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adresa / address:

Kabinet pro studium vědy, techniky a společnosti při Filosofickém ústavu AV ČR

Jilská 1, 110 00 Praha 1

tel: +420/222 220 107

fax: +420/222 220 725

e-mail: [teorievedy@flu.cas.cz](mailto:teorievedy@flu.cas.cz)

url: <http://teorievedy.flu.cas.cz>

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## PRAGUE AS A KNOWLEDGE CITY-REGION

Jakub Pechlát\*

### *Abstract*

*Prague is well known as political, economic and cultural centre of the country. In recent years, cities and regions are regarded and analyzed as knowledge-based economies. This paper tries to summarize selected data allowing the description of Prague as a knowledge-based regional economy and its development as such in the last decade. Presented are various available indicators together with findings of selected recent innovation-related analyses and data on financial support from EU Structural Funds. Furthermore, this paper introduces city development strategies and explains how they aspire to contribute to the development of the city as a knowledge-based economy.*

*Keywords: knowledge region; regional innovation policy; regional innovation statistics; European funds; city development strategy*

\* Contact: Jakub Pechlát, City Development Authority Prague, Strategic Planning Department, Vyšehradská 57/2077, 128 00 Praha 2, Czech Republic (pechlat@urm.mepnet.cz).

## **Introduction**

The capital of the Czech Republic is renowned for its long and rich history that gradually shaped it to its present state. This paper aims to examine its present situation and recent development with respect to the term city of knowledge or knowledge-based economy. The last two decades had profound impact on the city development, reflecting both global trends like globalisation of the economy, spread of information technology, shift in perception and provision of safety and national events and developments such as transformation of the economy from central planned to market oriented with focus on services instead of industry, disastrous floods in 2002, accession into the European Union and others. All of these factors have to some extent formed the city.

At present, many major European cities found that the structure of their economy – the core of their economy being the sector of services – presents an opportunity to form themselves as cities, or regions, of knowledge. This is even more topical in the regions of the Central European countries which became members of the EU in 2004. In the Czech Republic, the region of South Moravia is leading the way to knowledge regions regarding the support of city and regional government to this field.

In order to assess the knowledge city features of Prague, we shall examine available data about the city and its strategies related to knowledge economy and take a look at the situation with R&D and innovation support and development.

## **Knowledge city statistics**

Statistical data on innovation have begun to be gathered in large at the beginning of this decade. However, using some other relevant data we could put together even longer timelines to illustrate the process of increasing importance of knowledge in the economy. Table 1 below presents selected data related to the knowledge economy and innovation as in the

period 2001–2008. Indicators show that not only the economic performance of the city is improving but also the knowledge and innovation related values have increased.

The characteristic of the workforce show an increasing number and share of professionals, researchers, persons with tertiary education and persons employed in services. The portion of population with tertiary education has increased. Over the last 7 years, the number of university students has increased by 88%. Partly due to the possibility to establish private colleges that Czech law introduced in 1999. Apart from 9 public universities that usually have at least a few decades long history another 24 private colleges were established, the largest of which has around 5,000 students. In case of private higher education institutions, one has to bear in mind that their field of study is mostly humanities and social sciences, economics etc. Therefore, the core of innovation potential remains within the large public universities offering education in technical and natural sciences and medicine. These institutions have larger budgets, costly equipment and facilities at their disposal providing opportunity for the future scientists and innovators to train and develop their skills.

The number of researchers and their share on economically active population have also increased. On the other hand, the structure of researchers by their field of study has shown only minor changes. The largest share of researchers work in technical sciences (34%, 3 percentage point increase between 2001 and 2008). The second significant group are those working in natural sciences (28%, stable). The remainder is divided among medicine (18%, more than 3 percentage point decrease), humanities and social sciences (around 16%, stable) and agriculture (less than 5%, stable). This illustrates the inertia in the educational background formed by the large universities.

Table 1

Indicator	2001	2002	2003	2004	2005	2006	2007	2008
GDP per capita in PPS as percentage of EU-27 average	145.3	147.6	153.9	154.5	158.5	162.3	n. a.	n. a.
Economically active population (thousand persons)	631.9	631.2	634.6	625.6	637.5	645.2	648.2	658.1
Persons with tertiary education as share of economically active population (%)	25.2	27.5	27.1	28.1	28.5	28.2	28.4	32.1
Number of universities	13	19	26	26	29	30	30	32
Number of university students (of Czech citizenship)	68,599	70,148	74,321	78,387	81,760	107,671	116,033	130,000 (estimate)
Share of employed in tertiary sector (%)	76.9	78.0	78.1	79.0	79.1	79.2	81.4	80.4
Professionals (CZ-ISCO-88) (thousand persons)	134.4	134.5	138.8	148.3	142.9	147.2	152.3	153.1
Researchers (HC) as share of economically active population (%)	2.00	2.08	2.14	2.40	2.58	2.73	2.96	3.00
GERD (million CZK) (million EUR*)	10,119.6 296.9	10,189.8 330.7	11,853.7 372.2	13,300.3 416.9	15,835.1 531.7	19,186.2 676.9	22,914.1 825.4	22,481.3 901.3
GERD as share of regional GDP (%)	1.83	1.80	2.01	2.09	2.22	2.45	2.70	n. a.
Number of R&D workplaces	453	453	522	557	591	594	626	614
Science and technology parks and/or incubators	2	2	2	2	2	2	2	4
FDI (billion CZK) (billion EUR <sup>1</sup> )	484.7 14.2	613.0 19.9	537.4 16.9	598.6 18.8	801.1 26.9	885.3 31.2	1,049.1 37.8	n. a.
national patents per 1 million inhabitants	60.17	61.99	72.01	66.14	96.14	76.45	68.89	70.82
EPO patents per 1 million inhabitants	18.81	18.53	20.56	26.69	11.79	n. a.	n. a.	n. a.

Source: Czech Statistical Office, Eurostat, Czech National Bank, City Development Authority Prague

Note: HC – head count; GERD – gross expenditure on research and development; PPS – purchasing power standard; FDI – foreign direct investment; EPO – European Patent Office; n. a. – data not available.

\* Counted using the average EUR/CZK exchange rate in the respective years.

The increase in expenditure between 2001 and 2008 was remarkable, the amount more than doubled. Still, recent comparisons indicate it is significantly lower than in leading Central European regions (Munich, Vienna) as measured by GERD in PPS per economically active population or at par with such regions as Berlin or Mittlefranken. On the other hand, Prague is ahead of the remaining capital city regions – Bratislavsky kraj, Mazowieckie and Közép-Magyarország. However, unlike Prague, Vienna and Berlin all other Central European capital city regions are composed of the core city and its surroundings. Should we have data to compare the core cities themselves, the result might be different. Yet given the economic performance of the respective countries, one can estimate that Prague would still be the leader among the cities of the Visegrad countries in R&D expenditure. Regarding the Lisbon target of 3 % R&D expenditure share on GDP, it still awaits to be achieved, though Prague is not as far from it at 2.41 % as the Czech Republic as a whole at only 1.46 %.

The structure of expenditures is relatively stable with slight increase in share of natural and technical sciences (around 35 % share each) and minor decrease in other fields. With the exception of agriculture, in all fields the amount of expenditure was more than twice higher in 2008 than in 2001. An important finding is that the share of private funds on financial resources on R&D has increased from 23 % to 35 %. The amount of private funds has more than tripled. Also, the foreign funding has increased. Though still small in amount (9 % share) it has shown a sevenfold increase. At the same time, the government funds have increased only by 75 % and their share has dropped from 71 % to 56 %. Regarding the sector of performance it is also the business sector where the most significant increase occurred. The R&D expenditure in business sector has tripled and its share on total has increased from 32 % to 43 % whereas all other sectors show a decrease in share. The amount of expenditure in government sector has risen by almost 90 %. Similar value can be calculated for higher education sector (79 %). Importance of business sector clearly increased,

which is especially valuable due to the strong position of the government sector in Prague caused by high concentration of government-financed R&D institutions there.

Innovative firms, as monitored by the Czech statistical office, are significantly concentrated in Prague. Almost one third (31 %) of them is located in Prague – 2,600 out of 11,300 to be precise. Their physical closeness is one of the prerequisites for their co-operation. Similarly, the share of Prague R&D workplaces on country total was 27 % in 2008.

Prague has a special position in the administrative division of the country. It is both a city and a self-governing region. It is the only Czech region consisting of one large city. This affects statistical data and in many of them Prague scores significantly better than all remaining regions due to agglomeration effects.

What is also worth noticing is that Prague is both level NUTS 2 and NUTS 3 region. Often mentioned is the very high economic performance of Prague, making it the 12<sup>th</sup> best performing NUTS 2 region in the European Union measured in GDP per capita in purchasing power standard in 2006. However, when examining level NUTS 3 regions Prague faces some strong competitors in the Central Europe, namely German and Austrian cities with Warsaw and other Central European capitals closing up. As many NUTS 2 regions are composed of a core city and surrounding area, moving to a NUTS 3 level shows more comparable values for the core cities. On this level Prague moves down to 64<sup>th</sup> place, still ahead of other capital cities of the new member states (the runner-up being Warsaw at 76<sup>th</sup>) but behind geographically close city regions such as Munich (16<sup>th</sup>), Nuremberg (46<sup>th</sup>) or Vienna (58<sup>th</sup>).

More data could be used to further illustrate position of Prague among Czech regions, e.g. number of patents, publications and citations, participation of Prague-based organizations in various EU-funded support programmes. We think, however, that presented data already provide a picture of Prague as a city on its way to become a knowledge economy.



It is also true, that a comparison with a foreign city region, similar in size like Vienna, Munich or Warsaw, would help to provide a better perspective for evaluating the situation on an international level.

## **Analyses**

In recent years, a few analyses and surveys appeared that in some way examined regional aspects related to innovation and knowledge economy. The following articles briefly introduce their findings and conclusions.

During analytical phase of the BRIS project (Bohemian Regional Innovation Strategy, see below), analyses were elaborated of the regional infrastructure for support of innovation and of co-operation between R&D and business sphere. Some important findings became input for the Regional Innovation Strategy this project prepared. The extensive academic research infrastructure (the Academy of Sciences institutions, large public universities) was found to have relatively weak links to industrial sphere. On the other hand, those institutions take measures to improve the situation by establishing technology transfer centres and concluding co-operation agreements with large firms. This is to create conditions for innovation-based entrepreneurship and opportunities for interactions between academia and businesses. At the same time, institutional barriers were identified together with lack of interest in innovation among small and medium enterprises whose motivation to innovate is based mainly on market pull rather than on effort to form business networks [Müller 2003]. Survey among almost 500 SMEs identified some further weak spots. Absence of a framework for forming technology transfer infrastructure is considered a main barrier between research and businesses. The range of services offered by intermediary infrastructure is considered insufficient to motivate SMEs to co-operate with research institutions. Insufficient intellectual property protection is considered another important bar-

rier. It is the system of protection rather than legislation that is missing [Komárek 2003].

EU-financed project SUPER-SME<sup>1</sup> (2006–2008) analysed the R&D intermediation system in Prague and provided some basic data on the interconnections among actors relevant for the knowledge economy. It mapped existing links and supply and demand of services. Conclusions state that the intermediaries are few in number, lack certain specific know-how (intellectual property rights, licensing, legal support in creating spin-offs and start-ups) and some types of services and have insufficient funding. Structural Funds are considered an opportunity to finance a development of the intermediation system. Survey carried out in the course of the project suggested a weak link between city administration and R&D and business sphere.

Technology Centre of the Academy of Sciences elaborated an analysis of innovative potential of Czech regions. Using a multi-criteria analysis with 14 factors a compound indicator of innovative potential was calculated. Factors were composed of one or more variables. Prague scored best in 10 out of 14 factors and its innovative potential was considered high above average, the only region in this category. A high level of urbanization and the proximity of key players in the development of an innovation environment and other institutions and organizations have a strong agglomeration effect making Prague a distinct centre of development on a national level [Pokorný et al. 2008]

Survey of business environment in Prague was organized as part of preparations of the Strategic Plan update in 2008. A total of 308 firms with more than 50 employees participated in this survey. While firms respect R&D as a tool to maintain competitiveness, half of the respondents indicated that they do not co-operate with R&D institutions. Another 25% described such co-operation as average (could be seen as superficial) and

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<sup>1</sup> See project website: <http://www.e-innovation.org/supersme/index.html>

8 % as unsatisfactory. Such finding raises doubts about the readiness of firms to create higher level innovations. On the other hand, 48 % of firms described their own innovation capacities as “average” and 45 % as “very good”. Whereas this appraisal cannot be perceived as completely objective, it certainly shows a high-level of self-confidence that can turn out as a valuable capital for the future [Přikryl 2009].

These findings present a mixture of positive and negative characteristics of Prague innovation environment and suggest where the efforts for improvement should be targeted.

### **EU operational programmes**

Following the accession of the Czech Republic into the EU, Prague gained access to financial support from Structural Funds. Being the only Czech region falling under the Objective 2, the city had to prepare separate operational programmes. Under conditions set by the European Commission, about a third of the city’s population and 40 % of its area were selected to become eligible for the assistance offered by the Single Programming Document for Objective 2 (SPD 2). This programme was investment oriented and included measures focused on R&D and entrepreneurship. One half of the funding was provided by European Regional Development Fund, the other half came from national sources. The total amount of assistance was € 142.6 million. During the programming period 2004–2006, eleven R&D-related projects were successfully completed with total eligible costs of circa € 13.8 million. Two new incubators that appear in Table 1 (see above) in 2008 are among these projects, ranking among the most valued projects financed by the programme. Despite their varied scope and character, all eleven projects are considered an asset for the development of innovation infrastructure in Prague.

Another programme – Single Programming Document for Objective 3 (SPD 3) – was also drafted offering assistance for human resources

oriented projects. All city area and population were eligible in this case. Total budget of the programme was € 117.6 million with €13.7 million used for R&D oriented projects. Thirty-eight such projects were successfully completed and some of them continue to function even after the mandatory sustainability period has ended.

In the current programming period 2007–2013, two new operational programmes were prepared which are successors of those from the 2004–2006 period. Prague-Competitiveness is an investment oriented programme the scope of which is very similar to that of the SPD 2. Prague-Adaptability is a human resources oriented programme the scope of which is less broad than was the case of the SPD 3 and is more focused on the labour market. The limitations were lifted and the whole city is eligible for support under both programmes and the share of EU co-financing was increased. In case of the Competitiveness programme, two calls have already been organized resulting in 18 projects approved for financial support. Total costs of these projects amount to € 18.4 million. Total budget for R&D related projects is € 62.7 million for the whole period. The Adaptability programme offers € 48.7 million in priority 1 – Support to development of knowledge-based economy. During the first call, out of 548 submitted project applications 89 projects were approved for support under priority one with a total cost of circa € 14.7 million. Second call is in the process of project evaluation.

Worth noticing is that the operational programmes for Structural Funds are the only way in which the city budget currently participates on support for R&D sphere through project co-financing.

### **Strategic plan for Prague**

If Prague is to retain its present attractiveness it needs a development policy reflecting the above-mentioned trends and economic situation. While on the side of strategic planning the city is regarded as well-performing

and prepared it is the side of executive bodies where lack of capacities has to be dealt with. It was in the mid-90s when Prague realised the importance of strategic planning starting the way to the adoption of the Prague Strategic Plan in 2000 by the Prague Municipal Assembly. In 2008, an updated version was adopted which responds to present situation and sets new objectives for the next 10 to 15 years. This time, however, the Strategic Plan is supplemented by Programme for the Implementation of the Prague Strategic Plan for the period 2009–2015 (Implementation Programme) comprising a set of 82 main tasks to be carried out by the city administration and organizations established by the city. The Programme takes the more abstract and general approach of the Plan to a more tangible level making it easier to monitor its progress and fulfilment.

Where the Strategic Plan sets strategic objectives, the Implementation Programme follows with specific measures, actions or programmes that the city has to undertake to accomplish the objectives. Let us take a closer look at selected chapters. *Competitiveness*, the objective of which is that Prague is a prosperous city, states:

Prague is endeavouring to become a successful and competitive city with an effective economy based on its knowledge potential and functioning labour market. It wants to secure prosperity and good living conditions for its inhabitants, attract visitors and have the resources necessary to bring public projects to fruition. It wants to fulfil its role as the country's centre of innovations.

This clearly shows the city is well aware that the knowledge economy is its main field of opportunity as regards the future orientation of the city economy. Strategic objective formulated upon this vision is to *Utilize the city's potential to secure its competitiveness and prosperity*. It comprises five goals three of which are relevant for the topic of this paper. Goals are further articulated into examples of activities and principles. Here are relevant goals and activities:

*Improve economic efficiency and secure a favourable business environment*

- Aid the creation of suitable conditions for the development of small and medium-sized business operations (business incubators. advice and consultancy centres. etc.).
- Seek to boost the development of those branches of the city's economy that have strong growth potential through the city's economic policy (linking investment. property and land policies etc.).
- Provide investors, entrepreneurs and property owners with open access to all necessary information.

*Promote Prague as an innovative and enterprising centre for the whole country*

- Make fuller use of the knowledge of higher education centres, institutes of the Czech Academy of Sciences and other research and development resources, as well as the skills and qualifications of the labour force as a beneficial factor in the city's economic strength and also as a creative backup in the search for solutions to its needs.
- Support the emergence and development of centres of excellence and other entities in the knowledge-based sector, and prepare favourable conditions for their implementation in the European research area and appropriate involvement in the realization of strategic projects.
- Support comprehensive research, development and production facilities (e.g. science and technology parks, sectoral innovation centres and clusters) locally and functionally integrated with the natural science and technology departments of higher education institutions and other Prague-based centres of research.

- Implement the tried and tested measures that are proposed in the Regional Innovation Strategy for Prague and secure the co-ordination of activity that falls within the city leadership's purview.

*Forge new quality partnerships with the public and private sectors; improve Prague's profile as a good business partner*

- Work on providing a transparent system of communication between public and private sectors along with an effective information system for the city's development goals, technical regulations concerning land use and procedural rules.
- Prepare and implement a programme of partnership between the city administration and institutions that represent the business sector (the Prague Chamber of Commerce, business associations, etc.); include this among the main activities of the regional development agency.

Furthermore, chapter *People in Prague* also includes goals and activities contributing to the process of Prague becoming a knowledge region.

*Strengthen Prague's traditional standing as a centre of education and humanities*

*Link up universities with scientific research institutes*

- Integrate the teaching, study and accommodation capacities; functionally and spatially link up universities with science and research institutes.
- Maintain and further localize higher education institutions in the inner city.
- Build a new university campus.

Some other chapters, e.g. *Prague in a new Europe* could be mentioned as well. But we kindly ask the reader to refer to the document itself for more detailed information.

Such goals require not only an active approach of the city but of all other relevant stakeholders as well. And many of them, such as universities, research institutes and firms, have their own development strategies that are in line with the Strategic Plan and can contribute to make Prague a knowledge region. Strategic Plan is a roadmap for common effort to achieve goals that many will benefit from. As for the city administration itself, the Implementation Programme says what its first steps to accomplish strategic goals are. The development of knowledge-based economy can benefit most from the completion of the following tasks:

*Establishing of Prague regional development agency*

The agency will focus on support of small and medium enterprises and development of innovation infrastructure and regional sectoral clusters and on support of business incubators and science parks. Other activities shall include co-operation on projects of brownfields reclamation, searching for suitable investors and methodical presentation of Prague as a place for doing business.

*Preparation of City programme for support of entrepreneurship*

Program will be managed by the agency. Analysis is underway as regards the focus and scope of this programme, available funds and forms of co-operation with other actors related to business environment in the city.

*Establishing of Regional Council for Research and Innovation*

The council should serve as a dialogue platform between the city and all actors of the innovation process. It is expected to be an advisory body to the city government.



### **Regional innovation strategy**

Regional innovation strategies (RIS) are considered a key tool for development of knowledge-based economies. Taking advantage of the support offered by the EU Framework Programme a project called BRIS (Bohemian Regional Innovation Strategy) was launched in 2002. Two Czech cities, Prague and Pilsen, participated in it and formulated their first Regional Innovation Strategies. In 2004, the project successfully reached its goal and Prague got its RIS. However, contrary to original expectations, the RIS was not discussed in and adopted by the Municipal Assembly and did not become a binding document for the city government. Despite this fact, it was implemented to some extent and was valued among experts in the field.

The structure of the RIS comprises seven thematic areas with a total of fifteen measures. Here is the list of thematic areas and measures:

#### *Competitive sector of innovative enterprises*

- Support to the formation and development of regional clusters
- Support to progressive and hi-tech branches in the region

#### *Active involvement of the R&D base in the development of innovative entrepreneurship*

- Strengthening technology transfer, commercialization of R&D results and cooperation between R&D institution and the business sphere
- Support to establishing spin-off companies
- Greater involvement of enterprises in R&D activities at both regional and European level

#### *Human resources for innovation*

- Training system for dynamic labour market
- Lifelong learning for a knowledge-based economy

*Consulting services and infrastructure of innovation*

- Development of regional innovation infrastructure
- Qualified consulting services for innovation

*Financing innovation*

- Public financial support to innovation, entrepreneurship and building the innovation infrastructure
- Stimulation of the use of commercial resources for innovation

*Innovation as a part of regional development*

- Innovation culture and framework conditions for innovation
- Coordination of activities and strategic management of regional development in the field of innovation

*Interregional cooperation (horizontal theme)*

- Cooperation with EU regions and transfer of time-tested practices
- Prague – national initiation and innovation centre

Clearly, the scope of the strategy was ambitious. To further specify initial steps to be taken, an Action Plan was prepared as a part of the RIS consisting of 14 pilot projects to put the strategy implementation in motion. Most of the projects were managed by those who participated in the BRIS project itself. Selected pilot projects were prepared in a way that they complied with the conditions of the EU Structural Funds operational programmes and were thus partly financed by the EU. This was the case of five pilot projects carried out with the support from Prague Single Programming Documents for Objectives 2 and 3 for the period 2004–2006. Four other projects were also completed. One project not yet launched (Regional Council for Research and Innovation) is now part of the Implementation Programme of the Strategic Plan in the framework of which the update of the RIS is also planned. Implementation of the proposed measures has yet to be evaluated. Since there is no managing body co-

ordinating the implementation, measures that could be found as applied are results of individual activity of the respective stakeholders rather than results of a concerted effort.

### **Discussion and conclusions**

Even with the many positive features of innovative and knowledge-based economy Prague possesses, the support of this field should not remain unaddressed. After transition from industrial economy to one based on services and knowledge, research and innovation are one of the resources for future competitiveness. One for which Prague has good preconditions. This field has an increasing importance for competitiveness and employment, it creates added value, it has a potential to come up with internationally competitive products and services and to use Prague's highly skilled workforce. Since other regions take steps to reflect the new situation as well, Prague could begin to lose its position as an innovative centre of the country, if it does not take advantage of its qualities and predispositions.

The state of innovative environment in Prague also influences its attractiveness for foreign investors and multinational corporations. It can further support present attractiveness given by Prague's social capital, highly developed sector of services and the effective demand of its inhabitants. An opportunity for future orientation of city marketing towards investors can be found here.

Prague certainly is an unparalleled R&D and knowledge core of the country, yet it lacks some beneficial tools other regions already use. At the level of city government, for instance, there is no councillor responsible for R&D and innovations and no department or agency with this competence. This is to change if the city accomplishes the tasks set in the recently adopted Implementation Programme of the Strategic Plan. Then the city should be better able to help influence future development of the regional economy.

Data is not abundant on the development of the business networks and linkages. An intermediary system of technology transfer seems to be one of the key missing elements. However, apart from certain support infrastructure providing basic services the large universities actively co-operate with firms, often the large ones or the more specialized ones. Setting up of university spin-offs, as a progressive way of spreading innovation, seems to require a legislation change to become regularly used. Needless to say that funding of innovation remains also a problem, mainly among SMEs. Ways to stimulate the inflow of venture capital need to be found.

As some scholars suggest, innovation system does not respect the administrative boundaries of cities and regions. Therefore, attention should be paid to co-operation with the Central Bohemia region, in which, for instance, some large R&D infrastructure projects are planned under the Operational Programme Research and Development for Innovations. This region is naturally linked to Prague in almost all aspects of economic life. And unlike Prague it still has land available to place larger facilities like science parks or university campuses.

It is apparent that Prague city government could support city's transition into a knowledge-based economy to a larger scale. Especially in time of economic recession with plenty of negative consequences for the country and the regions, this support seems all the more suitable and urgent. The more so as it is in this EU programming period when Prague has access to European funds in a scope that will never be the case again in the future. Present state of preparations for EU cohesion policy after 2013 suggests that R&D and innovation could be one of the very few themes under which Prague will remain eligible for EU financial support. To have a functioning innovation infrastructure would be a good condition for sufficient absorption capacity for future operational programmes.

The concept of knowledge city is a valid theoretical tool we can study on the case of Prague. While structural data seem to be easy to access allowing us to describe the present state and to some extent the recent

development, it is the functionality of the innovation environment that presents an assessment challenge. Extensive surveys among innovation producers and users seem like a suitable instrument to explore the linkages among all stakeholders. Use of these tools for analytical purposes allowed the city to prepare a vision for the future. Ample human resources and social capital are at hand to gradually transform the city into a knowledge-based economy.

***Jakub Pechlát** works as a specialist for Prague city development strategy in the field of R&D and innovation environment. He participates on elaboration of Prague Strategic Plan, EU Operational Programmes and related analytical and strategic documents.*

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