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Use of innovation vouchers for the regional innovation environment development

Abstract. The author examines the evaluation of the regional innovation system in the Czech Republic and focuses on the assessment of the public policy tool known as the innovation voucher. Using the Ústí Region as an example, the article aims to analyze the Innovation Voucher Programme and the group of companies that used the vouchers, and whether these companies have the potential to grow while positively impacting the growth of the region's economic potential. Based on the analyses of the business results, it was found that the Innovation Voucher Programme supported the growth of the companies, which now achieve better economic results and have improved efficiency including the creation of new jobs. It can be concluded that the Innovation Voucher Programme strengthens the innovative companies' development and contributes to the sectoral restructuring of the region, which, due to its historically significant mining and heavy industry, needs development of innovative companies in new sectors with growth potential.

Keywords: Innovation Voucher; Czech Republic; Region; Ústí Region; Innovation Policy; Regional Innovation System

JEL Classification: O33; O38; R58

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Використання інноваційних ваучерів для розвитку регіонального інноваційного середовища

Анотація. У статті розглядається регіональна інноваційна система в Чеській Республіці та зосереджено увагу на оцінці такого інструменту державної політики, як інноваційний ваучер. Використовуючи регіон Усті як приклад, аналізується Програма інноваційних ваучерів та її застосування компаніями регіону, а також те, чи позитивно вона впливає на зростання економічного потенціалу регіону. На підставі аналізу бізнес-результатів програми було виявлено, що вона підтримала зростання компаній: нині вони досягають кращих економічних результатів і підвищують ефективність, створюють нові робочі місця. Можна сказати, що Програма інноваційних ваучерів зміцнює розвиток інноваційних компаній і сприяє секторній реструктуризації регіону, який, зважаючи на наявність історично значимих галузей гірничодобувної та важкої промисловості, потребує розвитку інноваційних компаній у нових секторах із потенціалом зростання.

Ключові слова: інноваційний ваучер; Чехія; регіон; інноваційна політика; регіональна інноваційна система.

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Использование инновационных ваучеров для развития региональной инновационной среды

Аннотация. В статье рассматривается региональная инновационная система в Чешской Республике и сосредоточено внимание на оценке такого инструмента государственной политики, как инновационный ваучер. Используя регион Усти в качестве примера, анализируется Программа инновационных ваучеров и ее применение компаниями региона, а также то, положительно ли она влияет на рост экономического потенциала региона. На основании анализа бизнес-результатов программы было выявлено, что она поддержала рост компаний: сейчас они достигают лучших экономических результатов и повышают эффективность, создают новые рабочие места. Можно сказать, что Программа инновационных ваучеров укрепляет развитие инновационных компаний и способствует секторной реструктуризации региона, который, принимая во внимание наличие исторически значимых отраслей горнодобывающей и тяжелой промышленности, нуждается в развитии инновационных компаний в новых секторах с потенциалом роста.

Ключевые слова: инновационный ваучер; Чехия; регион; инновационная политика; региональная инновационная система.

1. Introduction and Brief Literature Review

Significant factors which strengthen the regional innovation environment (Doloreux 2002) [7] include the functional transfer of R&D and different types of innovation (Strahl & Sobczak, 2017) [19] in the production process. The trend in recent years in the development of the region's innovation environment is to seek appropriate tools to ensure the innovative, and therefore economic, development of companies in the region. In practice, one of these tools is the innovation vouchers, which can be used as a technology transfer tool because the technology transfer itself can be defined as a goal-directed process leading to product and technology innovation (Audretsch & Caiazza 2016) [1].

The innovation vouchers were the focus of the studies by e.g. Sala, Landoni and Verganti (2015) [18], Langhorn (2014) [13], Hemert, Nijkamp & Masurel (2013) [11], who show the ability of SMEs to flexibly develop innovation in collaboration with the research organizations. Application of the innovation voucher tool is connected with introducing of such concepts as regional innovation systems (Cooke, Uranga & Etxebarria, 1997) [4], clusters and networking (Bathelt, Malmberg & Maskell, 2004) [2] and the triple helix (Etzkowitz & Leydesdorff, 2000) [9], according to which public administration should actively promote innovative changes in the regions. The regional innovation systems are developed on the basis of identifying key actors' interconnections,

concordance about the problems, and priority projects on the basis of the region's innovation potential (Kozun-Cieslak, 2016) [12]. The innovative infrastructure itself means a system of relationships among individual research, production, business, and other entities. These relationships are characterized by cooperation and aim to increase the innovative potential of the companies and the performance of the region's innovative environment. Therefore, acquiring of public support in the form of an innovation voucher is, in practice, conditional upon the involvement of a research institute in addressing the issue at which the innovation voucher is targeted.

The innovation vouchers programme is widely used in many countries, for example, Ireland, the UK, the Netherlands, Italy, and Finland, where companies usually receive financial support of around EUR 10,000 although the level of state support can greatly differ. The Netherlands was one of the first countries where the innovation voucher was first granted (Cornet, Vroomen & Van der Steeg, 2006) [5], specifically in the province of Limburg in 1997. At that time, the support was given to small and medium-sized enterprises, which cooperated with research organizations. In Austria, the innovation vouchers were first provided to businesses in 2007, and in Switzerland in 2009 (Good & Thieffenthaler, 2004) [8] where they were intended to stimulate knowledge transfer in order to reduce the differences in the knowledge capital of research organizations and small and medium-sized enterprises. However, the aggregated data for national innovation vouchers granted is not available, as this instrument is funded from various sources of public budgets at the EU, national, and regional level.

The Innovation Voucher Programme is often aimed at companies with innovative potential, which in the research area are referred to as innovative companies. According to the Czech Statistical Office (2017) [6], innovative companies are generally considered to be those which, in order to maintain or expand their competitive position, innovate original products or develop brand new products up to the stage of commercial maturity and marketing. The corporate innovation potential, in such a way, is the ability of the companies to create, receive, and disseminate technical and non-technical innovations at the microeconomic level. By contrast, at the macroeconomic level, the innovation potential of the region is not only the capacity of the region to generate new technologies, but also the ability to support their subsequent application in order to maintain the competitiveness of their economic base. If the company introduces new products to the market, the introduction of new procedures alone can increase productivity in the region. The innovation voucher provided can be an important tool which contributes to higher product quality, increased level of the value-added product or cutting the costs and increasing the market potential.

There are many factors influencing the innovation process, such as regional structure, entrepreneurship skills, and the rate of development of the regional innovation environment (Žitek & Klímová, 2017) [21] in conditions when pressure from the international competition is carried forward to the regions (Nijkamp, Zwetsloot & Van Der Wal, 2010) [15]. According to Blažek (2012) [3], the hierarchic level drop is associated with the importance of individual stakeholders and their capabilities. For example, for innovative start-ups, the beginnings are very challenging and often have to deal with a number of difficulties and obstacles. They usually lack a sufficient number of qualified workers, in-house research and development, investment capital and the knowledge required for processing different projects and making appropriate contacts with the relevant institutions to obtain the necessary information. In many cases, the companies lack the relevant knowledge to turn their own ideas into market success.

Another problem of innovation process development at the regional level according to Sucháček (2013) [20] is that, in many cases, cities and regions do not have a procedure defined for dealing with investors, which reduces their potential to attract investment and support the development of innovative business for the companies.

From the point of view of the use of innovation vouchers, innovation of a technical nature, which mainly acquires variants of products or process innovation, is prioritized. Its purpose is to guide the company to create a new or substantially

improved product or innovate the production process in order to improve the quality or efficiency of production. Viewed from a different perspective, the innovation vouchers are also provided to support the development of innovations defined in the Oslo Manual of OECD (1992) [17] as an innovation of a product with improved functional properties. The technological innovation process then consists of the introduction of either new or substantially improved manufacturing or implementation techniques.

2. Therefore, **the purpose** of the article is to process the analysis of companies using innovation vouchers at the time prior to granting the innovation voucher and during the year when the innovation voucher was drawn. The objective is to analyze the types of the companies that use the innovation vouchers by selected economic criteria and whether they are companies with growth potential that influences the competitiveness of the Ústí Region of the Czech Republic.

The common and distinctive characteristics of the individual indicators will be identified and the innovation voucher tool will be evaluated in terms of its contribution to the economic restructuring of the Ústí Region. This region is characterized by traditionally highly-developed coal mining and heavy industry, which is undergoing a transformation of its economic and social structures (Kačírek, 2015; Novák & Drdová, 2013) [11; 16]; the application of the innovation vouchers is very important for this region because it is expected that the support for innovative companies will aid the sectoral restructuring and competitiveness of the region in new sectors.

3. Roles of the innovation policy and tools for supporting innovative companies

The growth of innovation potential is significantly linked both to economic growth and to the setting up of an innovation policy mechanism. The overall innovation infrastructure of the Czech Republic is influenced by the development of the regional innovation infrastructures under the regional innovation strategies currently being prepared by all the regions. The innovation infrastructure of the regions is very similar to The Czech Republic's innovation infrastructure. The only difference is that the Regional Development Agencies (Regionální rozvojová agentura - RRA), the regional bodies and regional offices of the Association of Innovative Entrepreneurship of the Czech Republic (AIP ČR), also operate at the regional level. The innovation potential of the Czech Republic is subsequently created by all the entities that form a part of the Czech Republic's innovative infrastructure.

The priority task of public policy is to create functional tools to support and develop the innovation environment. The problem of the Czech economy and other transition economies is the underdeveloped innovation environment and weak innovation potential of the companies. The innovation policy of the region, represented in the Regional Innovation Strategy document, is an endogenous tool for the innovative growth of the regions consisting of support for the innovation activities of the companies joining under the regional innovation system with public and scientific research institutions.

Direct financial support from the state budget is represented by the tools considered to be one of the pillars of the innovation policy instruments and are received by the innovative companies either in the form of targeted support or institutional support. The subject of the targeted support is to finance the development of the innovations through grant projects from the Grant Agency of the Czech Republic or the Technology Agency of the Czech Republic, where different mechanisms and programme challenges are set for basic or applied research. One of the policy tools is innovation vouchers. There are various programmes in the Czech Republic and abroad that include innovation vouchers.

Innovation vouchers are provided at national and regional level, where they are linked to the National Innovation Strategy and the regional innovation strategy of the regions. The largest sources for financing the innovation vouchers are allocated in this operational programme coordinated by the Ministry of Industry and Trade of the Czech Republic; for example, 200 million CZK (approximately EUR 8 million) became available for the financing of the innovation vouchers in 2017.

The Czechinvest Investment and Business Development Agency oversees the innovation voucher support programme, which allocates EUR 13.9 million for the years 2014-2020. The programme aims to promote business investment in research and innovation in cooperation with universities and research centres. Most regions in the Czech Republic use the innovation voucher programme with the voucher programmes funded from the budgets of individual regional authorities, which annually finance the voucher programme with several million of CZK. There are differences in the use of innovation vouchers among the regions in The Czech Republic, with the South Moravia Region having the most experience because the innovation vouchers have been introduced there since 2009. Most of the other regions in the Czech Republic begin to offer the innovation vouchers over the following years.

Innovation Voucher Programme of the Ústí Region since 2015 has been focused on creating and developing the conditions for cooperation with universities. The targeted form of support is institutional support which consists of funding public and private R&D organizations. A separate form is also an indirect financial support from the state budget, which aims to create and develop innovative environment and innovation processes at national, regional, and local level, and plays a vital role in the Czech Republic's innovation policy mechanism. It is implemented in the form of financial rebates, for example by lowering customs, tax and other rates and fees to the innovating firms.

The enumeration of such public administration activities in the Czech Republic shows that the support for innovative solutions is considered both significant and necessary for the further growth of the innovation potential of the companies and thus the competitiveness of the regions.

4. Research methodology

Mapping the effectiveness of the innovation vouchers provided and their direct impact on the company's economic situation can be relatively complex. Monitoring the impact of innovation vouchers on changes to the product features or the production process requires detailed and internal company information. Based on the data from the financial statements, it is possible to assess the economic situation of a company in the years prior to the drawing of the voucher and in the 2015 financial statements when the innovation voucher was drawn. Data from the 2016 financial statements is currently only publicized partially and only available to a limited extent, so the information would not be sufficiently representative.

The analysis is based on the results of the innovation voucher programme for the Ústí Region in 2015. In 2015, a total of 45 applications were submitted, of which 29 were selected to grant support in the form of the innovation voucher. The basis for the evaluation of the economic development of the companies was the creation of a database of supported entities, which could be searched for data from the financial statements of the companies. On the basis of the supported companies that benefited from the innovation vouchers, the database of companies was developed for which the performance indicators were monitored. Some companies had to be removed from this assessment due to the unavailability of their financial statements; therefore, the file size reaches about three quarters of the underlying group.

5. Analyses of the innovation voucher programmes and the companies involved

The research for the innovation vouchers was conducted in 2017, and was implemented through the primary data from the Innovation Voucher Programme for the Ústí Region (Figure 1).

The branch structure of the companies is shown in Figure 2. It is clear from the data in the Figure 2 that the innovation vouchers were most often used by mechanical engineering companies, accounting in 2015 for approximately 1/3 of all the entities, followed by IT,



Fig. 1: Location of the Ústí Region in the Czech Republic
Source: Own elaboration based on software RegioGraph Planning

and chemical companies. In 2016, the representation of the industries was even more balanced, with most of the innovation vouchers being drawn by the companies operating in electrical engineering, electronics, mechanical engineering, and chemical industry. However, it should be noted that the definition of the field of study of the projects cannot be unambiguous, because a company could use the innovation voucher in the secondary activities different from its main focus.

The position of the company in the production chains also plays the role. It can be an environmentalist company delivering innovative solutions for the chemical industry. However, the specified structure is based on the focus of the innovation voucher and the sectoral area where the innovation voucher was applied. For example, company Constellium Extrusions Děčín in cooperation with the Faculty of Environmental Science of Jan Evangelista Purkyně University in Ústí nad Labem (UJEP), implemented a project using an innovation voucher aimed at improving the efficiency of wastewater treatment plants in the company's premises, where environmental pollutants were needed to be removed from the wastewater. The project helped to improve the quality of the water discharged into the in-house and urban sewer systems.

Another example is the innovation voucher for TOS VARNSDORF and the Czech Technical University, which cofinanced the development of a new machining centre for a larger sized milling machine. The project has enabled data to be acquired important for launching the development of the new machining centre to expand the company's product portfolio of machine tools.

Abovementioned innovation voucher projects are examples of activities that help to improve the quality of the

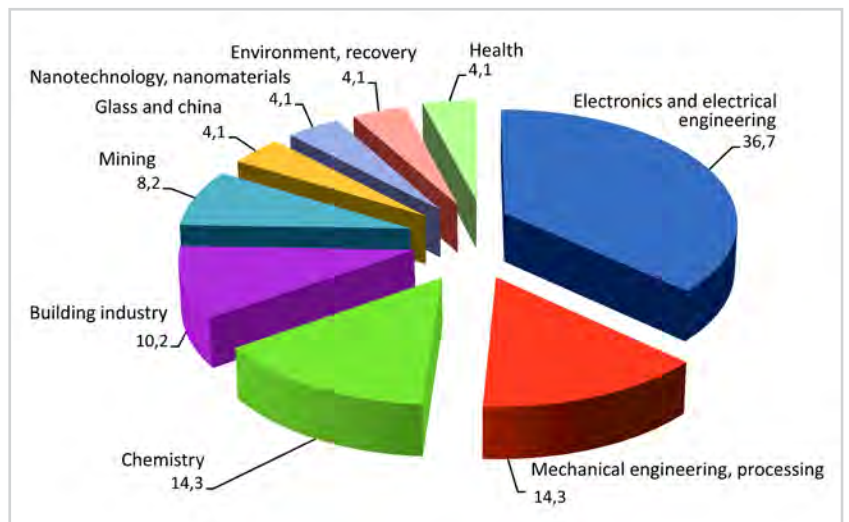


Fig. 2: Branch focus of the companies applying for the innovation vouchers in 2015 (in %)

Source: Own research

environment, which has been much deteriorated in the Ústí Region, due to its strong industrial history. The second project also represents innovation vouchers that contribute to product innovation and greater business competitiveness. The Ústí Region shows an above-average share of industrial activities, including higher employment in industry, and that is why it is important for the region to support the growth of industrial firms' competitiveness.

A condition for companies that have been granted innovation vouchers was the obligation to draw the vouchers within the framework of the development of co-operation with a R&D institution, thus, developing intersectoral cooperation with the benefits for the participating stakeholders, in such a way,

- Czech Technical University in Prague was involved in 13 submitted projects,
- Jan Evangelista Purkyně University in Ústí nad Labem - in 8 projects,
- Brno University of Technology - in 3 projects,
- Technical University in Liberec - in 3 projects,
- University in West Bohemia - in 3 projects,
- University of Chemistry and Technology - in 2 projects,
- other public universities - in 8 projects. There were also eight applications for innovation vouchers in cooperation with private research organizations.¹

From the point of view of the institutions involved, the weak research potential of the region is obvious, as the number of applications for innovation vouchers involving the university in the region only accounted for 28% of all applications. Only about a quarter of applicants planned to work with a research organization in the Ústí Region. This corresponds to the information obtained during negotiations with the companies, who pointed to the fact that the research organizations in the Ústí Region and their specializations only partially correspond to the needs of the companies in the region.

The analysis of the economic performance of the companies was based on several economic indicators. The first was the output consisting of the sum of the sales of own products and services and the change to inventory; the second was the consumption from operation representing the sum of the costs incurred for the purchases of materials, energies, and services; the third was the book value added, which is the difference between the outputs and the consumption from operation; and the fourth was the total personnel expenses of the company.

The graphs in Figure 3 and Figure 4 show several development trends that are obvious in the economic indicators used. Between 2013 and 2015, consumption from operation grew by 26% and book value added also grew, which increased by about one quarter from 2013. Increase was also seen in personnel expenses, which grew by 9% between 2013 and 2015. The growth of economic indicators also corresponds to the human resources area, as the group of the companies which have drawn the innovation vouchers in aggregate data also shows a headcount growth.

The achieved profit before tax increased most of all for the monitored indicators over a three-year period; the total value of the group of companies that benefited from the innovation vouchers has increased by 85%. The growth was also statistically higher in the added value per employee calculation, which increased by 18% between 2013 and 2015, which was influenced by the headcount growth and rising costs. On the other hand, this is balanced by higher revenue growth, which increased the added value. The growth rate, however, represents the growth in

¹ More information on the subjects of innovation infrastructure you can find at the webpage of the Innovation Centre of the Ústí region: <http://icuk.cz/en-innovation-infrastructure>

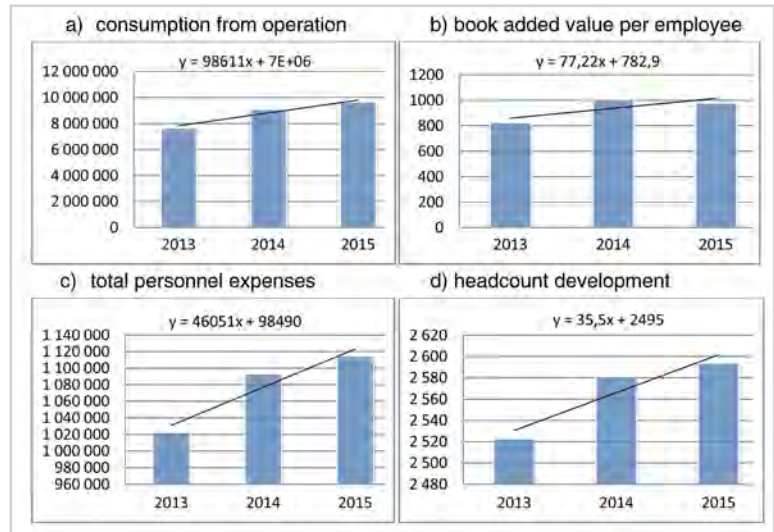


Fig.3: Development of the companies that drew innovation vouchers in 2015 (I.) (in CZK)
Source: Own research

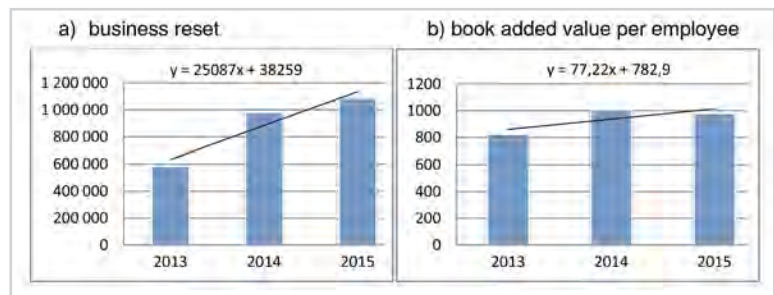


Fig.4: Development of the companies that drew innovation vouchers in 2015 (II.) (in CZK)
Source: Own research

efficiency and performance of the companies in the Ústí Region which received innovation vouchers.

Generally, if we evaluate the results of the Innovation Voucher Programme for the Ústí Region, it can be said that the support was mainly directed towards companies with innovative assumptions that have the potential for further economic growth. The innovation vouchers play their role, usually contributing to the growing companies that grow in the summary of the economic indicators, and increase the availability of jobs.

The innovation vouchers have contributed to stimulating the development of new technologies and implementing innovative solutions in the manufacturing processes of the companies.

6. Conclusion

The direct impacts of the drawn innovation voucher are relatively marginal with respect to the level of funds provided for the voucher in the overall financial management of the company. Monitoring of the economic results for a voucher per company was aimed at assessing the quality of the company and its ability to grow on the domestic and foreign markets. As far as the goal of the article was to analyze the activities of the companies drawing the innovation vouchers and assess their growth potential, it can be concluded from the companies' indicators that the Innovation Voucher Programme encouraged companies to grow, and they are now achieving better economic results and creating more jobs. In other words, the innovation vouchers were drawn by companies with above-average growth and innovation potential.

The innovation vouchers have helped the growth in the quality and quantity of those companies that have the prerequisites for further comprehensive development and market strengthening. From the point of view of the structure of the supported companies, the innovation vouchers were also drawn up by the entities that contribute to the sectoral restructuring of the Ústí Region's economy.

On the basis of the investigation into the effectiveness of the innovation vouchers in the Ústí Region, an increase in the amount provided under the innovation voucher can be recommended. The results of the investigation and communications with companies that have been granted the innovation voucher show that low financial limits restrict the development of the cooperation among the companies and scientific research institutions. The concept of the innovation voucher can be considered appropriate, and the relatively straightforward completion of the application for the innovation voucher is greatly appreciated. The innovation vouchers are widely accepted by the companies, which leads to their continued interest in the programme over the coming years.

Matulova, Stemberkova, Zdralek, Maresova and Kuča (2015) [14] state that 17 out of 100 companies benefited from the innovation voucher, continued to cooperate with a partner research institution even after the end of the drawing of the innovation voucher. The added value of the innovation vouchers was, among others, the establishment of new business contacts with research institutions that were directly involved in the solution of tasks along with outputs and innovative solutions which were directly applied in production and emerged from the mutual cooperation. It also shows that mobility among the businesses and the academic sphere is still underdeveloped in the Czech Republic due to weak interaction in the private sphere, universities, and research institutions. Therefore, the innovation vouchers should help developing stronger links between firms and research institutions with support from the public sector. Another recommendation for the further development of the Innovation Vouchers Programme in the Ústí Region will be to increase the promotion of this programme.

Interviews with project recipients indicate that companies appreciate the easier accessibility of the innovation voucher

compared to the project-based grant agenda. It proves to be true, however, that companies consider the process as a complex one, as indicated by Sala, Landoni, and Verganti (2015) [18]. Also, as evidenced by the interviews with the business representatives, the innovation vouchers also have the strategic potential to initiate and develop cooperation between businesses and research institutions, which can develop into long-term and mutually beneficial cooperation.

The Innovation Voucher Programme can be considered to be an effective tool for the development of the inter-sector cooperation among universities, research institutions and the business sphere of the Ústí Region. The Innovation Voucher Programme also creates the database of innovative companies that can develop communication through the vouchers even after the end of the programme. This can fulfil the principles of development of a regional innovation system and integrate the business sphere on a collaborative basis with the R&D and university institutions with the support of the regional government.

From an economic point of view, the innovation vouchers as an instrument of public support can positively contribute to strengthening the position of the companies on the market and thus provide a definite competitive advantage to the companies that draw the innovation vouchers. For further growth of the innovative potential, companies should be supported from public resources in the coming years in order to help restructure regional economies while employing modern technologies and services.

Another recommendation for the research into the benefits of the innovation vouchers for business development will be the analysis of their economic performance in the years following the granting of the innovation voucher, especially of the economic indicators that monitor productivity growth and strengthening of their market position and competitiveness.

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