

REGIONAL INNOVATION SYSTEM IN MORAVIAN SILESIAN REGION OF THE CZECH REPUBLIC

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ABSTRACT

The role and importance of regional innovation systems (RIS) in economic development and growth has attracted considerable attention in recent years. The concept of innovation system underlines the role of interaction and co-operation between various agents such as companies, public research and development institutions including universities, scientific institutes and public and private bridging institutions (technology transfer centres, science-technology parks etc.).

The paper describes the concept of innovation systems and the development of RIS in Moravian Silesian region, the former mining and metallurgy industry base, which is subject to structural transformation. Regional development strategies of Moravia Silesia based upon shared vision of key regional actors, Centre of advanced innovation technologies at the Technical University of Ostrava, Science-technology park, foreign direct investment, innovation centres and innovative industry clusters belong to instruments which are to change the dynamic region.

KEY WORDS

Innovation system, Moravian Silesian region, clusters, innovation strategy.

1. Introduction

Economic growth is increasingly related to the capacity of regional economies to change and to innovate. Considerable efforts should therefore be devoted to creating an environment that encourages research, development and innovation thus facilitating the transition to a knowledge economy. Regional research and innovation activities have a significant influence on the structuring of European research capacity as a whole, for example through the organisation and development of research infrastructure, specialised equipment and facilities, through linkages with industrial development zones and support to clusters, through the development and support of centres of excellence, the establishment of science and technology parks, and by encouraging

mobility of researchers, partnerships between education and training institutes and local technology based start-ups.

Regional innovation may systematically arise when a number of factors are in geographical 'proximity', although this is beginning to change thanks to advances in information and communication technologies. Nevertheless, geographical proximity remains one of the most powerful factors in favour of intellectual, commercial and financial exchanges, heavily influencing the innovation process. In this sense, regions are important because they form the spatial basis of groupings of research and innovation operators, which have come to be known as 'clusters', often considered as the main drivers of regional development [1].

Efficient clustering involves multi-sectoral linkages and organisations with different profiles. In its most successful expression, clustering combines industry, government and non-governmental organisations, together with a number of knowledge-specific players (universities, research centres, science and technology parks and 'techno poles', innovation agencies acting as service, competence and diffusion centres).

Regional disparities in R&D expenditure within Member States are considerable. In the majority of Member States for which regionalised data are available, between one third and two thirds of national allocations are spent in the capital region [2]. The top nine R&D expenditure regions in Germany, France and the United Kingdom alone spend EUR 51 billion or 25 % of the total EU expenditure in 2002. Only 21 of 254 regions currently reach the 3 % target or more for R&D expenditure in relation to GDP. These are located in Germany (11 regions), Finland (3), France, Austria and the United Kingdom (2 regions each), the Netherlands, Sweden and the Czech Republic (1 region each). Braunschweig (7.1 %) leads among the eight regions recording an R & D intensity of more than 3 %, ahead of Pohjois-Suomi (4.2 %), East of England (3.9 %), Střední Čechy (3.5 %), Vienna and Île-de-France (3.4

% respectively). Very low proportions of GDP are spent on R & D in the southern and eastern EU regions.

Covering the period 2007–13, the Community strategic guidelines for cohesion policy aim at improving knowledge and innovation for growth. As regards increasing and improving investment in research and technological development, the guidelines identify four priorities for investment:

- strengthening cooperation among businesses and between businesses and public research/higher education institutions by supporting the creation of regional and trans-regional clusters of excellence;
- supporting research and innovation activities in SMEs and enabling SMEs to access RTDI services in publicly-funded research institutions;
- supporting regional cross-border and transnational initiatives aimed at strengthening research collaboration and capacity building in priority areas of EU research policy;
- strengthening R & D capacity building, including information and communication technologies, research infrastructure and human capital in areas with significant growth potential.

The focus on innovation, *clusters* and networks is visible in different actions and measures everywhere in the official documents and policies. However clusters themselves are only the specific form of regional groupings. These are the regional innovation systems which have broader meaning for the innovation-based regional development.

2. Systems of innovation approach

Innovation and competitiveness are two concepts which govern the national and regional policies throughout the world. Innovation is the key driver of global economic competitiveness. Although certain historically important innovations had a linear development profile, particularly where in-house R&D was passed to production engineers for transformation and then to sales managers for reaching the consumer, today innovation is interactive and may be initiated by marketing as much as R&D and involve third party organisations like universities, suppliers and investors.

Christopher Freeman used the concept national systems of innovation for the first time in 1987 in his analysis of economic development in Japan since the Second World War (Edquist, Chaminade, 2005). In the term innovation system he included the network of institutions in the public and private sector whose interactions initiate, import, modify and diffuse new technologies.

Systems of innovation may be delimited in different ways: either spatially (geographically) or sectorally. Geographically defined innovation systems may be local, regional, national and supranational. This type of delimitation presumes that the area in question has a reasonable degree of ‘coherence’ or ‘inward orientation’ with regard to innovation processes. Sectorally delimited systems of innovation only include a part of a regional, national or international system. They are delimited to specific technological fields (generic technologies) or product areas. They can be restricted to one sector of production. Initial investigation on innovation systems was predominantly carried out on national level under National Innovation Systems approach. In the meantime a set of other varieties of innovation systems have been established as Sectoral Innovation Systems or Regional Innovation Systems.

The concept of Innovation Systems (IS) is based upon the interactive model of innovation. The key feature of the concept is that an economy’s (regional or national) ability to generate innovations does not only depend on how individual actors (firms, universities, organizations, research institutes, governmental institutions, etc) perform, but rather on how they interact as parts of a system. There are many different definitions of IS, e.g. (Anderson, Karlsson, 2004): „A system of innovation is constituted by the elements and relationships which interact in the production, diffusion and use of new, and economically useful, knowledge..” or „...a system of actors (firms, organizations and government agencies) who interact in ways which influence the innovation performance”, or „... a set of institutional actors that, together, plays the major role in influencing innovative performance“.

On the national level the innovation system can be described by the four groups of actors involved in innovation: (1) Government and legislative bodies, (2) firms and entrepreneurship promotion, (3) knowledge institutes (R&D and educational bodies including universities) and (4) innovation intermediaries.

3. Regional Innovation Systems

The regional innovation system as the key to regional economic competitiveness in the new global and knowledge driven economy explains, how firms, institutions and government interact to foster the innovation process in a regional context.

A regional innovation system is generally defined as the systemic interaction between (1) the regional production structure or knowledge exploitation subsystem which consists mainly of firms, especially where these display

clustering tendencies and (2) the regional supportive infrastructure or knowledge generation subsystem which consists of public and private research laboratories, universities and colleges, technology transfer agencies, vocational training organizations, etc.

Within the regional innovation system, networking and collaboration between public and private institutions, be they firms, universities, or other government agencies, are increasingly being seen as fundamental to economic development. Innovation is enhanced by networks of innovators, users and intermediaries, located in proximity within clusters. These offer opportunities for inter-trading, exchanging intangible goods or services and provide spillover effects or economic externalities for firms. Such clusters are likely to have strong links to global innovation networks and clusters (Cooke and Morgan, 1998).

The cluster concept was developed as a concentration of interdependent firms within the same or adjacent industrial sectors in small geographic area and it has proven to be highly used among a wide variety of policy-makers and researchers. Some researchers even designate RIS as regional clusters that are supported by surrounding organizations. They argue that a RIS has two key features. These are (1) firms in the regional core cluster and (2) an institutional infrastructure A RIS can in principle stretch across several sectors in the regional economy and comprises various industry clusters.

Cooke *et al* (1997) list the requirements for a RIS explicitly: “An innovative regional cluster is likely to have firms with: access to other firms in their sector as customers, suppliers or partners, perhaps operating in formal or informal networks; knowledge centres such as universities, research institutes, contract or research organizations and technology transfer agencies of consequence to the sectors in question; and a governance structure of private business associations, chambers of commerce and public economic development, training and promotion agencies and government departments. Where these are available in a region and crucially, the organizations noted are *associative*, meaning there is systemic, i.e. regular two-way, interchange on matters of importance to innovation and the competitiveness of firms, we may consider this to be a regional learning system. Where to this added the financial capacity, through the existence of the financial infrastructure needed to enable firms to gain the necessary venturing finance and invest the necessary qualities of capital to generate endogenous innovation, we may speak of a regional innovation system”.

Figure 1 describes what may be called a “complete” RIS (Andersson, Karlsson, 2004). The core is constituted by the firms in the regional clusters, surrounded by supporting as well as complementary firms. Institutions, as normative structures and “rules of the game”, are present which facilitate co-operation and knowledge spillovers and transfers.

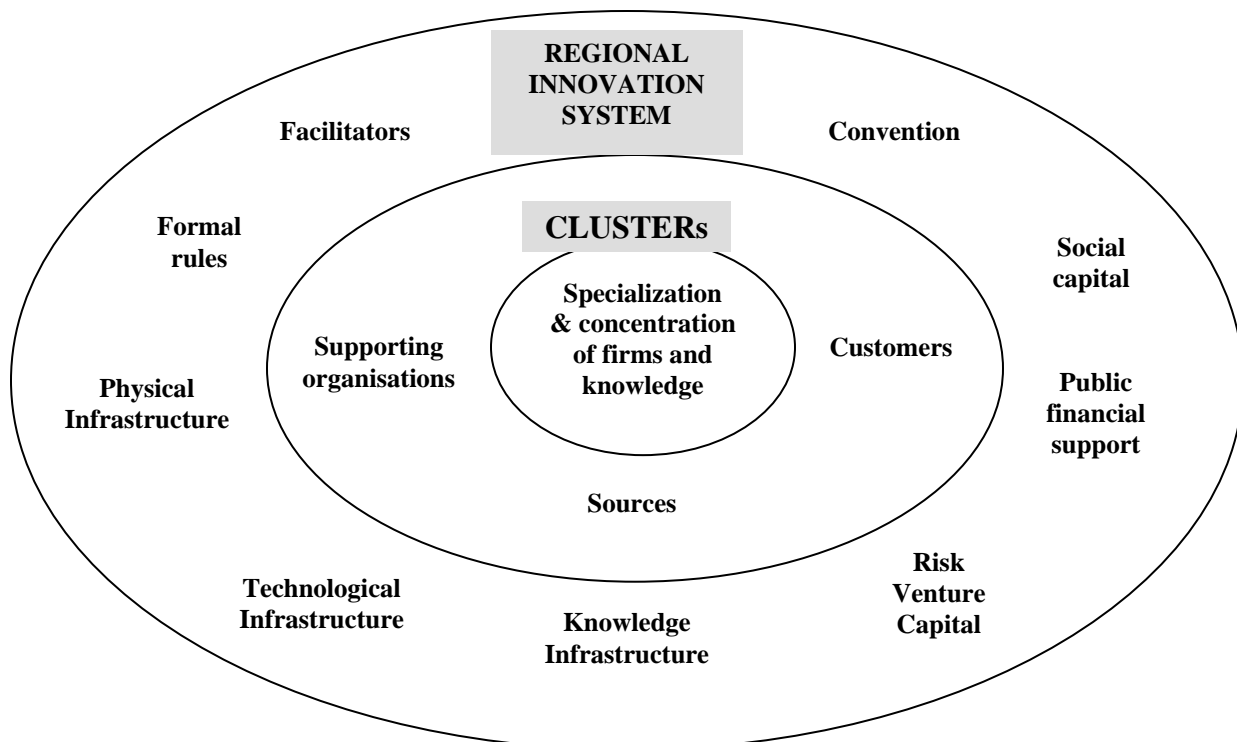


Figure 1: Model of Regional innovation system

The regional innovation system is a complex association of links between sources of capital, industries, universities and government agencies that are essential to turning knowledge to competitive economic advantage.

Figure 1 also suggests that the university-industry-government relationship have a key role to play in the functioning of a RIS. Etzkowitz & Leydesdorff (2000) refer to this relation as the *Triple Helix*. In their view, the Triple Helix generates "...a knowledge infrastructure in terms of overlapping institutional spheres, with each taking the role of the other with hybrid organizations emerging at the interfaces". Universities play an essential role for the functioning of RIS. Of course, universities are not the only relevant knowledge provider. Application-oriented and non-university research institutes are also important in forming the knowledge infrastructure in a RIS.

Based on this literature and on the above discussion, we discern two fundamental dimensions of regional innovation activity within the regional innovation system (Cooke et al., 2002):

- the business innovation system, largely in the private sector; and
- the governance of innovation system (largely in the public-sector).

Business innovation system (BIS) is based (1) on small and medium sized enterprises (SMEs), indigenous or foreign-owned, undertaking small scale R&D and innovation, in high association with other local SMEs, but with little dependence on external sources of R&D (so called *localist and associative* BIS), or (2) on multinational firms in the region, with R&D and innovation carried out internally and privately within these hierarchical corporations (so called *globalised and non-associative* BIS), or (3) on balanced mix of R&D and innovation carried out by the full range of small, medium-sized and large firms in the region, both indigenous and foreign-owned (called *fully interactive and associative*). The firms are highly networked locally, regionally, nationally and globally.

We also discern three varieties of public governance system. (1) *Grassroots and bottom-up* public governance of innovation system is driven at the sub-regional, local or civic level. (2) *Dirigiste and top-down* is central government driven and co-ordinated at the national level in regard to preferred and specialised regional R&D and innovation activity. (3) *Fully Networked and Balanced*. In this type of public governance system, there is multilevel governance of regional R&D and innovation, involving a balanced and co-ordinated mix of local, regional, national and supranational initiatives in pure and applied R&D, and in near and at market innovation. Baden-

Württemberg, Bavaria (Germany), Massachusetts (US) and Cambridge (UK) are good examples. However the majority of regional innovation systems are an intersection of above described characteristics in which some prevail. This classification of different types of regional innovation system allows for various degrees of regional networking and interaction across both public and private dimensions to define the „best’ regional innovation systems – fully interactive and associative across all public and private dimension.

However speaking about innovation systems we cannot confine our consideration to the structure only. The system has its function performed by various activities of its components [4]. The main activities in the innovation system relate to the provision of knowledge inputs to the innovation processes, the demand-side factors, the provisions of constituents of RIS and provision of support services for innovating firms.

4. The Region North Moravia Silesia

Moravian Silesian Region (in Czech *Moravskoslezský kraj*) is an administrative unit (*kraj*) of the Czech Republic, located in the north-eastern part of its historical region of Moravia and in most of the Czech part of the historical region of Silesia. The region borders two other countries – Poland to the north and Slovakia to the east.

It is a very industrial region, which was called the "Steel Heart of the Country" in the communist era, for its prevalence of heavy industry, especially steel works. Since the fall of the communism these industries have been in decline and the region suffers from high unemployment (about 15% compared with 8 % national average). There are, however, several mountainous areas in which the landscape has preserved its natural character and provide the favourite conditions for tourism and leisure activities.

The region has an area of 5 445 km² and it belongs with total population of 1 251 thousand to the largest regions in the Czech Republic [9]. Largest municipality in population terms is city of Ostrava with 311 thousand citizens. Of 38 towns there are 5 towns with a population over 60 thousand. These towns are the centres of industrial production in the region.

The region has a long industrial tradition. In its history we can find following milestones which formed its future (path dependency): 1763 - opening of coal mining in Ostrava, 1828 - foundation of the first ironworks in Vitkovice. The huge development of industry in the

Region started since 1945. Period of socialism saw enormous population growth (workers from all Czechoslovakia settled there) and construction.

Since 1989 - restructuring and revitalization of industry, closing of many coal mines, inflow of domestic and foreign investments, improving of the environment thanks to many ecological steps in plots and factories and enterprises.

The industrial structure of the region is formed by three groups of companies: *Multinationals*, which entered the traditional industries or started in green-field, *Old economy firms* (either indigenous or foreign owned) and *New economy indigenous innovators*, a group of mostly small firms in ICT and new technologies. The most important companies in the region are in the following table.

Company	Branch
Autopal, s.r.o. (VISTEON Group)	Automotive parts
Biocel Paskov	Wood industry
ISPAT NOVA HUT A.S.	Steel industry
OKD, a.s.	Coal mining, coke production
Severomoravska energetika, a.s.	Production, distribution and sale of electricity
Siemens elektromotory s.r.o.	Electrical engineering
Tatra, a.s.	Automotive industry
Trinecke zelezarny, a.s.	Steel industry
Vitkovice, a.s.	Steel industry, heavy engineering

Table 1: Most important companies in the region

The last ten years are marked by huge inflow of foreign investments into the region, which has prepared more than 600 hectares of industrial zones. The example of most important investors is given in Table 2.

Investor	Country	Branch
Huyndai	South Korea	Automotive
LNM Holdings	Netherlands	Metallurgy
Visteon International Holdings	USA	Automotive
Ford	USA	Automotive
Siemens	Germany	Automotive
Heyez-Lemmerz	Italy	Automotive
Dalkia	France	Energy
TietoEnator	Finland	ICT
ASUSTeK Computer	Tchaj-wan	ICT

Table 2: Inflow of investment into the region

Knowledge base of the region is formed by four universities attended by more than 33 000 students. The Technical University of Ostrava (VSB-TUO) with 20000 students and seven faculties (Faculty of Economics, Electrical Engineering and Computer Science, Mining and Geology, Metallurgy and Material Engineering, Mechanical Engineering, Civil Engineering and Safety Engineering) is the bedrock of engineering and technology education in the region. It is followed by The University of Ostrava (UO-7000 students, 4 faculties). The Silesian University – Opava and Karvina (SU-4000 students, 3 faculties) and private Business School of Ostrava (BSO-over 2000 students).

5. Regional Innovation System in North Moravia Silesia

Regional innovation system can be viewed at and described from various perspectives. As it was discussed above, we can structure of system elements into business innovation system and governance of innovation system, however we can also discern the interactions between the regional production structure and regional supportive infrastructure.

The schematic structure of RIS in Moravian Silesian Region is described in Figure 2. Regional production structure is the first level of RIS. It is formed not only by single firms, which can be described in three groups, but also by their networks and clusters.

The most important industrial sectors in the Moravian Silesian Region are already organized in clusters, which gives the Region a new profile and makes it much simpler for investors to access individual subcontractors. In this respect, this is the leading Region in the Czech Republic. Moreover in clusters there already exist links of firms to the VSB-Technical university, as it is seen in Table 3.

Cluster	Faculty of
The Moravian-Silesian Wood Processing Cluster	Civil Engineering
The Moravian-Silesian Engineering Cluster	Mechanical Engineering
IT Cluster	Electrical Engineering and Computer Science
Hydrogen Cluster	Safety Engineering
Automotive Supplier Cluster	Mechanical Engineering
Waste pyrolysis -.Envicrack cluster	Mechanical Engineering

Table 3: Clusters in Moravia Silesia

The second level of RIS is composed of Regional Innovation Support System which can be described in various sub-systems. The technology transfer intermediaries include the Centre of Advanced Innovation technologies, the joint project of Technical university, Science Technology park of Ostrava at the university campus, Business Innovation Centre of Ostrava in former Vitkovice Steel premises, Regional Innovation Centres.

Education, research and specialized and financing organization are other subsystems. The first are higher education and further education institutions including universities. Research and development is performed not only at universities, but in bigger companies (e.g. Vitkovice Research and Development, Vitkovice Testing and Laboratories, Ltd.) and research institutes as Institute of Geonics, Physical-Technical Testing Institute, Iron and Steel Research Institute VUHZ Group, Czech Welding Institute, etc.

Economic development agencies in the Region are represented by Regional Development Agency, an executive subsidiary of Regional authority with the mission is to contribute to the co-ordination of projects for the economic and social transformation of the region, The Chamber of Commerce of Moravian Silesian Region, The

Union for the Development of the Moravian Silesian Region, the subsidiaries of governmental agencies CzechInvest, Centre for regional development and others. Also local development agencies are doing well in some parts of the region focused mainly to the preparation of development projects with EU aid.

Financing of innovation activities in the Region is dependent upon a dense network of banks including the Czech-Moravian Guarantee and Development Bank. Limited possibilities of risk capital in the past seem to develop as the Czech Republic is characterised by more favourable environment for the risk capital investment than old EU member countries (Novotna, 2005). A good example is The Czech Venture Partners located in the region and newly appearing Business Angels which promote the growth of many prospective start-ups .

On the other hand the huge financing possibilities offer for the period 2007-2013 the EU structural funds in Operating programme Enterprise and Innovation which will be managed by regional subsidiary of CzechInvest and other operating programmes with their managing authorities.

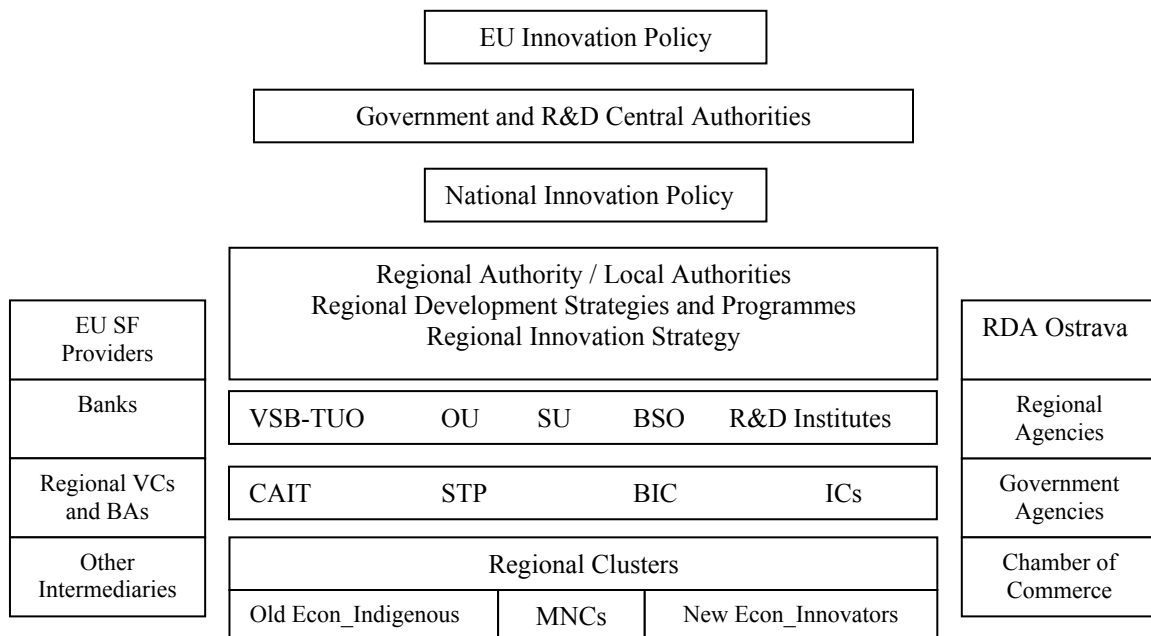


Figure 2: Components of RIS in Moravia Silesia

The framework for regional innovation policy is formulated in strategic and programming documents organized by regional authority. These programmes are of

different nature from Policy proclamation “The way forwards” to Regional development plan for the period 2004-2008, Regional innovation strategy, Regional

operation programme (EU structural funds) 2007-2013, Blueprint of Regional Research and Development strategy and others. The documents follow the national programmes of regional development and utilisation of EU structural funds.

The innovation scene in Moravian-Silesian Region has four key characteristics. One, Region has a globalised and hierarchical but not especially well-networked and largely publicly-led innovation setting, with a few highly innovative inward investors and a large share of firms not engaged very seriously in the pursuit of internationally competitive innovation practices. Two, within this structure are a number of smaller sub-systems involving public and private participants who are pursuing, on a small scale, practices that are comparable to those of far more accomplished networked and interactive innovation systems elsewhere. Three, in parallel, there are exemplar firms, often indigenous in origin, having reached positions of global competitiveness through innovation in traditional industries. Four, in the last years regional clustering is flourishing based on traditional inter-firm links and strengthened by new inward investors and the regional and government policies supported by EU structural funds programmes.

5. Conclusions

Contemporary regional policy is not focused in the regional disparities only. The regional competitiveness based on innovation and making use of regional potential for its development and growth is the new priority of development policies. All innovating regions in Europe developed their regional innovation strategies with measures for innovation support within regional innovation system with the aim to increase the regional innovation capacity. The RIS in Moravia Silesia exists in an initial stage with basic components already set up. The governance innovation system can be classified as something between globalist to balanced and grass-root intersection.

For the future development we can expect improvements for both business and governance innovation systems. Firms must be at the centre of the regional innovation system and strategy. The main interactions in innovation are in the value chain, not outside of it – so the main problem is how to improve the innovation management process within firms themselves – how firms organise to be more innovative. Multinational and exemplar indigenous firms must play a leading role. Regional business innovation networks and clusters must be strengthened. A broader conception of innovation must be developed, especially involving finance and the use risk venture capital. Fora should be established for intra-cluster and cross-sectoral learning. The regional innovation system must be viewed as open, not closed.

In governance innovation system publicly supported innovation management programme should be considered. The measures should comprise following actions: Skill formation and training provision must be fully integrated with innovation. RIS must be driven from the highest authority level. The research/industry interface at the local universities must be strengthened. Commercially focused public and private R&D must be increased.

The RIS project must be led by high-powered leaders with high enough legitimacy, respect and capacity so as to maintain the support and confidence of all partners in the regional innovation system. All this actions should be taken into consideration in the renewed regional innovation strategy of Moravian Silesian Region.

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