

Smart specialization in Silesian region in Poland

~ Ph. D. **Radosław Wolniak** (Silesian Technical University, Faculty of Organisation and Management, Poland)

E-mail: rwolniak@polsl.pl

Abstract: The paper presents the concept of smart specialization on the example of the Silesian province. Starting from the origins of the use of the concept of smart specialization in the European Union, shows the definition of the concept, the use of the concept in the development of regions and presented that specializations are considered smart for the Silesian province. In recent years, based on previous experience of the European Union to stimulate innovation at national and regional level there has been a paradigm shift in thinking about innovation in the creation of the concept of smart specialization. Smart specializations, taking into account the specificities and traditions of the regions have become a means to improve innovation and the competitive position of the European Union. In Poland, the regions introduce the concept of smart specialization in their innovation strategy. In the case of the Silesian Province for the most intelligent specializations were: energy, medicine and information and communication technologies. In these areas in the coming years should be focused stimulant level of innovation in the region, which gives a chance for faster development of the entire region.

Key words: smart specialization, innovation, production, technology, knowledge-based economy

JEL Classification: M14, M42, M48

1. Introduction

Modern strategies of the European Union are strongly focused on innovation. The Europe 2020 Strategy, dedicated to smart and sustainable development is defined as follows, the new priorities of the European Union (Europa 2020; Bęczkowska 2014; Nazarko 2014):

- smart growth: developing an economy based on knowledge and innovation,
- divorce sustainability: promoting resource efficient, greener and more competitive,
- inclusive growth: promoting a more resource efficient, greener and more competitive economy.

With these priorities comes the concept of establishing smart specialization, which in addition is also the result of criticism of the current innovation policy of the European Union.

To propose the concept of smart specialization regions prompted the European Commission both expert opinions based on theories territorially oriented, as well as existing experience gained over many years of cooperation with the regions and evaluate the effectiveness of earlier national and regional innovation strategy (Nowak 2014; Słodowa-Helpa 2013). The basis for development based on smart specialization is the so-called place-based approach, meaning that for development it is important to take into account the geographical context from the point of view of institutional features, cultural and social. It focuses on the use, in their policies on local knowledge about the specifics of the place and the role of institutions of this kind of approach has now become the basis for regional development policy and the EU cohesion policy (Łuczak & Wolniak 2015; Horodecka & Wolniak 2015;

Szostak 2015). The aim of this publication is to present the general concept of smart specialization in particular taking into account the specifics of the Silesian province and discussion of specialization, which in this region has been included in this group.

2. Smart specialization - definition of the issues

European Commission guidelines state that in each Member State and in every region of the European Union concerning the areas of innovation and knowledge transfer must be included in the strategy document. One of the basic conditions for support within the European ERDF programs is to build research and innovation strategies for smart specialization.

Assumptions of the concept of smart specialization, have been formulated in 2008 by the Expert Group "Knowledge for Growth", established in 2005 by the EU Commissioner for Research. They refer to the concept: the basic product, flexible production, district industrial A. Marshall, diamond competitive advantages, the concept of the five forces and cluster M. Porter, growth poles F. Perroux, economic base H. Hoyt, etc. (Wolniak & Habek 2015; Wolniak 2015; Słodowa-Helpa 2013).

According to the documents of the European Union for intelligent specializations unique characteristics and assets of the country or region that highlight their competitive advantage and allow you to focus on regional partners and resources around a vision for the future aimed at achieving (Strategie 2014-2020).

Another way of smart specialization defined as actions based on the identification

and selection of areas with the greatest potential, affecting ensure the competitive advantage of the region on an international scale (Europa 2020). The concept of smart specialization follows a new paradigm for regional development, which has been characterized in Table 1.

Smart specialization, called the Anglo-Saxon literature smart specialisation is a concept, as well as a tool for innovation policy, which is used to identify and build the present and future position of the region or country in terms of the knowledge economy (David et al 2007; Kardas 2011; Hąbek & Wolniak 2015; Wolniak 2014; Wolniak & Skotnicka-Zasadzień 2014). The most important assumptions of the concept of smart specialization may include the following (Brzóśka 2014):

- The implementation of smart specialization requires the creation of a sufficiently large area of research and innovation that will result in competition between many competitors. This will be allowed use of the

effects: the scale, the range and distribution.

- Competition European countries and regions in the same fields of study or areas of the economy will not provide the expected results due to the lack of economies of scale and achieve critical mass.

- The essence of the concept of smart specialization determine the so-called. technology general purpose (General Purpose Technologies, GTPS). These technologies have the advantage that they are normally used in many areas of human activity.

- The implementation of smart specialization should focus on "entrepreneurial" learning, which include the field of science and technology, in which the region or state can be a leader in the European and global scale.

The main actors in this process should be an entrepreneur, and public administration should provide adequate support. The inclusion of these concepts requires a paradigm shift in regional development, which was characterized in Table 1.

Table 1. Changing the paradigm of regional development in the direction of smart specialization

	The old paradigm	The new paradigm
Basic theory	The theory of industrial location, the main factors of development are characteristic of the region, eg. Production costs, availability of labor.	The theory of learning regions, the main factors are the ability, the region's ability to take ownership, use and creation of knowledge.
Objective	Justice through sustainable regional development	Increase competitiveness and value, eg. Entrepreneurship, innovation
Base policy	Temporary balance in less developed regions	Strengthening capacities in all areas affecting the growth of competitiveness through strategic regional programming, eg. Intelligent specializations

Actions	The sectoral approach with a limited number of sectors	Design approach based on an integrated and comprehensive approach taking into account the cooperation and relations with the environment (integrated development projects)
Space	Focus on backward, lagging administrative regions	All regions, with particular emphasis on functional areas
Approach	Uniform	Specific adaptation to space - place-based
Concentration	External investments and transfers	Endogenous growth factors and knowledge
Instruments	The impact of stimulus through subsidies and state aid focused on technical infrastructure and enterprises (often individual companies)	Development programs based on various investments in the sphere of hard and soft, eg. Entrepreneurship, labor market, infrastructure
Actors / organizations	Centralized management of shifting powers from the top down	Policy based on cooperation at various levels of management with different actors
Result	Ex-post evaluation, measurement results	Ex-ante, ex-post evaluation of the difficulty in measuring the effects

Source: (Szostak 2008; Vanthillo & Verhetsel 2012).

The most difficult task in the requirement of smart specialization is to determine the identity of the socio-economic region and identify those areas that seem most promising. You should then determine the resources of the region that are specific and unique to him, because they determine its competitive advantage. Resources of this kind, with a rare occurrence are difficult to imitate, copy and transfer to competitors, and their creation in a different space, does not guarantee positive results, even in the case of involvement in the process of large resources (Strategie 2014-2020).

In the case of the countries and regions to identify specialization should be done on a bottom-up approach involving key partners in the field of innovation and with the

participation of businesses, universities and centers for scientific research activities. Specializations are intelligent tool for policy implementation smart, sustainable and inclusive growth, which is to allow member countries of the European Union on the creation of a competitive and innovative economy. (Malik & Bedrunka 2013; Wolniak 2014; Wolniak 2013) In addition, specialization shall take into account the specificities of sectoral linkages between sectors, as well as the innovation infrastructure. Therefore the utilization-based approach promotes the development of smart specialties entire area (Barca 2009).

According to the guide PIS3 on the implementation of the concept of smart specialization, the concept is smart because (Guide 2013):

- builds bridges between the sphere of research and innovation on the one hand, and economic development on the other, using a novel quantitative and qualitative methods, such as the process of entrepreneurial discovery to create strategies and setting priorities for policy makers, in close cooperation with local stakeholders,

- is associated with the environment, which in determining the objectives of forcing the regions to an ambitious, but realistic approach.

The emergence of smart specialization and shot them in the forms of a document with the rank of strategic allow for more efficient use of structural funds. In addition, it will give the opportunity to increase synergies between different policies at EU level, as well as between the investments being made by the various means (public and private).

Smart specialization should facilitate the transition to a resource-efficient economies and low-carbon economy. Action should focus on sectors or groups of sectors with concentration and having a competitive edge in national and transnational as the endogenous development potential. These sectors should be well rooted in the regional economy, as well as demonstrate a mutual affinity technology, as well as the cooperative connections within and between sectors (Łuczak & Wolniak 2013; Szostak 2015). Objectives, which should be determined by the smart specialization issues such as (Rudnicka 2014):

- preventing fragmentation and duplication of research in the European Research Area (ERA),
- critical mass in key areas for Europe's competitiveness and sectors,
- spread of general purpose technologies, especially through the use of their

products and services,

- strengthening local capacities and capabilities to carry out R & D + I (stairways to excellence),
- strengthening the involvement of different stakeholders in the process of strategy (entrepreneurial discovery process)
- programming and implementation of policies based on evidence (evidence-based policy).

The main objective of the strategy for smart specialization is to target policy support investments in key national and regional challenges and needs in this way, to ensure the development of a knowledge-based. separation of smart specialization in specific areas will allow the use of strengths and competitive advantages of each country or region. They will constitute the capital endogenous, which will result in increase in the level of innovation and the growth of investment for the private sector. In addition, strategies for innovative specializations should be based on facts, and include appropriate mechanisms to monitor and control (Strategie 2014-2020).

In 2011, the European Commission has created the Smart Specialisation Platform. the aim of the platform is to help national authorities, as well as the regional authorities responsible for regional development in developing research strategies and innovative strategies based on smart specialization. Platform members are 15 states and 151 regions, of which 9 116 countries and regions have identified areas of smart specialization (Szostak 2015). Polska and Polish regions are also members of the Platform. At the national level identified five thematic sections, within which it has been designated 16 of smart specialization (Krajowa 20130).

3. Smart specialization in the development of the regions in Poland - Silesian region

In order to use smart specialization for regional development must take into account that it is based on mutual relationships between science, the public sphere, education and business. It is important in this case, use of the potential for the best possible matching directions of development of science and education in the region to its specific business.

To make a good choice of smart specialization is required in-depth analysis of the region, including in particular its potential, and the vision of its further development. In that case, the dynamics of the environment into account the context of national and global conditions, including the opportunity to use global resources necessary innovative business models (Brzóska 2014; Loska 2015; Prahaled & Krishnan 2008). Smart specialization is the concept entered in the innovation strategy, as well as the tool used to shape and build the present and future position of the region or country in the knowledge economy (Szostak 2005).

For the first time the concept of smart specialization appeared in the Regional Innovation Strategy of Silesia 2003-2013. According to contemporary needs of the region's economy the focus of the provisions, it was aimed at creating a possible full instrumentation support innovation, largely understood as the transfer of knowledge to SMEs. In particular, the document sets, such as specializations (Inteligentne; Regionalna 2012):

- biotechnology, including bioengineering and technology for health,

- technology for the power industry, including technology, energy production from renewable sources, combustion and thermal treatment of waste and energy saving,

- technology for environmental protection, including biogeochemical engineering and waste management,

- information technology and telecommunications,

- production and processing of materials, including advanced materials.

The next stage of work on intelligent specializations in the Silesian province was the development of the Regional Innovation Strategy and Technology Development Programme for 2010-2020. According to contemporary analysis determined the following areas of technological specialization of the region (Inteligentne):

- medical technology,
- technologies for the energy and mining,

- technologies for the environmental protection,

- information technology and telecommunications,

- production and processing of materials,

- transport and transport infrastructure,

- mechanical engineering, automotive, aerospace and mining.

According to the Regional Innovation Strategy of Silesia, developed for 2013-2020 issues related to smart specialization of the region are grouped around three areas: energy, medicine and information and communication technologies. In detail issues concerning the smart specialization in the region, which were concluded in these areas are summarized in Table 2.

Table 2. Smart specialization for the Silesian province

Area	Characteristic
Power engineering	<ul style="list-style-type: none"> • being an important economic sector in the region and the national economy, due to the existing infrastructure equipment (production, transmission and energy consumption) and high population density and the location of industries in the region, Province of Silesia is an excellent testing facilities and the full scale implementation of innovative solutions, • generates a suction effect, not only in terms of technology for the power industry, but also for modern solutions in the field of environmental protection, information technology and automation and machinery industry, • becoming increasingly important in the use of renewable energy sources in the power industry and industrial, as well as in groups prosumenckich - business and residential, • in the broad sense it is the first and most important area of creating, testing and use of smart grid technology media distribution, from which experiences can be transferred to other so-called solutions. Smart markets;
Medicine	<ul style="list-style-type: none"> • is one of the traits Silesian province in the country for the sake of perfection in many areas of prevention, treatment and rehabilitation and recognition of medical engineering products, • importance as an element of the public service system in the context of the strategy outlined in the Silesian 20/20 vision, in which the region is described as providing access to public services of a high standard • inextricably linked with the creation, adaptation and absorption of advanced technology solutions to medical engineering, biotechnology, materials science, computer science and electronics, • assisted information technology and telecommunications research in silico, as well as remote diagnostics and prevention, and treatment of complex cases; • in the developing intelligent systems markets or quasi-markets related to the operation of the insured in the public system or the private system, including international;
Information and Communication Technologies	<ul style="list-style-type: none"> • in the horizontal importance for the development of technological, economic and social development of the region by increasing access to knowledge, and enabling the creation and distribution of goods and services, • allowing for participation in global networks of cooperation and the creation of trading systems and management of intelligent markets, • associated with the creation, adaptation and absorption of advanced technological solutions, materials science and electronics and the use of design as an important link constituting the success of the relationship of technology and products based on it from the user, • the use of which is one of the modern civilization competences of both individuals and communities, and innovation environments.

Source: on basis (Regionalna 2012).

Table 3. Portfolio Technology of the Silesian province

		Interdependence groups of key technologies	
Impact on the development of the region	technologies exogenous	Group D Technologies island and exogenous •Spatial information management technologies •Production of non-ferrous metals •Polymeric materials – castings •Medical education	Group C Technology node and exogenous •Biotechnology in environmental protection •Technologies removal of problematic environmental soil, water and sewage •Technologies dust •Fluid technology •Technology infrastructure •Technologies of intelligent transport management systems •Technologies of intelligent systems knowledge •Information Technology •Transport systems
	technologies endogenous	Group B Technologies island and endogenous •Artificial organs •Telemedicine •Advanced diagnostic tools and therapeutic •Technologies and equipment medical infrastructure	Group A Technology node and endogenous •Medical and Pharmaceutical Biotechnology in the biomaterials •Environmental technologies related to material engineering •Technologies of coal gasification •Other energy technologies •Polymeric materials - injection molding, injection, molding technologies and the vacuum •Material Engineering for Medicine •New technology and information technology in transport

Source: (Regionalna 2012).

Specifying smart specializations for the Silesian province it was also determined the so-called portfolio technological Silesian province. You can present them in the form of a matrix (Table 2), which will be on one side technologies divided into exogenous and endogenous, and other technologies and technologies nodal island, and a portfolio of technological Silesia province (Table 3). On

the basis of the division can be considered that (Regionalna 2012):

- First strategic solutions are those solutions that bind to group A (technology nodes and endogenous) and B (island technologies and endogenous). These groups relate to technologies that can be developed using mainly their own resources and skills in order to become a product transfer-owany world markets.

- The next step could be to support the role of innovative development in the areas included in the group C (technology node and exogenous). these technologies, or core them technical solutions can be successfully purchased on world markets, but their mere implementation in the region can become a driver of technical competence and innovative potential of companies and research and development units in Silesia.

- Other activities (Group D - technologies insular and exogenous) pro-innovation should be regarded as associated, but not having a strategic dimension. Their use can be regarded as a kind of civilization heritage, which to some extent can not afford to neglect them.

4. Summary

In recent years, based on previous experience of the European Union to stimulate innovation at national and regional level there has been a paradigm shift in thinking about innovation in the creation of the concept of smart specialization. Smart specializations, taking into account the specificities and traditions of the regions have become a means to improve innovation and the competitive position of the European Union.

In Poland, the regions introduce the concept of smart specialization in their innovation strategy. In the case of the Silesian Province for the most intelligent specializations were: energy, medicine and information and communication technologies. In these areas in the coming years should be focused stimulant level of innovation in the region, which gives a chance for faster development of the entire region.

REFERENCES:

1. **Barca F.:** *An Agenda for a Reformed Cohesion Policy-Independent Report*, European Commission,. Brussels 2009.
2. **Bęczkowska M.:** *Inteligentne specjalizacje w turystyce polskich regionów*, „Studia Periegetica. Zeszyty Naukowe Wielkopolskiej Wyższej Szkoły Turystyki i Zarządzania w Poznaniu” nr 2, 2014, s. 37-50.
3. **Brzóška J.:** *Inteligentne specjalizacje regionu jako szansa wzrostu innowacyjności przedsiębiorstwa*, „Studia Ekonomiczne / Uniwersytet Ekonomiczny w Katowicach”, nr 183, 2014, s. 38-48.
4. **David P., Foray D., Hall B.:** *Smart Specialisation. The Concept*, „Knowledge Economist Policy”, 2007.
5. Europa 2020. Strategia na rzecz inteligentnego i zrównoważonego rozwoju sprzyjającego włączeniu społecznemu, KOM (2010) 2020, Bruksela 2010.
6. Guide to Research and Innovation Strategies for Smart Specialisations (RIS 3) Smart Specialization Platform S3, Przewodnik Strategii Badań i Innowacji na rzecz inteligentnej specjalizacji, (RIS 3), kwiecień 2013.
7. **Hąbek P., Wolniak R.:** *Assessing the quality of corporate social responsibility reports: the case of reporting practices in selected European Union member states*, „Quality and Quantity”, DOI 10.1007/s11135-014-0155-z, 2015.

8. **Horodecka A. M., Wolniak R.:** *Valutazione delle non conformita nell'esempio di un Azienda Italiana*, [w:] „Systemy Wspomagania Inżynierii Produkcji. Review of problems and solutions” [red:] J. Kaźmierczak, 2015, s. 18-31.
9. Inteligentne Specjalizacje Województwa Śląskiego, <https://www.slaskie.pl/zdjecia/2013/03/13/1363174944.pdf>
10. **Kardas M.:** *Inteligentna specjalizacja – nowa koncepcja polityki innowacyjnej*, „Optimum. Studia Ekonomiczne”, nr 2, 2011.
11. Krajowa strategia inteligentnej specjalizacji, KSIS, Warszawa 2013.
12. **Loska A.** *Review of opportunities and needs of building the SmartMaintenance concept within technical infrastructure system of municipal engineering*. w: monografii pod red. R. Knosali: *Innowacje w Zarządzaniu i Inżynierii Produkcji*, Oficyna Wydawnicza Polskiego Towarzystwa Zarządzania Produkcją, Opole 2015, tom 2, str. 544-555.
13. **Łuczak J., Wolniak R.:** *Problem-solving and developing quality management methods and techniques on the example of automotive industry*, „Manager” nr 22, 2015, p. 237-250.
14. **Łuczak J., Wolniak R.:** *The assessment of effectiveness of CAF method usage in the process of improvement of municipal administration*, „The Annals of the University of Bucharest, Economic and Administrative Series”, 2013 nr 7, s. 127-140.
15. **Malik K., Bedrunka K.:** *Specjalizacje inteligentne w równoważeniu rozwoju regionu*, „Handel Wewnętrzny”, 2013, nr 11-12, s. 103-114.
16. **Nazarko Ł.:** *Inteligentne specjalizacje polskich regionów – przyczynek do ewaluacji*, „Przedsiębiorczość i Zarządzanie”, nr 15, 2014, s. 247-262.
17. **Nowak P. A.:** *Smart Specializations of the regions – fashion or necessity?*, „Economic and Regional Studies”, nr 1, 2014, s. 24-37.
18. **Prahaled C. K., Krishnan M. S.:** *New age of inovation*, Mc Graw Hill, 2008.
19. Regionalna Strategii Innowacji Województwa Śląskiego na lata 2013-2020. Urząd Marszałkowski Województwa Śląskiego, Katowice 2012.
20. **Rudnicka M.:** *Koncepcja smart specialization a polityka spójności UE po 2014*, Urząd Marszałkowski Województwa Mazowieckiego w Warszawie, 2014.
21. **Słodowa-Helpa M.:** *Inteligentne specjalizacje polskich regionów – nadzieje, dylematy, obawy*, „Europa Regionum”, nr 17, 2013, s. 53-72.
22. Strategie badawcze i innowacyjne na rzecz inteligentnej specjalizacji, Polityka Spójności na lata 2014-2020. Arkusz informacyjny Komisji Europejskiej.
23. **Szostak E.:** *Inteligentne specjalizacje w rozwoju regionu*, „Studia Ekonomiczne / Uniwersytet Ekonomiczny w Katowicach”, nr 209, 2015, s. 209-2018.
24. **Vanthillo T., Verhetsel A.:** *Paradigm change in regional policy: towards smart specialization? lessons from Flanders (Belgium)*, „Belgeo”, nr 1-2, 2012.
25. **Wolniak R., Hąbek R.:** *Reporting process of corporate social responsibility and greenwashing*, [w:] 15th International Multidisciplinary Scientific GeoConference SGEM 2015. Ecology, economics, education and legislation, 18-24, June, 2015, Albena, Bulgaria. Conference proceedings. Vol. 3, Environmental economics, education & accreditation in geosciences. Sofia : STEF92 Technology, 2015, s. 483-490.
26. **Wolniak R., Skotnicka-Zasadzień B.:** *The use of value stream mapping to introduction of organizational innovation in industry*, „Metalurgia”, vol 53., iss. 4, 2014, s. 709-712.

27. **Wolniak R.:** *A typology of organizational cultures in terms of improvement of the quality management*, "Manager", vol 17, iss 1, 2013, p. 7-21.
28. **Wolniak R.:** *Relationship between selected lean management tools and innovations*, Zeszyty Naukowe Politechniki Śląskiej. Seria Organizacja i Zarządzanie, z 75, 2014, s. 157-266.
29. **Wolniak R.:** *The effects of the implementation of pipelined forms of production in an industrial enterprise*, „Technická Diagnostyka”, nr 1 2015, s. 44-45.
30. **Wolniak R.:** *The role of Grenelle II in Corporate Social Responsibility integrated reporting*, "Manager", vol. 17, iss. 1, 2013, s. 7-21.
31. **Wolniak R.:** *The use of the MTM method for the analysis of production process*, „Technická Diagnostyka”, nr 1 2014, s. 46.