

Moravia-Silesia Region

1. About the Region

The Moravia-Silesia Region is located in the north-eastern part of the Czech Republic. It borders Slovakia to the east and Poland to the North. It has an area of 5,427 square km and is inhabited by 1.2 million people. The region's capital is Ostrava with 310,000 inhabitants. The GDP per capita in the Moravia-Silesia Region is EUR 12,726 (2011). The average level of registered unemployment is 9.5% (2012), and the average gross monthly salary is EUR 960.

The Moravia-Silesia Region is mainly an industrial region with a long tradition. Its key industries include mining (brown coal extraction), metallurgy, engineering, energy, automotive industry, IT, electronics and newly also biotechnology. The region has 20 industrial zones covering an area of 1,060 hectares. The most important foreign investors include Halla Visteon Climate Control, Varroc Automotive Lighting Systems, Hyundai Motor Company, Behr, Brose, Brembo, Continental Automotive Systems, Siemens, TietoEnator, ArcelorMittal and others.

2. Description of key sectors and their areas of research and innovation activities

2.1 Metallurgy – Engineering

Metallurgy and engineering remain crucial industries for the Moravia-Silesia Region (as far as GDP, employment and exports are concerned). These sectors correspond to the mining industry and together with it form the key "coal-steel-machinery" value chain (these sectors are closely interconnected). The main companies in these sectors include Třinecké železářny, Bonatrans, ArcelorMittal, Vítkovice and Huisman Konstrukce. There are also specialised private research institutions in the region, which are focused on material research – Materiálový a metalurgický výzkum s.r.o. and Výzkumný ústav hutnictví Železa a.s. Since 2003 a national engineering cluster has been present in the region, comprised of more than 60 members from companies, universities and research institutions.

It can generally be stated regarding the metallurgy and engineering sectors that in the area of research and development they will remain focused mainly on modern materials (stainless alloys, composites), including surface adjustments (use of nano technologies). Emphasis will also be placed on perfecting machining technologies (their adaptation by engineering companies based on specific needs, particularly for the purpose of increasing the precision of machine parts) as well as on boosting mathematic modelling during development of machine parts. In the future, the connection of these sectors to energy (traditional and nuclear – part of the primary sphere and technology involving the use of pressurised gas) and the automotive industry will continue to be strengthened. New opportunities for material research include the healthcare sector and the oil and natural gas exploration industry. An interesting emerging technology is LSM – the technology of laser sintering of metals and plastics. At most companies involved in engineering, there has been a visible effort to shift to higher positions on the ladder in international value chains (from deliveries of components to deliveries of modules and complex technological whole units) in order to achieve positions as system integrators offering comprehensive and sophisticated technical solutions with higher added value and a higher price. Another way to increase companies' competitiveness in terms of productivity and fulfilment of environmental standards is effective use of generated waste (recycling technology), particularly limitation of their generation (waste-free technology).

2.2 Automotive industry

In the automotive industry, there is an evident very strong connection between companies and international supplier chains (75% of production is exported). Companies are basically concentrated in two clusters: particularly into the formalised Moravian-Silesian Automotive Cluster, a civic association (the leading companies in the cluster are Halla Visteon Climate Control, Varroc Automotive Lighting Systems, Continental Automotive Systems and Brano Group), and then into the non-formalised cluster around Hyundai Motor Manufacturing Czech (a South Korean sub-supplier mainly at level TIER 2). In the case of multinational corporations' branches in the region, their low autonomy can be observed when business and related research and development activities are selected. These companies are mainly involved in internal research and development and cooperate in research and development with universities, research institutes and other companies in the region to a limited extent.

Due to huge pressure on car prices, companies do not have the option of increasing the prices of their products, and therefore they are involved particularly in process innovations that improve quality and productivity and/or product and technological innovations on a lower scale that continuously improve the technical parameters of products. The scope of research and development activities in this sector is very wide ranging in the region (plastics, electronics – sensors, ventilation, air conditioning, heating, locks, pedals, hand brakes, etc.). An interesting opportunity for research in the future is represented by modern materials (alloys, composites, plastics, aluminium) – for the purpose of reducing vehicle weight (for lower fuel consumption and CO₂ emissions), energy accumulation systems and recuperation for the needs of developing electro-mobility and mechatronics. Another way of increasing productivity and the effectiveness of logistics is to achieve broader implementation of technology for automatic identification of motion of components and products inside and outside of production plants (for example using RFID technology). The importance of effective use of waste and/or limitation of its generation in production processes (waste-free technology) will also grow in the interest of increasing companies' competitiveness in terms of productivity.

2.3 IT and electrical engineering

The IT and electrical engineering sectors are among the most prospective and dynamically developing sectors in the Moravia-Silesia Region. Through their activities, these sectors are connected to engineering, the automotive industry, energy and newly also to biotechnology. The public sector is also an important target group. An example of new supporting research infrastructure in the region is the super-computer centre excellence IT4Innovations with total expenses of EUR 72 million at VŠB - Technical University of Ostrava. An important role in the development of research and innovation activities is also played by the IT Cluster, comprised of 40 members (such as VŠB - Technical University of Ostrava, Vodafone and others). Within the IT and electrical engineering sectors, areas of research specialisation have been identified, to which the most attention will be devoted in the years to come. The most important include e-commerce, business intelligence, mobile technology, applications for smart grids and healthcare, cloud systems and measuring and testing systems for industrial production and energy. In the electrical engineering field, another approach is to increase price competitiveness through effective use of waste from production processes or limitation of their generation.

2.4 Energy

The energy sector in the Moravia-Silesia Region is focused mainly on traditional and nuclear energy, but in the last 5 years a lot of energy has also been devoted to alternative energy sources. The main players in this sector are Dalkia, ČEZ, VŠB - Technical University of Ostrava and a few smaller technological companies involved in alternative energy. In the region, there is also an energy cluster comprised of approximately 30 entities.

Research and development specialisation in the energy sector offers a number of specific focuses and directions, which currently play and in the future will continue to play an important role. Emphasis is being placed mainly on increasing effectiveness and efficiency, reducing losses and achieving energy savings both in relation to traditional energy and nuclear energy and in relation to alternative energy sources. This will involve particularly more effective use of waste components (pyrolysis, fermentation) and increased efficiency of solar and geothermal technologies. Cogeneration is a very progressive research field and accumulation of energy in general.

This particular sector undoubtedly has a reach into other crucial areas, the most important of which are the metallurgy and engineering sectors (investment whole units, technological modules) and the automotive sector (electro-mobility and related accumulation of energy for electric vehicles, rapid charging stations and infrastructure in general).

2.5 Biotechnology

In relation to the particular field, it is currently necessary to concede that there is a shortage of critical potential, particularly due to the absence of biotechnology companies. However, something worth highlighting is the huge research potential of the Ostrava Teaching Hospital (the holder of multiple American patents) and the research activities of other institutions that complement the research activities of the Ostrava Teaching Hospital: VŠB - Technical University of Ostrava (technical applications for healthcare – biomedical engineering, cybernetics, materials), the University of Ostrava – the newly established Medical Faculty (biobanking, research of blood illnesses) and the Ostrava Medical Institute (effects of environmental pollution on human health – dust, nanoparticles). The key area of research specialisation in this sector is regenerative medicine (stem cells); for stem cell research a stem cell therapy and diagnostics centre has already been established (CBTD), and as of December 2013 the new biomedicine innovation park 4MEDI will begin operations with total costs of EUR 40 million and the most modern equipment in the world, which will also be the largest of its kind in Europe. Leading biotechnology companies will be involved in research and innovation activities within 4MEDI (such as PrimeCell a.s.), and there is a high probability of results from research and development being transferred in the form of new biotechnology start-ups and spin-offs, which will make the profile of this sector in our region complete. In regenerative medicine, there is an interesting opportunity to use nanotechnology (nano bio sensors and nano printing - 3D), and other prospective research activities include genomics, bioinformatics and medicinal data analysis (e.g. with the help of RFID technology). An interesting research question is the further increasing of the effectiveness of use of substrates generated during production of stem cells or during production of standard cells, for the purpose of producing other medicines or in other industries (cosmetics, drugstore products, etc.).

3. Universities in the Moravia-Silesia Region

The largest university in the region is VŠB - Technical University of Ostrava, whose research programme will play a key role for RIS3 on behalf of the university sector. This university has 7 faculties (engineering, electrical engineering and informatics, metallurgy and material engineering, mining and geological, construction, safety engineering and economics) and is attended by 25,000 students. Its technical faculties are compatible with the mentioned industrial sectors in the region, and therefore there are a lot of opportunities for development of applied research. At VŠB - Technical University of Ostrava a new research centre has been launched, which was built with financial support from EU structural funds with total costs of EUR 160 million – the super-computer Centre Excellence IT4 Innovations, the Regional Material Technological Research Centre, the Institute of Clean Technology for Mining and Use of Energy Resources, the Energy Units for Use of Non-traditional Energy Sources, Innovation for Effectiveness and the Environment and the Institute of Environmental Technology.

Another university in the region is the University of Ostrava. It is a university mainly focused on humanities, but the research activities of the newly established Medical Faculty (corresponding to biotechnology) and

the Institute of Fuzzy Modelling (mathematical models based on uncertainty, corresponding to IT) have potential for further development and broader application in practice. The third university is Silesian University, which also has a focus on humanities. At it there are important research activities focused on mathematical modelling and applied physics.

To summarise, the following areas of research can be mentioned in relation to all of the named universities:

- Material research (modern materials including nano materials for a wide range of sectors – engineering, automotive industry, medicine, etc.), surface adjustments,
- Environmental technology – energy use of waste and fuels, energy efficiency and savings, waste-free technology, intelligent energy networks,
- Business intelligence, e-commerce,
- Software for crisis management, integrated security systems,
- Research involving blood platelets, circulatory illnesses, stem cells,
- Machining technology, production of precise machine parts,
- Electro-mobility and related infrastructure.

It is clear from the description of the research activities of universities and businesses (see the previous chapter 2) that numerous windows of opportunity exist for further development of cooperation between companies and universities, which appear in RIS3.

4. Support for research, development and innovation activities in the Moravia-Silesia Region

A key tool for supporting research, development and innovation activities is undoubtedly a financial plan (grant programmes, innovation vouchers, grants for jobs created in research and development in companies, support for international scientific teams, a fund for micro loans, etc.) administered by the Moravia-Silesia Region. The mentioned fund for micro loans is being participated in financially also by the City of Ostrava. An important role is also played by the activities of the Agency for Regional Development as the organisation entrusted with the implementation of the Regional Innovation Strategy for 2010-2020 (used as a basis for preparing RIS3). This particularly involves proposing financial plans for supporting innovations for the Moravia-Silesia Region, guaranteeing of additional professional activities (such as support for internationalisation of research institutions and innovation companies – brokerage events, educational activities related to innovation management, marketing of innovation activities, etc.) and overall coordination of activities for strategy implementation (organisation of a meeting of the Council for Innovation, working groups, preparation and evaluation of action plans with development projects).

Very useful parts of the innovation system are business incubators, which by using several different tools attempt to stimulate innovative business in the region (such as Green Light – presentation of students' business objectives before an expert commission, a corresponding start-up accelerator – detailed processing of a business plan, professional advisory services for already formed start-ups – in the areas of marketing, intellectual property protection, etc.). In the region there are 5 business incubators – the Business Incubator of VŠB - Technical University of Ostrava, the Ostrava Scientific and Technological Park, BIC Ostrava, the Business Incubator Steel IT and the Business Incubator of the Business College. Since the Moravia-Silesia Region is, in terms of the intensity of citizens' business activities, one of the least active regions in the Czech Republic; support for identification and realisation of business objectives with innovative elements (and the resulting added value of products) is one of the objectives of the RIS3 of the Moravia-Silesia Region.