko-Mazurskie region one of the most important causes of economic weakness was closing down of state farms initiated during economic transformation. Despite poor economic situation, the region develops steadily. Industries of vital importance to the

region are indicated in strategic documents. These are: wood and furniture sector, food processing (in particular dairy industry, beer production, organic agriculture and manufacturing of high-quality food produce) and tourism. Industrial structure of the region's cluster initiatives corresponds to the regional economic specialties [PARP 2012a, p. 3-8]. Scientific potential of the region is concentrated in its capital, where the biggest regional state school - the University of Warmia and Mazury is based. Its rich educational offer compensates for the lack of technical schools in the region. The region is facing a problem of very low public R&D expenditure (23 times smaller than in the capital region) and weak linkages between science and economy. Half of the representatives of the region's R&D sector did not cooperate with economic operators in 2011-2013. The branch and size structure of firms and historical, geographical and environmental circumstances of the region determine the development path of enterprises. Their investment should not be limited solely to highly innovative projects, as most of them has not kept pace with the current-day economic challenges [RPO WWM 2014-2020, p. 3-6].

The Opolskie region is the smallest one in Poland in terms of territory and population. It is characterized by an average level of economic development and high level of industrialization. The dominant sectors are: food-, energy-, chemistry-, non-metal materials-, machines and electromechanical-, metal- and furniture industry. A particular challenge for the region is to overcome a slow development of the service sector. In 2000-2011 the Gross Value Added in services grew by 78 per cent in comparison to 96 per cent as the country average. The economic system of the region is reinforced by 25 entities performing research and development activity. The biggest R&D institutes include universities located in the region's capital: the Opole University and the Opole University of Technology. For the region it is important to develop clusters initiatives [RPO WO 2014-2020, p. 10-15]. The sector-oriented structure of clusters initiatives is very diverse. Most of them operate in the tourism sector (3), as well as the construction and eco-construction (2). The areas of operation of single initiatives include such sectors as: chemistry, eco-energy, training and consulting, IT, medical and timber-furniture [PARP 2012b, p. 3-10]. The regional development of clusters is supported by numerous science oriented institutions as well as business support institutions such as innovation and entrepreneurship centers including: Opole Science and Technology Park, Kędzierzyn-Koźle Industrial Park, Academic Entrepreneurship Incubator associated with Opole University of Technology etc. [PARP 2012b, p. 15].

The Kujawsko-Pomorskie region is characterized by strong specialization in industrial production. Five industries: food processing; manufacture of chemicals and chemical products; paper and paper products; metal products and rubber and plastic products generate almost three

quarters of sales revenues of industrial processing. Electro-mechanical, wood and electronic industries play also an important role in the economy of the region. According to the European Cluster Observatory, there are two clusters in the Kujawsko-Pomorskie region: Bydgoszcz Industrial Cluster and Tuchola Forest Tourist Cluster. According to the results of studies carried out by the Torun Regional Development Agency, the printing, electronic industry, machine-tool, wood-furniture and tourist-spa industries are also favorable for the development of cooperation between entities [PARP 2012c, p. 3-8]. In many industries, firms from the Kujawsko-Pomorskie region are among the Polish leaders, generating a substantial part of the national output. They are also seen as leaders in innovativeness and technological development, as reflected in high exports and the active participation in linkages within global players. The number of centers for innovation and entrepreneurship in the region is steadily growing. In 2007, there were 35 entities and in 2009, 2010 and in 2012: 37, 39 and 43 respectively. The present potential provides a very solid basis for future development of the region based on modern and innovative economy [RPO WK-P 2014-2020, p. 12-14].

The last least innovative Polish region, Świętokrzyskie, is divided into the industrial part (north) and the rural part (south and east). Its industrial potential was shaped mainly by activity of the Old Polish Industrial Region. The region's key branches are: metallurgy, machine construction, casting, construction and food processing. The level of entrepreneurial activity is relatively low, however the highest among the regions of Eastern Poland. Most of the enterprises operate in a relatively low-innovation level sectors (87,4 per cent in comparison to average 68,4 per cent in Poland). Most of the clusters are active in power engineering and tourism. There are also single clusters in food industry, ceramics, construction and design. There are 24 innovation and entrepreneurship centers in the region, including Kielecki Technological Park, Kielecki Technological Incubator, Regional Center for Innovation and Technology Transfer [PARP 2012d, p. 3-12]. The Świętokrzyskie region belongs to Eastern Poland Macroregion characterized by relatively low level of higher education sector development. There are 15 higher schools in the region, mostly non-public and only one technical school. There is a need to support the development of: fair and congress branch on the basis of Kielce Trade Fairs (the third centre of this type in Central and Eastern Europe), market gardening and horticulture production (organic processed food) and tourism sector services, based on the map of areas with the biggest tourist traffic [RPO WS 2014-2020, p. 35-44].

The EU's regional development agenda stresses the importance of smart specialisation strategies as an essential tool for promoting sustainable, smart and inclusive growth. According to the results of the study carried out by the World Bank, in Poland, substantial work has already

been done in designing regional innovation strategies based on the new smart specialisation concept. However, the resulting RIS3s may not yet be fully compliant with the EC's ex ante conditionalities within thematic objective 1 on strengthening research, technological development and innovation at national, macro-regional and regional levels [Piątkowski et al. 2013, p. 3]. At the regional level, it is still not clear how the issue of private sector investment in RTD will be tackled and what the basis for an eventual assessment of the success or failure of a given specialization will be [Piątkowski et al. 2013, p. 29]⁷.

Smart specialisations are based on combinations of branches and technologies. In the analysed regions they were defined in different ways. In the Warmińsko-Mazurskie region, three selected specialisations: water economy, high quality food and wood and furniture have their specificities but also common areas and problems. The Development Strategy of Warmińsko-Mazurskie 2025 underlines the importance of the following horizontal issues: ICT, financing, logistics (poor transport accessibility and internal consistency), fairs and promotion (using existing fair and congress infrastructure) and public and business protection [Zarząd Województwa Warmińsko-Mazurskiego 2013, p. 70]. The criteria for the selection of smart specialisations in the Kujawsko-Pomorskie region were: innovative potential, economic results, effects relevant to the Strategy and beneficiaries. With regard to the latter criterion, a broad spectrum of beneficiaries was taken into account (networks of suppliers, subcontractors, producers of final products, service suppliers, universities and R&D institutes) [Regionalna Strategia Innowacji Województwa Kujawsko-Pomorskiego na lata 2014-2020, p. 61]. In the Opolskie region, it has been assumed that smart specialisations occur when specified technology or its product is present in each of three phases of regional transfer of knowledge. Therefore smart specialisations can be identified in a region if specified technologies and/or their products are or become simultaneously:

1. a research object of regional R&D sector (institutes, laboratories and universities located in the region),
2. a subject to pilot implementation projects conducted by an enterprise located in the region,

⁷ However, if one takes into account the level of regional orientation on pro-innovative development paths that is measured by the proportion of pro-innovative objectives to all the objectives of Regional Development Strategy (RDS) the situation is a little bit different. Analysing this indicator, the Development Strategies of the Kujawsko-Pomorskie region, the Świętokrzyskie region and the Warmińsko-Mazurskie region might be considered as the most oriented on innovativeness, in which all the objectives of the RDS contain an innovativeness component. Simultaneously, Regional Innovation Strategies (RIS) of these three regions are as closely as possible to the RDS [PARP 2013, p. 62].

3. a subject of purchase or sale at the regional and supra-regional market [Zarząd Województwa Opolskiego, p. 105].

When the technology complies with all the three criteria it is recognized as smart specialisation. If only two criteria are met it is identified as potential smart specialisation. The fulfilment of one criterion enables it to be classified as regional specialisation (manufacturing or use) [Zarząd Województwa Opolskiego, p. 107]. In Świętokrzyskie two groups of smart specialisations were identified: key and horizontal specialisations. ICT, renewable energy development and fair and congress infrastructure should contribute to dynamic development of the key specialisations [Strategia Badań i Innowacyjności (RIS3) 2014, p. 32-33]. The implementation of smart specialisations in the Świętokrzyskie region is divided into three phases: 1. phase (2014) – preparation, 2. phase (2015-2016) – testing, 3. phase (2017-2020+) – improving and acceleration. “Population” of smart specialisations shall be all the enterprises operating in identified four specialization areas. A priority target group shall be enterprises with a high growth potential and management able to use public resources effectively. This group should generate value added for the whole region [Strategia Badań i Innowacyjności (RIS3) 2014, p. 45-46]. Smart specialisations and methods of their identification in selected Polish regions are presented in Table 2.

Table 2. Smart specializations in Polish regions and their methods of identification

| region | smart specializations with reference to EU RIS3 priorities | methods of identification |
|--------------------|---|--|
| Kujawsko-Pomorskie | 1. Food safety and personalized food - processing, fertilizers, packages; 2. medicine, medical services, health tourism; culture, arts, creative industries; 3. tools, moulds and plastic products; 4. automotive, technical transportation means, industrial automation; 5. processing of information, multimedia, software and ICT; 6. bio-intelligent specialization: natural potential, environment, energy; 7. transport, logistics and trade: waterways and land routes; | Smart specialisations identified precisely, not as branches or technologies but as mutual dependency chains. Methods of identification: -foresight; -analysis of the strongest regional branches; -analysis of R&D potential (particularly science and technology parks); -public consultation. Process of implementation and monitoring precisely defined in RIS. |
| Opolskie | 1. <i>group of technologies – smart specialisations</i> (polymers, rubber and plastics, organic chemicals, cleaning products, energy-efficient construction, cement and concrete, | Choice of areas, in which innovations go through all the stages of technology transfer (R&D, using in production, expansion on the regional and supra-regional market) and technologies used |

| | | |
|---------------------|---|---|
| | <p>wood, power systems, design and manufacture of machines and equipment, metals, fuel production, manufacture of motors, high voltages, plant production, milk processing)</p> <p>2. <i>group of technologies – potential smart specialisations</i> (health and physiotherapy products, spatially integrated regional tourism product, integration process of system of intermodal environmentally friendly transport)</p> | <p>in the region and providing products and services.</p> <p>Methods of identification: - quantitative and qualitative approach (foresight); - identification of development areas, key scopes of activities and groups of key regional technologies.</p> <p>Systematic collection of data and analysis of indicators provided in Regional Development Strategy (RDS) and RIS.</p> |
| Świętokrzyskie | <p>1. <i>key specialisations</i>: resource-efficient construction; metal & foundry industries; health & wellness tourism; modern agriculture and food processing;</p> <p>2. <i>horizontal specialisations</i>: energy efficiency; ICT; conferences & fairs;</p> | <p>Specialisations included in recently prepared RIS3.</p> <p>Methods of identification: -analysis of R&D potential; -analysis of economic specialisations; -foresight; -market selection (auto-selection); -public consultation.</p> <p>The RIS3 foresees a mid-term (in 2016) and final evaluation (in 2020).</p> |
| Warmińsko-Mazurskie | <p>1. water economy (accommodation and biological renewal, transport, sports, tourism, agri-food industry, machinery, yachts, environment, science);</p> <p>2. high quality food (aqua and animal farming, food processing, manufacturing and services for livestock, production of agro machineries, and processing and disposal of farm waste, science);</p> <p>3. wood and furniture (furniture production, carpentry, wood processing, design services and maintenance of wooden goods, science);</p> | <p>Smart specialisations defined as groups of related branches on the basis of the works of two projects teams (external and internal). Consultations of Socio-Economic Development Strategy for the Warmińsko-Mazurskie Region 2025 (SEDS) carried out with authorities of Pomorskie and Podlaskie.</p> <p>A new mechanism of actualization is not planned because within the region operates electronic Monitoring System of Strategy used for SEDS. On-going evaluation is planned for 2018/2019, ex-post evaluation for 2026.</p> |

Source: Authors based on Regional Strategies of selected regions.

4. The least innovative French regions and their advancement in the smart specialisation process

The same procedure of selection of the least innovative regions, based on four indicators, has been applied to the French case. On the basis of the results, four worst performing NUTS 2 regions in France⁸ have been identified: Limousin, Champagne-Ardenne, Poitou-Charentes and Corse (Table 3).

⁸ Only NUTS 2 in metropolitan France have been taken into account in the selection procedure (French overseas regions have been excluded from the analysis).

Table 3. Ranks for French regions

| Region | 1. GDP per capita, 2011 | 2. Population with tertiary education, 2011 | 3. Patent applications av. 2008-2010 | 4. R&D expenditure, 2011 | Average | Rank |
|----------------------------|-------------------------|---|--------------------------------------|--------------------------|--------------|-----------|
| Île de France | 1 | 1 | 2 | 2 | 1,5 | 1 |
| Rhône-Alpes | 2 | 5 | 1 | 4 | 3 | 2 |
| Midi-Pyrénées | 8 | 2 | 6 | 1 | 4,25 | 3 |
| Provence-Alpes-Côte d'Azur | 3 | 3 | 7 | 7 | 5 | 4 |
| Alsace | 4 | 6 | 3 | 9 | 5,5 | 5 |
| Bretagne | 13 | 4 | 5 | 8 | 7,5 | 6 |
| Pays de la Loire | 5 | 7 | 11 | 16 | 9,75 | 7 |
| Aquitaine | 7 | 8 | 13 | 11 | 9,75 | 8 |
| Franche-Comté | 17 | 17 | 4 | 3 | 10,25 | 9 |
| Centre | 11 | 10 | 10 | 10 | 10,25 | 10 |
| Haute-Normandie | 6 | 16 | 8 | 13 | 10,75 | 11 |
| Auvergne | 16 | 15 | 9 | 5 | 11,25 | 12 |
| Languedoc-Roussillon | 20 | 9 | 18 | 6 | 13,25 | 13 |
| Basse-Normandie | 18 | 13 | 17 | 12 | 15 | 14 |
| Bourgogne | 12 | 18 | 14 | 17 | 15,25 | 15 |
| Lorraine | 19 | 14 | 15 | 15 | 15,75 | 16 |
| Nord - Pas-de-Calais | 14 | 11 | 21 | 20 | 16,5 | 17 |
| Picardie | 21 | 21 | 12 | 14 | 17 | 18 |
| Limousin | 22 | 12 | 16 | 18 | 17 | 19 |
| Champagne-Ardenne | 9 | 20 | 19 | 21 | 17,25 | 20 |
| Poitou-Charentes | 15 | 19 | 20 | 19 | 18,25 | 21 |
| Corse | 10 | 22 | 22 | 22 | 19 | 22 |

Source: Eurostat Regional Statistics, own calculations.

Limousin is the second least populated region in the country (2012). Limousin is ranked 18th at the national level in terms of GDP per capita (€24,794). The regional economy is mostly service-oriented (67% of regional employment). Agriculture is the foundation of the regional economy (with 8% of regional employment). However, it is highly dependent on the CAP, and mainly based on bovine production generating low incomes. The region is also known for a strong presence of wood-related activities, although the wood industry is suffering from a lack of structure. Industry accounts for 25% of regional employment with traditional activities: ceramics and porcelain; mechanics, metallurgy and car industry; food industry, etc. However, these fields are currently facing great challenges, and need to be restructured. Between 2000 and 2011, the region only dedicated on average 0.77% of its GDP to GERD, compared to 2.17% at the national level and 1.89% at the European level. It can therefore be concluded that RTDI

capacities are underdeveloped, compared to French and European performances. However, the weight of innovative sectors in the regional economy has been increasing over recent years. Similarly, human resources in S&T increased by an average of 4.5% per year between 2002 and 2011 (vs. 3.7% at national level) [European Commission 2015].

Between 2007 and 2011, the Champagne-Ardenne region accounted for an average of 1.74% of the annual French GDP (Eurostat). The regional economy is characterised by the strong presence of industrial and agricultural activities, with limited innovation-oriented activities. Industrial employment represents 26.6% of regional employment, compared to 20.6% at national level (2013). The agro-food industry is the central driver of regional economy. The region is particularly competitive in the field of new uses of agro-resources (Nouvelles Valorisations des Agro-Ressources), supported by the creation of the Europol' Agro competitiveness cluster. Between 2008 and 2011 the region only dedicated an average 0.8% of its GDP to GERD. The regional economy is characterised by a very large majority of very small companies and SMEs that do not use research or innovation, because of a lack of internal resources (human resources, funding, interest). The Industries and Agro-resources competitiveness cluster and the Material competitiveness cluster represent the regional hubs for RTDI activities. Based on the Regional Strategic Diagnostic, the region is characterised by the weak presence of technology intermediaries [European Commission 2015].

Poitou-Charentes is one of the smallest French regions with a 2.2% contribution to national GDP (2011). Around 71% of the regional population is employed in the service sector; employment in the agricultural sector remains high, accounting for 5.4% of regional employment. The industrial sector, including building, accounted for 23.9% of the regional employment in 2010 and contributed to 22.3% of the GVA. The agri food industry is the main contributor, followed by mechanical equipment industries, eco-industries (i.e., the wood industry) and the steel industry. The region is characterised by a strong presence of very small businesses with less than 10 employees that account for 92.8% of the total number of regional businesses (in 2013). Between 2006 and 2011 the region only dedicated on average 0.8% of its GDP to GERD. R&I activities are oriented towards regional key industries, namely agri-food industries, high-performance materials, horticulture, ICT, sports and chemical industries. The capacity of local businesses to innovate is limited due to a lack of self-funding. The potential of public research is growing, even though it remains modest compared to larger French regions: there are two public universities, five engineering schools, and 25 public laboratories. In addition, the region hosts six CNRS laboratories (National Centres for Scientific Research) on chemistry, agronomy, and humanities and social sciences [European Commission 2015].

Corse is an outermost French region, the least populated region of Metropolitan France. Between 2007 and 2011, Corse accounted for an average of 0.4% of the annual French GDP (Eurostat). The economic profile of Corse Region is characterised by: almost inexistent agriculture, a small industrial sector and predominance of service and construction/building sectors (78.5% of regional employment in 2013). Three industrial sectors are predominant: energy sector, agro-food industry and the construction and building sector. In addition, new niche clusters are emerging on renewable energies, aeronautics, natural resources valorisation, and ICT. In 2011, the region only dedicated 0.4% of its GDP to GERD. The regional weakness is a low level of R&D expenditures from the private sector and a low level of innovation among companies. Public research is concentrated on three main broad areas: humanities, environment and renewable energies (solar energy), and agronomy and valorisation of natural resources. The public research is still poorly connected to the private sector (low level of collaboration, lack of culture of research valorisation among public researchers, few patent applications). Key challenges for the regional innovation system are the strengthening of the partnerships and cooperation (public-public; public-private; private-private); the dissemination of the innovation culture whatever the type of innovations and sectors (including service); the access to external expertise and knowledge [European Union 2015].

Smart specializations selected by the above described regions as well as their methods of identification are presented in Table 4.

Table 4. Smart specializations in the least innovative French regions and their methods of identification

| Region | Smart specialisations with reference to the EU priorities | Methods of identification |
|--------------------------|--|--|
| Limousin | <ol style="list-style-type: none"> 1. Agri-food 2. Wood 3. Health 4. Electronics 5. Ceramics 6. Mechanics 7. Personal & business services | The SWOT analysis and the regional diagnosis were used to identify SS, with the help of regional stakeholders. |
| Champagne-Ardenne | Strategic domains: <ol style="list-style-type: none"> 1. Bio economy 2. Process efficiency and resource efficiency 3. Health care for fragile population 4. Support to innovative solutions and experiments in the field of smart energy consumption (emerging strategic domain) | Identification of SS based on key regional domains, an assessment of the outcomes of the previous RIS, with the help of an external assistance (cabinet Technopolis). Regional products and markets were positioned on the value chain and then combined with the key regional domains. Three transversal axis have also been identified into order to add social and territorial dimension to SS. |
| Poitou-Charentes | <ol style="list-style-type: none"> 1. Food quality 2. Green chemistry | Smart specializations were identified taking into account: |

| | | |
|--------------|---|---|
| | 3. Environment and health 4. Advanced materials and reduction of environmental impacts in transport 5. Eco-mobility 6. Sustainable construction 7. Digital industry for education and cultural industry | - regional economic potential; - training and public research potential; - structure and dynamic of regional actors; - future markets and responses to the social needs. Identified SS are in conjunction with regional priority sectors. |
| Corse | 1. Promotion of natural and cultural resources 2. Production, distribution and energy management in the island environment | SS elaborated on the basis of the regional diagnosis documents, approx. 70 interviews with regional innovation stakeholders and 4 working groups composed of public and private actors of different domains. |

Source: Authors based on: [European Commission 2015], S3 Platform, Stratégie de Spécialisation Intelligente (3S) en Corse.

5. Conclusions

The process of smart specialisation can be applied in all types of regions. The selected regions are facing numerous problems, such as low public R&D expenditure, low level of entrepreneurial activity, slow development of the service sector or weak linkages between science and economy. In less developed regions one can also observe the immature institutional framework and a lack of trust among regional stakeholders. These problems can be thus observed in least innovative Polish regions (with post-socialist background) as well as in least developed French regions, the difference being in the scale of barriers.

Smart specialisations can be identified in different ways. The results of empirical analysis have shown that methods of identification of smart specialisation in the least innovative Polish and French regions are quite similar. Polish regions selected specialisations as groups of industries, groups of technologies (smart and potential smart specialisations) or key and horizontal specialisations. Analysed French regions selected smart specializations as strategic domains, in conjunction with key regional domains, regional strengths and weaknesses, regional economic and research potential as well as future markets and responses to social needs. Methods used in the process of identification were inter alia foresight, analysis of R&D potential and economic specialisations and public consultations with regional innovation stakeholders, based on diagnosis of regional assets.

It is expected that RIS3 strategies should help regions to create their competitive advantage and overcome at least some of socio-economic challenges, however their results are expected once the strategies are fully implemented which indicates some avenues for further research.

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